ASSPs

Audio & Video Equipment ICs

TV Set ICs (Microcontroller, PIF, SIF, Video, Chroma and Deflection ICs)

Part Number	OTP	Package	Functions/Features	Operating Supply Voltage Range
TMPA8812CxDNG	TMPA8812PSNG	P-SDIP56-600-1.78	NTSC system, CCD, EW	8.55 to 9.45 V 4.75 to 5.25 V 3.1 to 3.5 V
TMPA8821CxNG	TMPA8821PSNG	P-SDIP64-750-1.78	PAL/NTSC/SECAM systems (built-in 1HDL), CCD	
TMPA8823CxNG			PAL/NTSC systems (built-in 1HDL), CCD	
TMPA8827CxNG	TMPA8827PSNG		PAL/NTSC/SECAM systems (built-in 1HDL), CCD, EW	
TMPA8829CxNG			PAL/NTSC systems (built-in 1HDL), CCD, EW	
TMPA8857CxNG	TMPA8857PSNG		PAL/NTSC/SECAM systems (built-in 1HDL), CCD, EW, sync out	
TMPA8859CxNG			PAL/NTSC systems (built-in 1HDL), CCD, EW, sync out	

x: Mask ROM size (KB) S: 64, R: 56, P: 48, M: 32

(PIF, SIF, Video, Chroma and Deflection ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA1201CN	P-SDIP56-600-1.78	Single-chip CTV	NTSC system, I^2C bus supported, TA1201AN derivative	8.5 to 9.5 V
TA1268N	P-SDIP56-600-1.78		NTSC system, I^2C bus supported, TA1201AN derivative	8.1 to 9.5 V
TB1238AN/BN	P-SDIP56-600-1.78		PAL/NTSC systems (built-in 1HDL)	8.5 to 9.5 V
TB1240AN	P-SDIP56-600-1.78		PAL/NTSC systems (built-in 1HDL), EW	8.5 to 9.5 V
TB1251CN	P-SDIP56-600-1.78		PAL/NTSC/SECAM multicolor systems, Ycbcr input	8.55 to 9.45 V
TB1253AN	P-SDIP56-600-1.78		NTSC system, Ycbcr input	8.5 to 9.5 V
TB1254AN	P-SDIP56-600-1.78		PAL/NTSC/SECAM multicolor systems, Ycbcr input	8.55 to 9.45 V
TB1261ANG	P-SDIP56-600-1.78		PAL/NTSC/SECAM multicolor systems	
✧ TB1261AFG	P-QFP80-1420-0.80F			
** TB1262ANG	P-SDIP56-600-1.78		PAL/NTSC/SECAM multicolor systems, designed for Europe	
✧ TB1262AFG	P-QFP80-1420-0.80F			

✧: Dry-packed product **: Under development

(Video, Chroma and Deflection ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8745EN	P-SDIP54-600-1.78	Video, chroma and deflection	NTSC system	10.8 to 13.2 V
TA8801AN	P-SDIP36-500-1.78		NTSC system	10.8 to 13.2 V
TA8845BN	P-SDIP64-750-1.78		NTSC system, I^2C bus supported	10.8 to 13.2 V
TA1252AN	P-SDIP56-600-1.78		NTSC system, built-in deflection distortion corrector, I^2C bus supported	8.1 to 9.9 V
TA1276AN	P-SDIP56-600-1.78		PAL/NTSC systems (base band delay), double-speed YUV processing, I^2C bus supported	8.7 to 9.3 V
TA1276AF	P-QFP80-1420-0.80F		PAL/NTSC systems (base band delay), double-speed YUV processing, I^2C bus supported	8.7 to 9.3 V
TA1298AN	P-SDIP56-600-1.78		PAL/NTSC systems (base band delay), double-speed YUV processing, I^2C bus supported	8.7 to 9.3 V
TA1298BN	P-SDIP56-600-1.78		PAL/NTSC systems (base band delay), double-speed YUV processing, I^2C bus supported	8.7 to 9.3 V
TB1226DN	P-SDIP56-600-1.78		PAL/NTSC/SECAM multicolor systems (built-in 1HDL), I^2C bus supported	8.5 to 9.3 V
TB1227CN	P-SDIP56-600-1.78		PAL/NTSC/SECAM multicolor systems (built-in 1HDL), I^2C bus supported	8.5 to 9.3 V
TB1229DN	P-SDIP56-600-1.78		PAL/NTSC systems (built-in 1HDL), I^2C bus supported	8.5 to 9.3 V
TB1230AN	P-SDIP56-600-1.78		PAL/NTSC systems (built-in 1HDL), I^2C bus supported	8.5 to 9.3 V
TA1310N	P-SDIP56-600-1.78		NTSC system, I^2C bus supported, built-in deflection distortion corrector, YUV input	8.7 to 9.3 V

(Liquid Crystal TV ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8819F	P-SSOP30-375-1.00	Liquid crystal TV IC	NTSC video, chroma, sync. regeneration	3.5 to 7.5 V
TA8795BF	P-QFP60-1414-0.80F		PAL/SECAM/NTSC multicolor systems, also useful for M/N-PAL	4.0 to 5.5 V
TA8696F	P-SSOP30-375-1.00		LCD gamma correction driver	3.5 to 7.5 V
✧ TA1204AF	P-QFP44-1414-0.80F		LCD gamma driver, 2 linear inputs	4.5 to 5.5 V 12.5 to 13.5 V
TC90A64AF	P-LQFP144-2020-0.50A		YC separation, color demodulation, gamma correction, image quality adjustment Liquid crystal display 480 dots × 234 lines, 400 dots × 234 lines (for Toshiba liquid crystal panels TFD65, 70 and 80)	2.3 to 2.7 V 3.0 to 3.6 V

✧: Dry-packed product

(Color Decoder/Backend Processor ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TA1340F	P-SSOP30-375-1.00	Color decoder	NTSC system, Multi-point scan sync deflection & generation, I^2C bus supported	4.7 to 5.3 V 8.7 to 9.3 V
TA1383FG	P-SSOP30-375-1.00		NTSC system, Multi-point scan sync deflection & generation, I^2C bus supported	4.7 to 5.3 V 8.7 to 9.3 V
TA1270BF	P-QFP48-1014-0.80		PAL/NTSC systems, 2-input 1-output YUV switch. I^2C bus supported	8.5 to 9.5 V 4.7 to 5.3 V
✧ TB1274AF	P-QFP48-1014-0.80		PAL/NTSC/SECAM color TV video, chroma, sync processing IC	4.75 to 5.25 V
✧ TC90A92AFG	P-QFP100-1420-0.65Q		3D YC separation, multicolor version 3-line YC separation, PAL/NTSC/SECAM systems, digital color decoder, digital format 601656 outputs, 10-bit ADC	1.3 to 1.65 V 2.3 to 2.7 V 3.0 to 3.6 V
TA1316AN	P-SDIP56-600-1.78	BEP	High-performance RGB processor, multi-point scan (D4 pin)	8.5 to 9.1 V 1.8 to 2.2 V
TA1360ANG/ ✧ TA1360AFG	P-SDIP56-600-1.78 P-QFP80-1420-0.80F		High-performance RGB processor, multi-point scan (D4 pin)	8.5 to 9.1 V 1.8 to 2.2 V

✧: Dry-packed product

(Flat Panel Display ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TC90203	TBGA352	Flat panel display IC	3DYSC, color decoder, I/P conversion, scaler, RGB processor	3.3 V 2.5 V 1.8 V
TC90A94TB	TBGA480		I/P conversion, scaler, image quality processing, RGB processor	

(Scanning Rate Converter ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TC90A85AF	P-LQFP208-2828-0.50B	Progressive scan IC	Motion-adaptive I/P conversion, PAL100 conversion, 3D NR, 64-Mbit SDRAM	3.0 to 3.6 V 2.3 to 2.7 V

✧: Dry-packed product

(Synchronization, Deflection and Vertical Drive ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8403K/8427K	P-HSIP7-2.54B	Deflection block	CTV vertical output, output current 1.8 A_{PP} / 2.2 A_{PP} max	21 to 27 V
TA8432K/8445K	P-HSIP12-2.54A		CTV vertical output, with ramp circuit, positive/negative input trigger, output current 2.2 A_{PP} max	21 to 29 V
TA8859CP	P-DIP16-300-2.54A		Correction of deflection distortion, I^2C bus supported	10.8 to 13.2 V
TA1241AN	P-SDIP24-300-1.78		Correction of deflection distortion in wide-screen TVs, I^2C bus supported	8.1 to 9.9 V
TA1300AN	P-SDIP24-300-1.78		Multi-point scan, sync & deflection, frequency counter	8.7 to 9.3 V
TA1317AN	P-SDIP24-300-1.78		Correction of deflection distortion for wide TV, I^2C bus supported, Vertical drive (AC/DC-coupling), EW drive (PWM output)	8.5 to 9.5 V
TA1318N/AF	P-SDIP24-300-1.78 P-SSOP30-375-1.00	Sync processing	Multi-point scan sync detection & generation (D4 pin)	8.5 to 9.5 V
TA1370FG	P-SSOP30-375-1.00		Multi-point scan sync detection & generation (28 kHz)	8.5 to 9.5 V

(MPEG Decoding/Graphic Processing for Digital Broadcasting ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TC81221F	QFP208	CS satellite broadcasting	Built-in DVB descrambler Built-in TS decoder Video/Audio decoder Built-in RISC CPU	3.0 to 3.6 V
✧ TC81240TBG	TBGA648	HD digital TVs	BS/SC digital/ terrestrial digital broadcasting Descrambling function Built-in TS decoder Video/audio decoder Graphics function Built-in RISC CPU Built-in peripheral controller	3.1 to 3.5 V
✧ TC90A43AF	QFP64	MULTI2 descrambling		3.0 to 3.6 V
✧ TC90A84F	QFP64	8PSK demodulation for digital BS	Error correction function Built-in de-interleave memory Built-in 2-channel 6-bit A/D converter	3.3 to 2.5 V

✧: Dry-packed product

(Comb Filter ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TC90A65F	P-QFP100-1420-0.65A	Comb filter IC	Motion-adaptive 3D YCS Embedded 4-Mbit DRAM Built-in ADC (1-ch), DAC (2-ch) I^2C bus data preset mode Noise level detection, ID-1 data slicer	2.3 to 2.7 V 3.0 to 3.6 V
✧ TC90A88F	P-QFP100-1420-0.65Q		Motion-adaptive 3D YCS (NTSC) Multicolor 3-line YCS + motion-adaptive 3D YNR, CNR Embedded 4-Mbit DRAM Built-in ADC (2-ch), DAC (2-ch) Image quality correction I^2C bus supported	2.3 to 2.7 V 3.0 to 3.6 V
✧ TC90A30AF	P-QFP100-1420-0.65A		Motion-adaptive 3D YCS Motion-adaptive 3D YNR, CNR Built-in ADC (2-ch), DAC (2-ch) Built-in VCO for 8fSC and digital H-PLL 2-Mbit FIFO memory I^2C bus supported	3.0 to 3.6 V
TC90A53N ✧ TC90A53F	P-SDIP28-400-1.78 P-SOP28-450-1.27		Built-in clamp circuit Built-in ADC (1-ch), DAC (2-ch) Vertical edge enhancer 1-line color dot interference reducer Built-in VCO and PLL Pin control	4.75 to 5.25 V
TC9090AN ✧ TC9090AF	P-SDIP28-400-1.78 P-SOP28-450-1.27		PAL/NTSC multicolor systems Built-in clamp circuit Built-in ADC (1-ch), DAC (2-ch) Vertical edge enhancer (NTSC, PAL) 1-line color dot interference reducer (NTSC) Built-in VCO and PLL I^2C bus supported	4.75 to 5.25 V
TC90A49P ✧ TC90A49F	P-DIP20-300-2.54A P-SOP24-450-1.27B		PAL/NTSC multicolor systems Built-in clamp circuit Built-in ADC (1-ch), DAC (2-ch) Vertical edge enhancer (NTSC, PAL) Built-in VCO and PLL I^2C bus supported	4.75 to 5.25 V
TC90A69N ✧ TC90A69F	P-SDIP28-400-1.78 P-SOP28-450-1.27		PAL/NTSC multicolor systems CNR circuit (only NTSC) Built-in clamp circuit Built-in ADC (1-ch), DAC (2-ch) Vertical edge enhancer (NTSC, PAL) Built-in VCO and PLL I^2C bus supported	4.75 to 5.25 V
TC90A83N ✧ TC90A83F	P-SDIP28-400-1.78 P-SOP28-450-1.27		NTSC system Built-in 10-bit ADC (1-ch), DAC (2-ch) H-dot interference reducer 1-line color dot interference reducer Vertical edge enhancer Built-in VCO and PLL (fsc, 2fsc, 4fsc and 8fsc) I^2C bus supported (pin control)	4.75 to 5.25 V
TC90A44P/45P ✧ TC90A45F	P-DIP16-300-2.54A P-SOP16-300-1.27		Built-in clamp circuit Built-in ADC (1-ch), DAC (2-ch) Built-in VCO and PLL	4.75 to 5.25 V

✧: Dry-packed product

(PIP ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TC90A67F	P-QFP80-1420-0.80B	PIP IC	NTSC/PAL/M-PAL/N-PAL systems Built-in 181-Kbit memory Composite video input, YUV/RGB output Screen mode 1/9, 1/16, up to 6 sub-pictures (1/36 × 6) Built-in V-chip slicer function	3.0 to 3.6 V

✧: Dry-packed product

(Audio Controller ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8776N	P-SDIP30-400-1.78	Sound processor	I^2C bus-compatible, Pseudo-surround	10.8 to 13.2 V
TA1216AN	P-SDIP30-400-1.78		I^2C bus-compatible, 3-ch I/O, sound multiplex IC control interface	8.1 to 9.9 V
TA1217AN ✧ TA1217AF	P-SDIP36-500-1.78 P-SSOP36-375-1.00		I^2C bus-compatible, 4-ch I/O, sound multiplex IC control interface	8.1 to 9.9 V
TA1304N TA1304F	P-SDIP24-300-1.78 P-SSOP24-300-1.00		I^2C bus-compatible, 2-ch input / 3-ch output, sound multiplex IC control interface	8.1 to 9.9 V
TA1343N	P-SDIP24-300-1.78		I^2C bus-compatible, 2-ch input / 3-ch output, Pseudo-surround	8.1 to 9.9 V

✧: Dry-packed product

(Multiplexed Sound Demodulator ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA7762N	P-SDIP30-400-1.78	Multiplexed sound demodulater ICs	EIAJ multiplexed sound demodulation, built-in filter, sound processor function	8.1 to 9.9 V
TA8874Z	P-SZIP21-0.889		EIAJ multiplexed sound demodulation, adjustment-free, facsimile-capable, I^2C bus control	8.1 to 9.9 V
TA1230Z	P-SZIP21-0.889		EIAJ multiplexed sound demodulation, built-in adjustment-free filter, facsimile-capable	8.1 to 9.9 V

(Audio Output ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8200AH	P-HZIP12-1.78B	Audio output ICs	Sound output power: 13 W × 2, built-in audio mute	10 to 37 V
TA8211AH	P-HZIP12-1.78B		Sound output power: 6 W × 2	10 to 30 V
TA8213K	P-HSIP7-2.54B		Sound output power: 6 W × 1	10 to 30 V
TA8216H	P-HZIP12-1.78B		Sound output power: 13 W × 2, built-in audio mute	10 to 37 V
TA8218AH	P-HZIP17-2.00		Sound output power: 6 W × 3, built-in audio mute	10 to 30 V
TA8246AH	P-HZIP12-1.78B		Sound output power: 6 W × 2, built-in audio mute, fixed gain (GV = 34dB)	10 to 30 V
TA8256BH	P-HZIP12-1.78B		Sound output power: 6 W × 3, built-in audio mute, fixed gain (GV = 34dB)	10 to 30 V
TA8265K	P-HSIP10-2.54C		Sound output power: 6 W × 2	10 to 30 V

(A/V Selector ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8628N	P-SDIP24-300-1.78	A/V switch	2-input switch volume control	8.1 to 9.9 V
TA8720AN	P-SDIP30-400-1.78		4-input A/V switch (useful for S-VHS)	8.1 to 9.9 V
TA8742N	P-SDIP24-300-1.78		3-input switch volume control	8.1 to 9.9 V
TA8747N	P-SDIP36-400		5-input A/V switch (useful for S-VHS)	8.1 to 9.9 V
TA8777BN	P-SDIP36-500-1.78		5-input A/V switch (useful for S-VHS), I^2C bus supported	10.8 to 13.2 V
TA8851BN	P-SDIP54-600-1.78		7-input, 2-output A/V switch (useful for S-VHS), I^2C bus supported	8.1 to 9.9 V
TA8851CN	P-SDIP54-600-1.78		7-input, 2-output A/V switch (useful for S-VHS), I^2C bus supported	8.1 to 9.9 V
TA1218AN	P-SDIP42-600-1.78		5-input, 2-output A/V switch (useful for S-VHS), I^2C bus supported	8.1 to 9.9 V
TA1219AN	P-SDIP36-400		5-input, 1-output A/V switch (useful for S-VHS), I^2C bus supported	8.1 to 9.9 V
TC90L01N	P-DIP24-300-1.78		3-input, 1-output A/V switch, volume control, ALC	8.1 to 9.9 V
TA1287P/F	P-DIP16-300-2.54A	RGB SW	2-input and 1-output, RGB → YUV/IQ, built-in mixing circuit for a main signal and an external signal	8.1 to 12.9 V

(Power Supply Control ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA1294N/F	P-SDIP24-300-1.78 P-SSOP24-300-1.78	AC/DC switching power supply control	Power factor correction + PWM control, f_H = 30 kHz to 110 kHz Can be used for both flyback (external synchronization) and half-bridge converters.	7.0 to 14.0 V
TA1307P	P-DIP8-300-2.54A		Reduced standby power consumption by intermittent control, f_H = 20 kHz to 150 kHz	7.5 to 11.5 V
TA1319AP/AF	P-DIP8-300-2.54A P-SOP8-225-1.27		PWM control (for power supply at 50 W or less), AC wide input voltage, automatic frequency reduction at standby mode	9.5 to 24.0 V
** TA1361P/F	P-DIP8-300-2.54A P-SOP8-225-1.27		RCC control (for power supply at 140 W or less), AC wide input voltage, automatic frequency reduction at standby mode	9.0 to 23.5 V
TC90A75P/F	DIP8-C-300A DIP8-F-255C		AC transformer control, reduced standby power consumption to maximum by intermittent control	8.5 to 14.0 V

**: Under development

(Other Optional ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TC90A18AF	P-QFP100-1420-0.65A	Time compression for wide-screen TV	Time-compression and time-extension (×1/2 to ×3/2) of the luminance and chroma, digital super live mode (horizontal 16-point variable compression), adaptive aspect conversion, EDTV2 detection and letterbox detection, built-in ADC (2-ch) and DAC (3-ch), built-in 1368fH VCO, I^2C bus supported	3.1 to 3.5 V
TA1227AP	P-DIP16-300-2.54A	EDTV-2 identification detection	EDTV-2 identification signal (B1 to B27) detection, I^2C bus supported	8.1 to 9.9 V
✧ TC90A36F	P-QFP100-1420-0.65A	Field-doubling converter	PAL/NTSC field-doubling converter (simple 100 Hz), horizontal time compression and expansion, picture freeze mode, 4-Mbit FIFO memory, I^2C bus supported	4.75 to 5.25 V
✧ TC90A46F	P-QFP80-1420-0.80B	Noise reduction	Noise reduction function with field-doubling converter (TC90A36F), general-purpose DRAM (4-Mbit EDO), I^2C bus supported	4.75 to 5.25 V
✧ TC90A58F	P-LQFP80-1212-0.50A	A/D converter	3-ch A/D converter for video signal, built-in clamp circuit, built-in digital filter, built-in horizontal PLL, built-in formatter for ITU-R BT.601, 656	3.0 to 3.6 V
✧ TC90A90FG	P-QFP100-1420-0.65Q	3D noise reduction	Motion-adaptive 3D NR for component signals, built-in 8-bit ADC (2-ch) and 8-bit DAC (3-ch), built-in HPLL, general-purpose DRAM (4-Mbit EDO), I^2C bus supported	3.0 to 3.6 V 4.75 to 5.25 V
TA8710S	P-SIP7-2.54A	SIF converter	5.5, 6.0, 6.5 MHz to 6.0 MHz conversion	8.1 to 9.9 V
TA1275AZ	P-SZIP21-0.889	Chroma circuit	SECAM chroma processing	4.5 to 5.5 V
TA1229N	P-SDIP24-300-1.78		SECAM chroma processing	8.1 to 9.9 V
TA8772AN	P-SDIP30-400-1.78	Special function	Base band 1H delay line	8.1 to 9.9 V

✧: Dry-packed product

TV Tuning & Channel Decoder ICs (Tuning System ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TA1281FN	P-SSOP16-225-0.65B	Mixer + OSC for TV/VCR	UHF/VHF 2-band mixer, oscillator, IF amp	4.5 to 5.5 V
✧ TA1284FN	P-SSOP16-225-0.65B	Mixer + OSC for TV/VCR	UHF/VHF 2-band mixer, low phase noise oscillator, IF amp	4.5 to 5.5 V
✧ TA1303BFN	P-SSOP30-300-0.65	PLL, mixer + OSC for TV/VCR	UHF/VHF 2-band mixer, oscillator, IF amp, built-in high-voltage transistor for tuning voltage, PLL (I^2C bus/3-wire), (modified test mode of the TA1303AFN)	4.5 to 5.5 V
✧** TA1384FNG	P-SSOP24-300-0.65A	PLL, mixer + OSC for TV/VCR	UHF/VHF 2-band mixer, oscillator, IF amp, built-in high-voltage transistor for tuning voltage, low distortion, wideband oscillator, UHF/VHF RF unbalanced input, PLL (I^2C bus), small 24-pin SSOP package	4.5 to 5.5 V
✧ TA1334FN	P-SSOP30-300-0.65	PLL, mixer +OSC for digital CATV	UHF/VHF 2-band mixer, oscillator, IF amp, low distortion, low phase noise oscillator, built-in high-voltage transistor for tuning voltage, PLL (I^2C bus/3-wire)	4.5 to 5.5 V
✧ TA1302FN	P-SSOP30-300-0.65	PLL, mixer + OSC for CATV	Down converter for CATV, low distortion, low noise mixer, low phase noise oscillator, direct two modules-type PLL (I^2C bus/3-wire)	4.5 to 5.5 V
✧* TA1375FG	LQFP48-P-0707-0.5	Digital tuner (mixer + OSC, PLL, GCA)	UHF/VHF mixer, oscillator, IF amp, low distortion, low phase noise oscillator, direct two modules-type, low phase noise PLL, I^2C bus supported, built-in low-noise IF GCA	4.5 to 5.25 V
✧ TD7626F/FN	P-SOP16-225-1.27/ P-SSOP16-225-0.65B	PLL + prescaler for frequency synthesizers	2.7-GHz prescaler + PLL (I^2C bus control) with band switch, built-in A/D converter	4.5 to 5.5 V
✧ TD7624AFN/BFN	P-SSOP16-225-0.65B	PLL + prescaler for frequency synthesizers, built-in peripheral type	1.3-GHz direct two modules-type prescaler + PLL (I^2C bus/3-wire), built-in bandswitch drive transistor	PLL: 4.5 to 5.5 V Band: 4.5 to 9.9 V VT: 4.5 to 35 V
✧ TD7623AFN			2.3-GHz direct two modules-type prescaler + PLL (I^2C bus/3-wire), built-in bandswitch drive transistor	
✧ TD7627FN			2.7-GHz direct two modules-type prescaler + PLL (I^2C bus/3-wire), built-in bandswitch drive transistor	
✧* TD7633FNG			2.3-GHz direct two modules-type prescaler + PLL (I^2C bus/3-wire), built-in band switch drive transistor, low phase noise type	

✧: Dry-packed product

*: New product

**: Under development

(PIF and SIF ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TA1290FN	P-SSOP16-225-0.65B	PIF	Reverse RF AGC, peak AGC	8.1 to 9.9 V
TA7337P	P-SIP9-2.54A	SIF	SIF detection, with sound multiplexing-compatible regulator	8 to 13.2 V
TA8721ASN	P-SSIP12-1.78		SIF detection × 2	8.1 to 9.9 V
TA8800N	P-SDIP24-300-1.78	PLL PIF/SIF	PLL split-carrier type PIF + SIF	8.1 to 9.9 V
TA8865BN	P-SDIP36-500-1.78	PLL PIF + SIF	L-SECAM system (video, audio) PLL, split-carrier type PIF + SIF	8.1 to 9.9 V
✧ TA1267AF	P-SSOP24-300-1.00B	PLL PIF + SIF	PIF/SIF multi-system SIF, audio BPF switching, audio trap switching	8.1 to 9.9 V
✧ TA1274F	P-SSOP24-300-1.00B	PLL PIF + SIF	TA1267AF pin-compatible, single system SIF	8.1 to 9.9 V
TA8805F	P-SSOP24-300-1.00	PIF/SIF + ATT for LCD TV	PIF/SIF, built-in electronic volume and black NI, reverse RF AGC, sync. separation	3.5 to 7.5 V
TA1207F	P-SSOP24-300-1.00		PIF/SIF, built-in electronic volume, no black NI, reverse RF AGC, sync. separation	3.5 to 7.5 V
TA1272AF	P-SSOP24-300-1.00	PIF/SIF for LCD TV	PIF/SIF, black NI ON output, black NI OFF output (diversity supported), reverse RF AGC, sync. separation	3.5 to 5.5 V
✧ TA1209F	P-QFP48-1014-0.80	Built-in 10.7-MHz converter, PIF/SIF + ACC for LCD TV	PIF/SIF + ACC (accessory), built-in 10.7-MHz converter, white/black NI ON output, OFF output (diversity supported), forward/reverse switchable RF AGC, sync. separation, built-in audio accessories	4.5 to 5.5 V 8.0 to 9.0 V

✧: Dry-packed product

(BS Tuner/Decoder ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TA1296FN	P-SSOP30-300-0.65	Built-in PLL Down-converter for satellite tuners	2.7-GHz prescaler + PLL (I^2C bus), low phase noise oscillator, mixer, built-in high-voltage transistor for tuning voltage, built-in bandswitch drive transistor, XO buffer output pin	4.5 to 5.5 V
✧ TA1322FN	P-SSOP30-300-0.65	Built-in PLL Down-converter for satellite tuners	2.7-GHz prescaler + PLL (I^2C bus), low phase noise oscillator, mixer, built-in high-voltage transistor for tuning voltage, selected IF 2-ch output port, XO buffer output pin	4.5 to 5.5 V
✧ TC90A26F	P-LQFP64-1010-0.50	QPSK demodulation PCM decoder DA converter	QPSK demodulation by digital PLL PCM decoder ×8 oversampling digital filter 1-bit ΣΔ modulation DA converter Analog LPF General-purpose port	4.5 to 5.5 V
TA8899AF	P-SSOP30-375-1.00	FM demodulation	400-MHz band video FM demodulation, AFT adjustment-free	4.75 to 5.25 V
TA1260BF	P-QFP52-1010-0.65	FM demodulation Video processing (for Japan)	FM demodulation + video processing, 400-MHz band video FM demodulation, audio BPF, video LPF, CN detection LPF, CN-compatible NR	4.5 to 5.5 V
TA1248F	P-HQFP30-1010	I/Q demodulator for digital satellite tuners	Second IF AGC amp, PLL detection, I/Q demodulation	4.5 to 5.5 V
** TB1293FNG	P-SSOP30-300-0.65	Direct quadrature demodulator for digital satellite tuners	BS digital broadcast in Japan, CS digital broadcast, AGC, detection, I/Q demodulation	3.15 to 3.45 V

✧: Dry-packed product **: Under development

(Channel Decoder ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TC90A84F	P-LQFP64-1010-0.50	8PSK demodulator	BS digital broadcast in Japan, CS digital broadcast, 8PSK, QPSK demodulation, error correction, built-in A/D converter, built-in memory	3.0 to 3.6 V 2.3 to 2.7 V 1.35 to 1.65 V
✧ TC90A87F	P-LQFLP144-2020-0.50A	OFDM demodulator	Terrestrial digital broadcasting in Japan, OFDM demodulation, error correction, built-in A/D converter, built-in memory	3.0 to 3.6 V 2.3 to 2.7 V 1.4 to 1.6 V

✧: Dry-packed product

(RF Modulating ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8637BP/BF	P-DIP16-300-2.54A P-SSOP16-225-1.00A	VHF-band RF modulator	VHF-band RF modulator for VCRs Video modulator, FM sound modulator, RF oscillator	4.5 to 5.5 V
* TA1372FNG	P-SSOP16-225-0.65B	VHF-band RF modulator	VHF-band PLL RF modulator for VCRs, USA (3 ch/4 ch), video modulation, audio FM modulation, RF oscillator	4.5 to 5.5 V
✧ TA1297AFN	P-SSOP24-300-0.65A	UHF-band RF modulator	UHF-band PLL RF modulator for VCRs, PAL-/SECAM-compatible, I^2C bus control	4.5 to 5.5 V
TA1326FNG	P-SSOP16-225-0.65B	UHF-band RF modulator	UHF-band PLL RF modulator for VCRs, PAL-compatible, I^2C bus control	4.5 to 5.5 V

✧: Dry-packed product *: New product

VCR ICs (Video Signal Processing ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
TA8898AN	P-SDIP20-300-1.78	NTSC CNR IC Built-in CCD	Improved S/N ratio for NTSC playback color signal due to feedback-type comb filter	4.75 to 5.25 V
TA1225N	P-SDIP20-300-1.78	PAL CNR IC Built-in CCD	PAL version of TA8898AN	4.75 to 5.25 V
✧ TA1238N/F	P-SDIP24-300-1.78 P-SSOP24-300-1.00	L-SECAM chroma signal processing IC	Used for SECAM chroma signal processing during VHS VCR recording/playback Various filters and SECAM Ident are built-in.	4.75 to 5.25 V

✧: The suffix F indicates dry-packed product

(Y/C S and NR ICs)

Part Number	Package	Use	Functions/Features	Operating Supply Voltage Range
✧ TC90A11F	P-QFP100-1420-0.65A	Motion-adaptive 3D NR IC	Motion-adaptive 3D NR (TNR, CNR) Built-in ADC (2-ch), DAC (2-ch) 2-Mbit FIFO memory I^2C bus supported	4.75 to 5.25 V
TC90A79AN ✧ TC90A79AF	P-SDIP28-400-1.78 P-SOP28-450-1.27	3-line YC separation	PAL/NTSC multicolor systems CNR circuit (PAL/NTSC) Y-N, C Built-in ADC (1-ch), DAC (2-ch) Skew correction circuit for NTSC ×5 mode Skew correction circuit for PAL LP mode Built-in VCO and PLL I^2C bus supported	4.75 to 5.25 V
TC90A80N	P-SDIP28-400-1.78	3-line YC separation	NTSC system CNR circuit YNR circuit Built-in ADC (2-ch), DAC (2-ch) Skew correction circuit for NTSC ×5 mode I^2C bus supported Built-in VCO and PLL (fsc, 2fsc, 4fsc and 8fsc)	4.75 to 5.25 V
✧ TC90A80F	P-SOP28-450-1.27	NTSC 3-line YC separation		
✧ TC90A88F	P-QFP100-1420-0.65Q	3D YC separation • frame TBC + 2D NR	Motion-adaptive 3D YC separation Multicolor systems 3-line YC separation Servo F/B type line TBC Motion-adaptive 3D YNR, CNR Frame TBC Separate lines for YNR and CNR 4-Mbit memory Built-in ADC (2-ch), DAC (2-ch) Image quality correction Color OSD character capability I^2C bus supported	2.3 to 2.7 V 3.0 to 3.6 V

✧: Dry-packed product

Audio ICs (AM/FM Receiver ICs)

Part Number	Package	Recommended Use			Function				Description	Features/Functions	Operating Voltage
		Car audio	General audio	Other	AM	FM					
						F/E	IF	Stereo demodu-lation			
TA7060AP	P-SIP5-2.54			○			■		Differential 1-stage amp		2 to 15 V
TA7343AP	P-SIP9-2.54A		○					■	PLL FM stereo multiplex	Positive gain	3.5 to 12 V
TA7358P/AP	P-SIP9-2.54A		○			■			RF amp	FM front end (mixer, local oscillator)	1.6 to 6 V
TA7371AF	P-SOP8-225-1.27		○			■			RF amp	FM front end (mixer, local oscillator, AFC varactor diode)	0.95 to 5 V
TA7765AF	P-SSOP16-225-1.00A		○		■		■		AM/FM IF	Built-in LED driver for tuning indicator, 1-terminal type output circuit (common to AM and FM), low current consumption, built-in FM/AM select switch	0.95 to 5 V
TA7792P **TA7792F**	P-DIP16-300-2.54A P-SSOP16-225-1.00A		○		■	■	■		AF/FM tuner	FM F/E + AM/FM IF + DET, AM detection / FM mixer coil unnecessary	0.95 to 5 V
TA8116F	P-SSOP16-225-1.00A	○				■			FM front end	FM front end (balanced mixer, local oscillator, IF amp, AGC, delayed AGC)	6 to 9 V
TA8122AN/AF TA8123AN/AF	P-SDIP24-300-1.78 P-SSOP24-300-1.00		○		■	■	■	■	Single-chip AM/FM stereo tuner system	FM DET, non-adjustable VCO FM stereo demodulator	1.8 to 7 V
TA8127N **TA8127F**	P-SDIP24-300-1.78 P-SSOP24-300-1.00		○		■	■	■	■	5-chip AM/FM stereo tuner system		1.8 to 7 V
TA8129Z	P-ZIP16-1.27	○					■		FM IF system (differential peak detector)	Differential 6-stage amp, signal meter, station detection, soft muting	7 to 16 V
TA8130Z/F	P-ZIP16-1.27 P-SSOP24-300-1.00	○						■	PLL FM stereo demodulation	Non-adjustable VCO, auto blender, auto high cut, auto high blend, auto pilot canceller	7 to 16 V
TA8132AN **TA8132AF**	P-SDIP24-300-1.78 P-SSOP24-300-1.00		○		■		■	■	DTS compatible IF + FM stereo demodulator	DTS compatible IF + FM stereo demodulator, IF count output, FM DET, non-adjustable VCO FM stereo demodulator	1.8 to 8 V
TA8158F	P-SSOP10-225-1.00		○			■			RF amp	FM front end (mixer, local oscillator)	1.6 to 6 V
TA8164P	P-DIP16-300-2.54A		○		■	■	■		AM/FM monaural radio IC	FM F/E + AM/FM IF + DET	1.8 to 7 V
TA8167N	P-SDIP24-300-1.78		○		■	■	■	■	Single-chip AM/FM stereo tuner system		1.8 to 7 V
TA8168SN	P-SSIP12-1.78		○			■			RF amp	FM front end (mixer, local oscillator, IF amp, AFC diode)	3.5 to 14 V
TA8176SN TA8176F	P-SSIP12-1.78 P-SSOP16-225-1.00A		○			■			RF amp	FM front end (mixer, local oscillator, buffer amp, IF amp)	4 to 8 V(F) 4 to 14 V(SN)
TA8182FN	P-SSOP16-225-0.65B		○			■			TV/FM 2-channel RF amp	TV/FM 2-channel front end (mixer, local oscillator, IF amp)	0.95 to 4 V
TA8186P	P-DIP16-300-2.54A		○		■		■	■	AM/FM IF + MPX	AM IFT used in FM stereo demodulation VCO resonance circuit, Soft muting	3.5 to 9 V
TA8187AFN	P-SSOP16-225-0.65B		○				■		DUAL FM IF	Built-in buffer amp (2-ch) and soft mute function	0.95 to 2.2 V
TA2003P/F	P-DIP16-300-2.54A P-SSOP16-225-1.00A		○		■	■	■		AM/FM radio IC	IFT-less AM/FM, non-adjustable FM DET	1.8 to 7 V
TA2005SN	P-SSIP12-1.78	○							FM noise canceller	built-in LPF and HPF	7 to 9 V
TA2008AN	P-SDIP24-300-1.78		○		■	■	■	■	Single-chip AM/FM stereo tuner system	DTS-compatible, IF count output, FM DET, non-adjustable VCO FM stereo demodulator	3.5 to 14 V
TA2017FN	P-SSOP24-300-0.65A	○							FM/IF diversity	Double front-end type FM IF diversity	7 to 9 V
✧ TA2022AFN	P-SSOP24-300-0.65A		○		■		■	■	AM/FM IF + MPX	DTS-compatible IF + FM stereo demodulator, IF counter output, adjustment-free FM DET, AM stereo supported, MPX with independent main signal and pilot signal input pins	0.95 to 2.2 V
TA2027F	P-QFP48-1014-0.80	○					■	■	Single-chip FM processor	IF amp, differential peak detector, noise canceller, FM stereo demodulation	7 to 9 V
✧ TA2029FN TA2029N	P-SSOP30-300-0.65 P-SDIP30-400-1.78		○		■	■	■		Single-chip AM/FM radio system	built-in audio power amp, DTS-compatible, IF counter output, adjustment-free FM DET	1.8 to 8 V

✧: Dry-packed product

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Audio ICs (AM/FM Receiver ICs) (continued)

Part Number	Package	Recommended Use			Function				Description	Features/Functions	Operating Voltage
		Car audio	General audio	Other	AM	FM					
						F/E	IF	Stereo demodu-lation			
✧ TA2030FN	P-SSOP16-225-0.65B		○			■			TV/FM 2-channel RF amp	TV/FM 2-channel front end (mixer, local oscillator, IF amp)	0.95 to 4 V
TA2039FN	P-SSOP16-225-0.65B	○							FM antenna diversity	Antenna switchover type FM diversity	7 to 9 V
TA2051FN	P-SSOP24-300-0.65A	○							AM pulse noise reduction	AM pulse noise reduction, AM stereo reception	7 to 9 V
TA2074F	P-QFP48-1014-0.80	○			■	■			RF processor	FM front end + AM tuner, Up-conversion system AM tuner, Motorola system AM stereo reception, Improved AM transient response for rapid changes in field strength, Improved error-free AM seek, About 20% fewer external parts	7 to 9 V
TA2082F	P-QFP48-1014-0.80	○			■	■			RF processor	FM front end + AM tuner, Up-conversion system AM tuner, Motorola system AM stereo reception, Improved AM transient response for rapid changes in field strength, Improved error-free AM seek, Improved FM interference rejection	7 to 9 V
TA2083AFN	P-SSOP16-225-0.65B	○							FM antenna diversity	Antenna switchover type FM diversity, Upgrade version of the TA2083FN	7 to 9 V
TA2093F	P-QFP44-1010-0.80H	○					■	■	FM processor	IF amp, quadrature detector, noise canceller, FM stereo demodulator	7 to 9 V
TA2099N TA2099F	P-SDIP24-1.78 P-SSOP24-300-1.00		○		■		■	■	AM/FM IF + FM stereo demodulation for DTS	IF + FM stereo demodulation for DTS, IF count output, FM DET adjustment-free (coil can be used.), built-in FM narrow band detector circuit, built-in VCO for MPX, FM blender control circuit, anti-birdie circuit	4 to 9 V
TA2111N **TA2111F** ✧ TA2111FN	P-SDIP24-300-1.78 P-SSOP24-300-1.00 P-SSOP24-300-0.65A		○		■	■	■	■	Single-chip AM/FM stereo tuner system	FM DET adjustment-free, built-in FM stereo demodulation VCO circuit, built-in AFC diode, compatible with new FCC standards	1.8 to 7 V
TA2126F	P-QFP48-1014-0.80	○					■	■	FM processor	IF band select switch, IF amp, quadrature detector, noise canceller, FM stereo demodulator	7 to 9 V
TA2132BP TA2132BF	P-DIP16-300-2.54A P-SSOP16-225-1.00A		○		■	■	■		AM/FM monaural radio IC	FM DET adjustment-free, built-in AFC diode, compatible with new FCC standards	1.8 to 7 V
TA2149BN ✧ **TA2149BFN**	P-SDIP24-300-1.78 P-SSOP24-300-0.65A		○		■	■	■	■	Single-chip AM/FM stereo tuner system	DTS compatible, IF count output, FM/AM OSC output, built-in VCO for MPX, compatible with new FCC standards	1.8 to 7 V

✧: Dry-packed product

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Part Number	Package	Recommended Use			Function				Description	Features/Functions	Operating Voltage
		Car audio	General audio	Other	AM	FM					
						F/E	IF	Stereo demodu-lation			
✧** TA2154AFN	P-SSOP30-300-0.65		○		■	■	■	■	Single-chip AM/FM stereo tuner system	TV bands, DTS compatible, IF count output, FM/AM OSC output, built-in VCO for MPX, compatible with new FCC standards	1.0 to 2.2 V
✧* TA2159F	P-GFP64-1010-0.50C		○			■	■	■	FM synthesizer tuner	FM F/E, IF detector, FM stereo demodulation, PLL, PLL controlled microcontroller	1.8 to 3.6 V
TA2101AF	P-QFP48-1014-0.8	○			■	■			RF processor	FM front-end, Down-conversion system AM tuner, AM pluse noise reduction, FM 4th NLA	7.5 to 8.9 V
TA2102AF	P-QFP64-1212-0.65	○					■	■	FM processor	IF amp, quadrature detector, FM pulse noise reduction, FM stereo demodulator, FM antenna diversity, Keyless entry system	7.5 to 8.9 V
TA2127AF	P-QFP84-1014-0.8	○			■	■	■		Intelligent RF processor	FM front-end, FM IF amp, IF band select switch, quadrature detector, Up-conversion system AM tuner, high-speed lock-up PLL, DAC output for RF amp and FSD automatic adjustment	V_{CC} = 7.5 to 9.0 V V_{DD} = 4.5 to 5.5 V
TA2135F	P-QFP84-1014-0.8	○			■	■	■		Intelligent RF processor	FM front-end, FM IF amp, IF band select switch, quadrature detector, Up-conversion system AM tuner, high-speed lock-up PLL, DAC output for RF amp and FSD automatic adjustment	V_{CC} = 7.5 to 8.5 V V_{DD} = 4.5 to 5.5 V
TB2122F	P-QFP84-1014-0.8	○			■	■	■		Intelligent RF processor	FM front-end, FM IF amp, IF band select switch, quadrature detector, Up-conversion system AM tuner, high-speed lock-up PLL, DAC output for RF amp and FSD automatic adjustment I^2C bus control	V_{CC} = 7.9 to 8.9 V V_{DD} = 4.5 to 5.5 V
TB2123AF	P-QFP64-1212-0.65	○						■	Intelligent audio processor	FM/AM pulse noise reduction, FM stereo demodulation, electronic volume, I^2C bus control	7.9 to 8.9 V
TB2124BFG	P-QFP64-1212-0.65	○			■	■	■	■	VE1 chip	FM front end, FM IF amp, IF bandwidth variable, FM detector, Up-conversion system AM tuner, FM/AM pulse noise reduction, FM stereo decoder, DAC output for RF amp and FSD automatic adjustment, I^2C bus control	7.9 to 8.7 V
✧* TB2132FN	P-SSOP30-300-0.65		○		■	■	■	■	Single-chip AM/FM stereo tuner system with PLL	TV bands, built-in VCO for MPX, compatible with new FCC standards	1.8 to 5.5 V

✧: Dry-packed product

*: New product

**: Under development

(PLL ICs for Car Audio)

Part Number	Package	Features	Operating Voltage
✧ **TB2118F**	P-SSOP-24-300-1.00	High-speed lock-up PLL, Lock-up time can be set to 500 μs by selecting an appropriate Vt range and low-pass filter constant.	V_{CC} = 8.5 V V_{DD} = 5 V

✧: Dry-packed product

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(Preamp and Line Amp ICs)

Part Number	Package	Characteristics/Functions	Recommended Use				Operating Voltage
			Car stereo	Cassette tape recorder	Home stereo	General-purpose amp	
TA7330P TA7330F	P-SIP7-2.54A P-SSOP16-225-1.00A	Low-voltage preamp for compact tape recorders, built-in ALC circuit		■			2 to 5 V
TA7705F TA7705P	P-SSOP16-225-1.00A P-DIP16-300-2.54A	2-channel, auto-reverse head select switch, Tape equalizer (metal/normal) select switch	■				6 to 16 V
TA7668BP	P-DIP16-300-2.54A	2-channel recording amp with ALC		■			6 to 15 V
TA7784P	P-DIP16-300-2.54A	Built-in input select switch, 2-channel amp, built-in tape equalizer select switch		■			3.5 to 15 V
TA7795F TA7795FN	P-SSOP16-225-1.00A P-SSOP16-225-0.65B	Auto-reverse compatible input, 2-channel amp, built-in tape equalizer select switch		■			0.9 to 4.5 V
TA8125S	P-SIP9-2.54A	2-channel amp, high open loop gain	■				6 to 16 V
TA8142AP	P-DIP16-300-2.54A	Double cassette preamp, 2-channel play amp, 2-channel rec amp, built-in ALC		■			4.0 to 13.5 V
TA8155F ✧ TA8155FN	P-SSOP24-300-1.00 P-SSOP24-300-0.65A	Play and rec amps, ALC-compatible microphone amp, Power ON/OFF switch, Rec/Play select switch, buffer amp		■			0.9 to 4 V
TA8162SN	P-SSIP12-1.78	2-channel preamplifier and metal/normal tape equalizer control switch	■				6 to 16 V
TA8189N	P-SDIP24-300-1.78	Double cassette preamp, 2-channel play amp, 2-channel rec amp, built-in ALC, input selector, EQ selector		■			4.0 to 13.5 V
TA2011S	P-SIP7-2.54A	Single microphone amp, built-in ALC		■			4.0 to 13.5 V
TA2025F TA2025P	P-SSOP16-225-1.00A P-DIP16-300-2.54A	Low-noise, auto-reverse head select switch, Tape equalizer (metal/normal) select switch	■				6 to 16 V
TA2042F	P-SSOP24-300-1.00	Low noise, auto-reverse preamp, music selection + mute	■				6 to 16 V
TA2068N	P-SDIP24-300-1.78	System preamp, built-in rec, play, monitor and microphone amps, built-in ALC, microphone mixing amp		■			4.0 to 9.0 V

✧: Dry-packed product

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(Power ICs)

Part Number	Package	Output Power (POUT)			Features/Functions	Recommended Use			Operating Voltage
		Recommended VCC	RL = 4 Ω	RL = 8 Ω		Car stereo	Cassette tape recorder	TV/Home stereo	
TA7252AP	P-HSIP7-2.54A	13.2 V	5.9 W	—	Compact package, various protective circuits	■			9 to 18 V
TA7280P TA7281P	P-HZIP12-1.78B	13.2 V	5.8 W × 2 19 W × 1	—	2 channels, low distortion, low noise, various protective circuits (TA7281P is of reverse pin type)	■		■	9 to 18 V
TA7331P **TA7331F**	P-SIP9-2.54A P-SSOP16-225-1.00	3 V	0.2 W	—	Low voltage operation, low current consumption (suitable for compact tape recorders)		■		2 to 5 V(P) 2 to 4 V(F)
TA7368P **TA7368F**	P-SSIP9-2.54A P-SSOP10-225-1.00	6 V	0.72 W —	0.45 W 0.45 W	Few external parts (3 parts min) Low quiescent current		■		2 to 10 V
TA7376P	P-SIP9-2.54A	6 V	—	0.4 W × 2	2 channels, low current consumption		■		1.8 to 6 V
TA7688F	P-SSOP16-225-1.00A	3 V	38 mW × 2 @16	27 mW × 2 @32	2 channels, headphone power amp, ripple filter, power-off circuit, muting		■		1.8 to 5 V
TA7769P	P-DIP16-300-2.54A	6 V	1 W × 2	—	2 channels, few external parts, thermal shutdown protection circuit		■		4.5 to 9 V
TA8145FN	P-SSOP16-225-0.65B	1.5 V	—	8 mW × 2 @16	2-channel OCL system headphone power amp, muting, power ON/OFF switch, GV = 22dB, ripple filter		■		0.9 to 2.2 V
TA8157AFN	P-SSOP24-300-0.65A	1.5 V	—	9 mW × 2 @16	2-channel OCL system headphone power amp, GV = 24dB, muting, low-frequency boost amp, ripple filter		■		0.9 to 2.2 V
TA8200AH	P-HZIP12-1.78B	28 V	—	13 W × 2	2 channels, muting function, output shorting (AC) / thermal shutdown protection circuit			■	10 to 37 V
TA8201AK	P-HSIP7-2.54B	13.2 V	14 W	—	Compact package, various protective circuits	■			9 to 18 V
TA8205AH TA8205AL	P-HZIP17-2.00 P-HSIP17-2.00	13.2 V	15 W × 2	—	2 BTL channels, low heat resistance, various protective circuits, standby switch	■			9 to 18 V
TA8207K	P-HSIP12-2.54A	9 V	2.5 W × 2	—	2 channels, standby switch, thermal shutdown protection circuit		■		6 to 15 V
TA8208H	P-HZIP12-1.78B	13.2 V	5.8 W × 2	—	2 channels, various protective circuits	■			9 to 18 V
TA8210AH TA8210AL	P-HZIP17-2.00 P-HSIP17-2.00	13.2 V	19 W × 2	—	2 BTL channels, low heat resistance, various protective circuits, standby switch	■			9 to 18 V
TA8211AH	P-HZIP12-1.78B	20 V	—	6 W × 2	2 channels, output shorting (AC) / thermal shutdown protection circuit			■	10 to 30 V
TA8213K	P-HSIP7-2.54B	20 V	—	6 W	Compact package, output shorting (AC) / thermal shutdown protection circuit			■	10 to 30 V
TA8215H TA8215L	P-HZIP17-2.00 P-HSIP17-2.00	13.2 V	15 W × 2	—	2 BTL channels, low heat resistance, various protective circuits, standby switch	■			9 to 18 V
TA8216H	P-HZIP12-1.78B	24 V 28 V	13 W × 2 —	— 13 W × 2 (@VCC = 28 V)	2 channels, muting function, output shorting (AC) / thermal shutdown protection circuit			■	10 to 24 V 10 to 37 V
TA8217P	P-HDIP12-300-2.54	9 V	2.5 W × 2	—	2 channels, thermal shutdown protection circuit		■		4.5 to 12 V
TA8220H	P-HZIP17-2.00	13.2 V	19 W × 2	—	2 BTL channels, standby switch, RL = 2 Ω guaranteed (30-W output), with clipping/shorting detector	■			9 to 18 V
TA8221AH TA8221AL	P-HZIP17-2.00 P-HSIP17-2.00	13.2 V	19 W × 2	—	2 BTL channels, standby switch, RL = 2 Ω guaranteed (30-W output)	■			9 to 18 V
TA8223K	P-HSIP15-2.00A	15 V	6.5 W × 2	—	2 channels, standby switch, thermal shutdown protection circuit		■		6 to 18 V
TA8225H TA8225L	P-HZIP17-2.00 P-HSIP17-2.00	13.2 V	23 W	—	40-W output power when using RL = 2 Ω, Standby switch	■			9 to 18 V
TA8227P	P-HDIP12-300-2.54	9 V	2.5 W × 2	—	2 channels, thermal shutdown protection circuit, standby switch		■		5 to 12 V
TA8229K	P-HSIP15-2.00A	9 V	2.5 W × 2	—	2 channels, standby switch, thermal shutdown protection circuit		■		6 to 15 V
TA8231L	P-HSIP17-2.00	13.2 V	22 W × 2	—	2 BTL channels, standby switch, NF capacitor not needed, RL = 2 Ω guaranteed (37-W output)	■			9 to 18 V
TA8233BH	P-HZIP17-2.00	13.2 V	19 W × 2	—	2 BTL channels, standby switch, RL = 2 Ω guaranteed (30-W output), with clipping/shorting detector	■			9 to 18 V
TA8238K	P-HSIP15-2.00A	13.2 V	5.3 W × 2	—	2 channels, standby switch	■			6 to 18 V
TA8246AH	P-HZIP12-1.78B	20 V	—	6 W × 2	2 channels, muting function, output shorting (AC)/thermal shutdown and overvoltage protection to prevent output shorting			■	10 to 30 V
TA8248K	P-HSIP15-2.00A	9 V	2.5 W × 2	—	2 channels, standby switch, thermal shutdown protection circuit		■	■	6 to 15 V
TA8251AH	P-HZIP25-1.27C	13.2 V	18 W × 4	—	4 BTL channels, standby switch, mute, built-in AUX amp	■			9 to 18 V
TA8252H	P-HZIP25-1.27E	13.2 V	21 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 37 W × 4 ch	■			9 to 18 V
TA8254BH	P-HZIP15-P-1.27E	13.2 V	21 W × 2	—	2 BTL channels, standby switch, mute, with clipping/shorting detector	■			9 to 18 V
TA8255AH	P-HZIP25-1.27C	13.2 V	14 W × 4	—	4 BTL channels, standby switch, mute, built-in AUX amp	■			9 to 18 V

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(Power ICs) (continued)

Part Number	Package	Output Power (P_{OUT})			Features/Functions	Recommended Use			Operating Voltage
		Recommended V_{CC}	$R_L = 4\ \Omega$	$R_L = 8\ \Omega$		Car stereo	Cassette tape recorder	TV/Home stereo	
TA8256BH	P-HZIP12-1.78B	20 V	—	6 W × 3	3 channels, muting function, output shorting (AC) / thermal shutdown and overvoltage protection			■	10 to 30 V
*TA8258H	P-HZIP12-1.78B	37 V	—	20 W × 2	2 channels, muting function, output shorting (AC) / thermal shutdown protection circuit			■	15 to 42 V
TA8259H	P-HZIP25-1.27E	13.2 V	21 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 37 W × 4 ch	■			9 to 18 V
TA8260AH	P-HZIP25-1.27E	13.2 V	22 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 40 W × 4 ch	■			9 to 18 V
TA8261AH	P-HZIP25-1.27E	13.2 V	22 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 37 W × 4 ch, self-diagnosis	■			9 to 18 V
TA8262H	P-HZIP25-1.27E	13.2 V	24 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 43 W × 4 ch	■			9 to 18 V
TA8263BH	P-HZIP25-1.00F	13.2 V	24 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 43 W × 4 ch, self-diagnosis	■			9 to 18 V
TA8264AH	P-HZIP25-1.00F	13.2 V	21 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 41 W × 4 ch, self-diagnosis, speaker burnout prevention function	■			9 to 18 V
*TA8265K	P-HSIP10-2.54C	20 V	—	6 W × 2	2 channels, output shorting (AC) / thermal shutdown protection circuit		■	■	10 to 30 V
TA8266H	P-HZIP25-1.00F	13.2 V	20 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 35 W × 4 ch, self-diagnosis, speaker burnout prevention function	■			9 to 18 V
TA8270H	P-HZIP25-1.00F	13.2 V	24 W × 4	—	4 BTL channels, standby switch, mute, Maximum power: 43 W × 4 ch, high-efficiency KB amp, self-diagnosis	■			9 to 16 V
TA8271H	P-HZIP25-1.00F	13.2 V	21 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 41 W × 4 ch, speaker burnout prevention function	■			9 to 18 V
TA8272H	P-HZIP25-1.00F	13.2 V	24 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 43 W × 4 ch, self-diagnosis	■			9 to 18 V
TA8273H	P-HZIP25-1.00F	13.2 V	25 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 47 W × 4 ch, self-diagnosis	■			9 to 16 V
TA8275H	P-HZIP25-1.00F	13.2 V	21 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 41 W × 4 ch, self-diagnosis, speaker burnout prevention function	■			9 to 18 V
TA8276H	P-HZIP25-1.00F	13.2 V	20 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 35 W × 4 ch, self-diagnosis, speaker burnout prevention function	■			9 to 18 V
TA8277H	P-HZIP25-1.00F	13.2 V	24 W × 4	—	4 BTL channels, standby switch, mute, AUX amp, Maximum power: 43 W × 4 ch	■			9 to 18 V
✧ **TA2120FN**	P-SSOP24-300-0.65A	2.4 V		8 mW × 2 @16	2 channels, headphone power amp, built-in OCL/C-cup, low current consumption (I_{CCQ} = 1.9 mA), low-frequency boost amp, beep, standby switch, muting, G_V = 16dB/8.5dB, volume limiter		Portable CD/MD ■		1.8 to 4.5 V
✧ TA2131FL ✧ TA2131FN	P-QON24-0505-0.50 P-SSOP24-300-0.65A	+B = 1.2 V_{CC} = 2.8		8 mW × 2 @16	2 channels, headphone power amp, G_V = 12dB, low current consumption (I_{CCQ} = 0.75 mA), low-frequency boost amp with AGC, beep, standby switch, muting		Portable MD ■		+B = 0.9 to 4.5 V V_{CC} = 1.8 to 4.5 V
✧ TA2152FL ✧ **TA2152FN**	P-QON24-0505-0.50 P-SSOP24-300-0.65A	+B = 1.2 V_{CC} = 2.4		8 mW × 2 @16	2 channels, headphone power amp, built-in OCL/C-cup, G_V = 11.5dB, low current consumption (I_{CCQ} = 0.7 mA), beep, phase compensation partsless, standby switch, muting		Portable MD and others ■		+B = 0.9 to 4.5 V V_{CC} = 1.8 to 4.5 V
✧ TA2170FL ✧* TA2170FTG	P-QON24-0505-0.50 P-VQON24-0404-0.50	3 V		20 mW × 2 @32 Ω	3-input stereo headphone amp, constant volume sensation regardless of selector output and mixer output, $G_V \simeq$ 0dB, standby switch, muting		Cellular phone and portable audio ■		+B = 0.9 to 4.5 V V_{CC} = 1.8 to 4.5 V
*TB2901H	P-HZIP25-1.00F	13.2 V	25 W × 4	—	4 BTL channels, standby switch, mute, BiCD MOS Maximum power: 47 W × 4 ch, high side switch	■			9 to 18 V
*TB2903H	P-HZIP25-1.00F	13.2 V	25 W × 4	—	4 BTL channels, standby switch, mute, BiCD MOS Maximum power: 47 W × 4 ch, offset detection	■			9 to 18 V

✧: Dry-packed product

*: New product

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(Pre + Power Amp ICs)

Part Number	Package	Output Power (P_{OUT})	Features/Functions	Recommended Use			Operating Voltage
				Headphone stereo	Radio cassette recorder	Other	
✧ TA8159FN	P-SSOP30-300-0.65	6 mW (1.5 V, 16 Ω)	2 channels, auto reverse, ripple filter, Pre-off switch, OCL system, G_V = 28dB (power stage)	■			0.9 to 2.2 V
✧ TA2002FN **TA2002F**	P-SSOP24-300-0.65A P-SSOP24-300-1.00	50 mW (3 V, 16 Ω)	2 channels, auto reverse, ripple filter, Pre-off switch, OCL system, G_V = 27dB (power stage)	■			1.8 to 4.5 V
TA2069AF	P-SSOP24-300-1.00A	28 mW (3 V, 16 Ω) 20 mW (3 V, 32 Ω)	2 channels, motor governor, OCL system, low-frequency boost amp, G_V = 31dB (power stage)	■			PRE+PW 1.8 to 3.6 V GVN 2.1 to 3.6 V
✧ TA2123AF	P-LQFP48-0707-0.50	6 mW (1.5 V, 32 Ω)	Low current consumption (C-cup = 1.5 mA, OCL = 2.2 mA) Preamp stage: Auto reverse, metal mode driver, preamp muting Power stage: Boost function, beep, boost with AGC, power amp muting Others: Ripple filter, power switch, AMS	■			0.95 to 2.2 V
TA2145AF	P-SSOP24-300-1.00A	28 mW (3 V, 16 Ω) 20 mW (3 V, 32 Ω)	2 channels, motor governor, OCL system, low-frequency boost amp, preamp muting switch	■			PRE+PW 1.8 to 3.6 V GVN 2.1 to 3.6 V
✧ TA2160FN	P-SSOP30-300-0.65	6 mW (1.5 V, 32 Ω) 12 mW (3 V, 32 Ω)	2 channels, OCL system, low current consumption (1.6 mA (1.5 V), 3 mA (3 V)) Ripple filter, preamp switch, power amp muting switch, boost function, boost with AGC	■			0.95 to 4.5 V

✧: Dry-packed product

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(Accessories and Others)

Part Number	Package	Uses	Features/Functions	Operating Voltage
TA7317P	P-SIP9-2.54A	OCL power amp, Speaker protection	Overcurrent / DC voltage detector, power ON/OFF mute, reel driver	±24 to ±60 V
TA7630P	P-DIP16-300-2.54A	Electronic tone, volume and balance controls	2 channels, DC control	8 to 14 V (single supply) ±4 to ±7 V (dual supply)
TA7796P TA7796Z	P-DIP16-300-2.54A P-ZIP16-1.27	5-band graphic equalizer	Low distortion, few external parts	4 to 16 V
TA8126S TA8126F	P-SIP9-2.54C P-SSOP10-225-1.00	DC-DC converter for electronic tuning (3-V)	VHF/UHF tuner using variable capacitance diode bias, output voltage (V_O = 15 V/30 V), switchable stabilized power supply, sine wave oscillator	1.8(2.0) to 10 V @V_O = 15 V (@V_O = 30 V)
TA8161F	P-SSOP10-225-1.00	DC/DC converter for driving CMOS ICs	Power supply for CMOS ICs, blocking oscillator, output voltage (2.5 V/5 V), built-in back-up function	0.9 to 4 V
TA8173AP	P-DIP16-300-2.54A	Sound field reproduction processor	4-phase shift filter stage, built-in normal/delay switch	4 to 12 V
TA8184P TA8184F	P-DIP20-300-2.54A P-SSOP24-300-1.00	2 channels, volume, tone, balance and loudness controls	Low noise, DC control, variable loudness, variable volume	7.5 to 15 V (TA8184P) 7.5 to 12.5 V (TA8184F)
TA8194Z	P-ZIP16-1.27	Muting control	Built-in muting control and power control	8 to 18 V
TA8198F	P-SSOP10-225-1.00	DC-DC converter for electronic tuning (3-V)	VHF tuner using variable capacitance diode bias, output voltage (V_O = 15.5 V), constant-current output for LPF, power switch, sine wave oscillator	1.8 to 10 V
TA8214K	P-HSIP7-2.54B	Multi-output type voltage-regulated power supply	8.3-V output × 4, 1 fixed output, 3 switchable outputs	9.3 to 18 V
TA8244H	P-HZIP12-1.78B	Multi-output type voltage-regulated power supply	8.4-V output × 4, 1 fixed output, 3 switchable outputs, built-in standby switch, muted output when power is down	9.4 to 18 V
TA8269H	P-HZIP15-P-1.27E	Multi-output type voltage-regulated power supply	For microcontroller 5 V output × 1, 8.5 V outoput × 1, High Side SW × 3, Stand-by, Mute, Reset, each voltage detector included.	9.6 to 18 V
TA2015FN	P-SSOP10-0.65	1.5-V ripple filter	Built-in power ON/OFF function and constant-current power supply circuit Adjustable output voltage	0.9 to 2.2 V
TA2016FN	P-SSOP10-0.65	1.5-V 2-channel buffer amp	Output impedance switchable in 3 steps, EQ switching	0.95 to 2.2 V
TA2018FN	P-SSOP10-0.65	DC-DC converter for electronic tuning (1.5-V)	VHF tuner using variable capacitance diode bias, output voltage (V_O = 14.3 V), built-in constant-current output circuit, sine wave oscillator	0.9 to 4 V
TA2026SN TA2026F	P-SSIP12-1.78 P-SSOP16-225-1.00	Balanced signal output amp	Low noise, 2 channels, low distortion	5 to 12 V
TA2050S TA2050F	P-SIP9-2.54A P-SSOP16-225-1.00	Ground isolator	2 channels, low noise, high common-mode rejection ratio	5 to 10 V
TA2078P	P-DIP16-300-2.54A	Preset equalizer	2 channels, 3-mode preset equalizer, flat mode	7.5 to 14 V
TA2062F	P-SSOP16-225-1.00A	Sound field correcting 5-band equalizer	Low distortion, low noise	4 to 16 V

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(Infrared Receiver ICs (f = 2.3 MHz/2.8 MHz))

Part Number	Package	Uses	Features/Functions	Operating Voltage
✧ TA2056FN	P-SSOP24-300-0.65A	Receiver IC	f = 2.3 MHz/2.8 MHz Built-in 2-ch tuner matched to frequency modulation, built-in mute function, low current consumption	0.95 to 2.2 V

✧: Dry-packed product

(Digital Tuning System (DTS) (1))

System No.	Part Number	Prescaler	Package	Operating Voltage	Crystal Oscillator	ROM Size	RAM Size	Display Format	I/O Ports	Remarks
DTS-20	✧* TC9324FG	—	P-QFP100-1420-0.65A	4.5 to 5.5 V	4.5 MHz/ 75 kHz	16 bits × 16K	4 bits × 4096	LCD 1/4, 1/3, 1/2 duty 1/2, 1/3 bias	IN: 35 lines OUT: 13 lines I/O: 40 lines	Single chip Suitable for car stereo
	✧* TC9325FG		P-QFP100-1420-0.65Q	3.0 to 3.6 V			4 bits × 1024			Single chip Suitable for portable
DTS-21	✧ TC9318FAG	—	P-QFP64-1010-0.50A	1.8 to 3.6 V	75 kHz	16 bits × 4K	4 bits × 256	LCD 1/3 duty 1/2 bias	IN: 11 lines OUT: 33 lines I/O: 10 lines	Low-voltage operation Single chip Suitable for portables
	✧ TC9318FBG		P-QFP64-1212-0.65A							
	✧ TC9327AFG		P-QFP80-1212-0.50A	1.8 to 3.6 V	75 kHz	16 bits × 7K	4 bits × 256	LCD 1/4 duty 1/2 bias	IN: 9 lines OUT: 33 lines I/O: 24 lines	Low-voltage operation Single chip Suitable for portables
	✧ TC9328AFG		P-QFP80-1212-0.50A	0.9 to 1.8 V	75 kHz	16 bits × 8K	4 bits × 512	LCD 1/4 duty 1/2 bias	IN: 8 lines OUT: 21 lines I/O: 36 lines	Low-voltage operation Single chip Suitable for portables
	✧ TC9329AFAG		P-QFP64-1010-0.50A	0.9 to 1.8 V	75 kHz	16 bits × 4K	4 bits × 256	LCD 1/4 duty 1/2 bias	IN: 4 lines OUT: 16 lines I/O: 28 lines	Low-voltage operation Single chip Suitable for portables

✧: Dry-packed product

*: New product

(Digital Tuning System (DTS) (2) Standard Software Products)

System \ Function / Part Number		Reception Band					Preset Memory	Station Selection Mode		Clock Function			Display	Remote Control	Function Switch	Other Functions
		FM	MW	LW	SW	TV		Auto search	Memory scan	Clock	Timer	Sleep timer				
DTS-21	✧ TC9318FBG-001	○	○	○	○	○ VHF	FM: 10 MW: 10 LW: 10 SW: 10 TV: 10 Random: 18	Seek	—	12H / 24H	○	○	LCD	—	—	• For use in portable systems • IF count auto stop • Dial tuning function • Direct frequency key-in
DTS-20	✧* TC9324FG-002	○	○	○	—	—	FM: 20 MW: 10 LW: 10 Random: max 40	Seek	—	12H / 24H	○	○	LCD	○	4	• RDS function • 3CD changer/CDR control • Remote control external Input
	✧* TC9325FG-002	○	○	○	○	—	FM: 20 MW: 10 LW: 10 SW: 10 Random: max 50	Seek	—	12H / 24H	○	○	LCD	○	4	• CDR-W play control • Remote control external Input • Dual clock

✧: Dry-packed product

*: New product

(Plunger Driver ICs)

Part Number	Output Current	Output Pulse Duty Cycle	Package
TD6304AP	Io = 400 mA (max)	4:1	P-SIP7-2.54A
TD6308AP	Io = 400 mA (max)	8:1	P-SIP7-2.54A

(Analog Switches)

Classification	Part Number	Functions	Package
Analog switch	** TC9162BNG/BFG	High-breakdown-voltage analog function switch array	P-SDIP28-400-1.78 P-SOP28-450-1.27B ✧
	** TC9163BNG/BFG		
	** TC9164BNG/BFG		
	** TC9273BNG/BFG	High-breakdown-voltage analog switch array Available for semi-customized production	P-SDIP28-400-1.78 P-SOP28-450-1.27 ✧
	** TC9274BNG/BFG		P-SDIP42-600-1.78 P-QFP44-1414-0.80D ✧

✧: Dry-packed product

**: Under development

(Electronic Volume Control ICs)

Classification	Part Number	Functions	Package
Volume control	** TC9235PG/FG	Up/Down-type electronic volume control	P-DIP16-300-2.54A
	** TC9260PG/FG	Serial data-controlled electronic volume control	P-SOP16-300-1.27
High-breakdown-voltage volume control	** TC9459BNG/BFG	High-breakdown-voltage serial-data-controlled electronic volume control + loudness control	P-SDIP28-400-1.78 P-SOP28-450-1.27B ✧
	** TC9482BNG/BFG	6-channel high-breakdown-voltage serial-data-controlled electronic volume control	P-SDIP28-400-1.78 P-SOP28-450-1.27B ✧
	** TC94A32BFG	High-breakdown-voltage serial-data-controlled electronic volume control with trim volume	P-SOP28-450-1.27B ✧
	* TC94A27UG	4-channel serial-data-controlled electronic volume control with trim volume	P-LQFP44-1010-0.80A ✧
Single-chip volume control	TC9422NG TC9422FG	Volume, 2-band tone control, 4-input selector	P-SDIP28-400-1.78 P-SOP28-450-1.27B ✧
	* TC9498NG/FG	6-channel serial-data-controlled electronic volume control with trim volume (single supply voltage)	
	* TC9499NG/FG	6-channel serial-data-controlled electronic volume control with trim volume (dual supply voltage)	

✧: Dry-packed product

*: New product

**: Under development

(PLL, Prescaler)

Classification	Part Number	Functions	Package
PLL	TC9256GP/GF	High-speed PLL incorporating DTS prescaler	P-DIP16-300-2.54A P-SOP16-300-1.27
	TC9257GP/GF		P-DIP20-300-2.54A P-SOP20-300-1.27
	TB2110FNG	High-speed PLL incorporating 1.5-V DTS prescaler	P-SSOP24-300-0.65A
Prescaler	TD6127BPG	1 GHz, 1/64, 1/65 1/128, 1/129	P-DIP8-300-2.54
	TD6134AFG	250 MHz, 1/4 × (1/15, 1/16), 1/8 × (1/15, 1/16)	P-SOP8-225-1.27
	TD7101FG	150 MHz, 1/4 + (1/15, 1/16), 1/15, 1/16	P-SOP8-225-1.27
	TD7103FG	150 MHz, 1/4 + (1/15, 1/16), 1/8 + (1/15, 1/16)	P-SOP10-225
	TD7104PG	1 GHz, 1/1, 1/2, 1/4, 1/8	P-DIP8-300-2.54
	TD7104FG		P-SOP8-225-1.27

(Display Driver ICs)

Classification	Part Number	Functions	Package
Display driver	TB2104FG	20-bit VFD driver	P-SSOP30-375-1.00

(Compact Disc Player ICs)

Classification	Part Number	Functions				Package
Single-chip processor	✧ TC9462F	Sync. separation, EFM demodulation, error detection/correction, error-corrected output, microcomputer interface, search control, digital equalizer, capable of decoding text data, variable speed playback, ×8 oversampling digital filter, 1-bit DA converter		×4 speed operation	CD-LX2 system (V_{DD} = 5.0 V)	P-QFP100-1420-0.65
	✧ TC9495F				CD-LX3 system (V_{DD} = 5.0 V)	P-QFP100-1420-0.65
	✧ TC94A14F/FA/*FB				CD-AX system (V_{DD} = 3.0 V/5.0 V)	P-QFP64-1414-0.80A P-QFP64-1010-0.50 P-QFP64-1212-0.65
	✧** TC94A15F		Built-in head amp	×4 speed operation for CD-R/CD-RW playback	CD-RX system (V_{DD} = 3.0 V/5.0 V)	P-LQFP100-1414-0.50C
Firmware built in Single-chip processor	✧ TC9457F	Sync. separation, EFM demodulation, error detection/correction, error-corrected output, microcomputer interface, search control, digital equalizer, capable of decoding text data, variable speed playback, ×8 oversampling digital filter, 1-bit DA converter		Double speed operation	CD-MX system (V_{DD} = 5.0V)	P-QFP100-1420-0.65
	✧ TC94A09F				CD-HX system	P-QFP100-1420-0.65
	✧ TC94A23F				CD-BX system	P-QFP100-1420-0.65
	✧ TC94A29FAG/FB				CD-CX system (V_{DD} = 3.3 V)	P-QFP64-1010-0.50 P-QFP64-1212-0.65
	✧ TC94A39FAG/FB				CD-DX system (V_{DD} = 3.3 V)	P-QFP64-1010-0.50 P-QFP64-1212-0.65
Head amp	TA2109F	Head amp, focus-tracking error amp, auto laser power amp, RF-AGC amp				P-SSOP24-300-1.00
	TA2122AFN				CD-LX2, LX3, MX,HX, BX system (V_{DD} = 5.0 V)	P-SSOP30-300-0.65
	✧ TA2151FN					
	✧ **TA2153FN**			Support for CD-R/CD-RW		
	✧ **TA2157F/FN**				CD-AX CX,DX system (V_{DD} = 3.3 V)	P-SSOP24-300-1.00 P-SSOP24-300-0.65A
4-ch BTL driver	TA2058F	BTL driver		CD-LX2, LX3, MX, HX and BX systems		P-HSOP20-450-1.00
	TA2092N					P-SDIP24-300-1.78
	TA2092AN			CD-AX, CX and DX systems		
5-ch driver	TA2125AF	4-ch BTL power driver, single H switch, 5 V regulator		CD-LX2, LX3, MX, HX and BX systems		P-HSOP36-375-0.80
DAC	TC9250F/P	16-bit twin DAC (Up to ×8 speed supported, resistor string type)				P-SOP16-300-1.27 P-DIP16-300-2.54A
1-bit DAC incorporating digital filter	TC9270F/N	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital attenuator, digital de-emphasis, L-ch data input when LRCK signal is High				P-SOP28-450-1.27 P-SDIP28-400-1.78
	✧ TC9293F/FN/N	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital attenuator (128 steps), digital de-emphasis, built-in analog filter, low voltage supported (TC9293FN/AFN is dry packed.)			2nd order LPF	P-SSOP24-300-1.00
	✧ TC9293AF/AFN/AN				3rd order LPF	P-SSOP24-300-0.65A P-SDIP24-300-1.78
	✧ TC9404FN	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital zero detection, digital attenuator (128 steps), digital de-emphasis, built-in analog filter (3rd order LPF), low voltage supported				P-SSOP24-300-0.65A
	✧ TC9438FN	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital zero detection, dynamic bass boost, digital attenuator (128 steps), digital de-emphasis, built-in analog filter (3rd order LPF), low voltage supported				P-SSOP24-300-0.65A
	✧ TC9470FN	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital zero detection, dynamic bass boost, digital attenuator (4096 steps), digital de-emphasis, built-in analog filter (3rd order LPF), low voltage supported (2.4 V)				P-SSOP24-300-0.65A
Filter IC for 1-bit DAC	TA2009F/P	LPF, amp (used for TC9284BF, TC9296F/AF)			Used with single 5-V power supply	P-SSOP16-225-1.00A P-DIP16-300-2.54A P-SSOP16-225-1.00A
	TA2055F/P	LPF, amp (used for TC9270F/N)				
	TA2063F	LPF, amp (used for TC9284BF, TC9296F/AF)				
Clock generator IC	TC9246F/P	PLL, microcomputer interface, programmable counter				P-SOP16-300-1.27 P-DIP16-300-2.54A

✧: Dry-packed product

*: New product

Toshiba manufactures the products in bold in the factories in Malaysia and Thailand. We do not provide those products domestically.

**: Under development

(Digital Signal Processor & Digital Amp System ICs)

Classification	Part Number	Functions		Package
Audio digital signal processor	✧ TC9446F	Multi-channel decoder for compressing and expanding audio data, Built-in DIR (Digital audio Interface Receiver) / DIT (Digital audio Interface Transmitter), program ROM (12K word), program RAM (128 word), VCO circuit. V_{DD} = 3.3 V		P-QFP100-1420-0.65A
	✧ TC9447F	Sound field control and various other signal processing functions are accomplished in software. Built-in program ROM (1 Kword), delay RAM (64 Kbit) and boot ROM (1 Kword), built-in 1-bit 2-ch ADC and 4-ch DAC		P-QFP100-1420-0.65A
	✧ TC9496AF	Sound field control and various other signal processing functions are accomplished in software. Built-in program ROM (2 Kword), delay RAM (64 Kbit) and boot ROM (1 Kword), built-in 1-bit 2ch ADC, 5ch DAC with 24dB trim volume, 1-ch multi-bit type ADC for microphone input.		P-QFP100-1420-0.65A
	✧ TC94A02F	Low-power decoder for compressing and expanding audio data, Built-in DIT, VCO circuit, 2-ch DAC, Program ROM (10K word), Program RAM (256 word), standby function, V_{DD} = 2.5 V, I/O = 3.3 V		P-LQFP64-1010-0.50A
	✧ TC94A20F	Low-power decoder for compressing and expanding audio data, Built-in DIT, VCO circuit, 2-ch DAC, Program ROM (12K word), Program RAM (256 word), standby function, V_{DD} = 2.5 V, I/O = 3.3 V, Built-in 1Mbit SRAM		P-LQFP64-1010-0.50A
	✧ TC94A04AF/AFD	Sound field control and various other signal processing functions are accomplished in software, Built-in program ROM (1K word), delay RAM (32K bit) and boot ROM (512 word), built-in 1-bit 2-ch ADC and 4-ch DAC, 4-ch DAC with trim volume, 4-series analog switches and line-out		P-QFP60-1414-0.80D P-QFP80-1420-0.80A
1-bit DAC incorporating digital filter	TC9276F/P	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital de-emphasis, low-voltage operation, L-ch data input when LRCK signal is High, with soft mute		P-SOP20-300-1.27 P-DIP20-300
	TC9278F/P	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital de-emphasis, low-voltage operation, L-ch data input when LRCK signal is Low, double-speed operation supported		P-SOP20-300-1.27 P-DIP20-300
	✧ TC9293F/FN/N	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital attenuator (128 steps), digital de-emphasis, built-in analog filter, low voltage supported (The TC9293FN/AFN is dry packed.)	2nd order LPF	P-SSOP24-300-1.00 P-SSOP24-300-0.65A P-SDIP24-300-1.78
	✧ TC9293AF/AFN/AN		3rd order LPF	
	✧ TC9404FN	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital attenuator (128 steps), digital de-emphasis, built-in analog filter, low voltage supported, digital zero detection	3rd order LPF	P-SSOP24-300-0.65A
	✧ TC9438FN	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital zero detection, dynamic bass boost, digital attenuator (128 steps), digital de-emphasis, built-in analog filter (3rd order LPF), low voltage supported		P-SSOP24-300-0.65A
	✧ TC9470FN	×8 oversampling digital filter, twin DAC (sigma delta modulation type), digital zero detection, dynamic bass boost, digital attenuator (4096 steps), digital de-emphasis, built-in analog filter (3rd order LPF), low voltage supported		P-SSOP24-300-0.65A
Filter IC for 1-bit DAC	TA2009F/P	LPF, amp (used for TC9237BF/BN)	Used with single 5-V power supply	P-SSOP16-225-1.00A
	TA2028F/P		Used with single 9-V power supply	P-DIP16-300-2.54A
	TA2055F/P	LPF, amp (used for TC9270F/N)	Used with single 5-V power supply	P-SSOP16-225-1.00A P-DIP16-300-2.54A
	TA2063F	LPF, amp (used for TC9268F/P, TC9278F/P, TC9276F/P)	Used with single 5-V power supply	P-SSOP16-225-1.00A
1-bit AD/DAC	TC9287AF	1-bit AD/DAC on a single chip		P-QFP44-1010-0.80

✧: Dry-packed product

(Karaoke ICs and Surround ICs)

Classification	Part Number	Functions	Package
Single-chip karaoke IC	✧ TC9452F	Microphone echo, sound field control, dynamic bass boost, built-in 3-ch ADC and 2-ch DAC, built-in delay RAM (64 Kbits)	P-QFP44-1414-0.80D
	✧ TC9465F	Microphone echo, vocal cancel, bass/treble functions, built-in 3-ch ADC and 2-ch DAC, built-in delay RAM (64 Kbits)	P-QFP44-1414-0.80D
	✧ TC9444F-003	Microphone echo, key control, vocal key control, vocal cancel, bass/treble function, built-in 3-ch ADC and 2-ch DAC, built-in delay RAM (64 Kbits) and boot ROM	P-QFP60-1414-0.80D
Microphone echo IC	TC9488F	Built-in microphone amp, microphone echo (128-ms delay), built-in electronic volume control, 3-line bus control or DC control	P-SSOP30-375-1.00
Microphone amp	TA2011S	Single microphone amp, built-in ALC	P-SIP7-2.54A
Surround IC	✧ TC9456F (Note)	SRS 3D stereo, SRS 3D mono, sound field control, bass boost, 3-band EQ function, built-in 3-ch ADC and 2-ch ADC, built-in delay RAM (64 Kbits)	P-QFP44-1414-0.80D
	TA2136F/N (Note)	SRS 3D stereo, SRS 3D Mono	P-SSOP24-300-1.00 P-SDIP24-300-1.78

✧: Dry-packed product

(Note) The SRS; Sound Retrieval System and (●)SRS are registered trademarks of SRS Labs, Inc.
The device incorporated the SRS; Sound Retrieval System under license from SRS Labs, Inc.

(LED Level Meter Driver ICs)

Part Number	Package	Functions	Operating Voltage
TA7612AP	P-DIP16-300-2.54A	Linear scale display, continuous 10 LED display	6 to 15 V

DVD & CD-ROM ICs (DVD ICs)

Classification	Part Number	Functions	Package
RF amp	✧ TA1313F	2-laser, 2-detect, 1-beam (DPD) / 3-beam track error detection	P-QFP80-1414-0.65
	✧ TA1313FA		P-LQFP80-1212-0.50A
	✧ TA1323F		P-LQFP64-1010-0.50A
	✧ TA1329F		P-LQFP80-1212-0.50A
	✧ TA1339F		
	✧ TA1351F	2-laser, 2-detect, 1-beam (DPD) / 3-beam track error detection, ×16 DVD Playback, DVD-RAM Read.	
	✧ TA1365AF	DVD-R × 2 write, ×16 DVD Playback, CD-R × 24 write, APC laser control, 2-laser, 2-detect, 1-beam (DPD) / 3-beam track error detection, DVD-RAM Read.	
	✧ TA1369F	×16 DVD Playback, CD-R × 24 write, APC laser control, 2-laser, 2-detect, 1-beam (DPD) / 3-beam track error detection, DVD-RAM Read.	
Servo & data processor	✧ TC94A03F	DVD/CD digital servo, RF demodulation, error correction	P-LQFP176-2424-0.50A
	✧ TC94A08F		
ATAPI I/F	✧ TC94A12F	Copy protection for DVD-ROM, built-in ATAPI interface circuit, built-in DVD/CD-ROM decoder	P-LQFP144-2020-0.50A
	✧ TC94A16F		
Single chip processor	✧ TC94A11F	DVD/CD digital servo, RF demodulation, error correction, copy protection for DVD-ROM, built-in ATAPI interface circuit, built-in DVD/CD-ROM decoder	P-LQFP216-2424-0.40A
	✧ TC94A25AF	×16 DVD Playback, DVD-RAM read, DVD/CD digital servo, RF demodulation, error correction, Copy protection for DVD-ROM, built-in ATAPI interface circuit, built-in DVD/CD-ROM decoder, Buffer memory 1.5M bit	
	✧ TC94A36F	CD-R × 16 write, DVD × 16 playback, DVD-RAM read, DVD/CD digital servo, RF demodulation, error correction, copy protection for DVD-ROM, built-in ATAPI interface circuit, built-in DVD/CD-ROM decoder	
	✧ TC94A24F	DVD-R × 2 write, DVD × 16 playback, DVD-RAM read, 2-laser, 2-detect, 1-beam (DPD)/3-beam tracking error detection, copy protection for DVD-ROM, built-in ATAPI interface circuit, built-in DVD/CD-ROM decoder	
	✧ TC94A37F	CD-R × 32 write, DVD × 16 playback, DVD-RAM read, DVD/CD digital servo, RF demodulation, error correction, copy protection for DVD-ROM, built-in ATAPI interface circuit, built-in DVD/CD-ROM decoder	
	✧ TC94A38F	DVD-R × 4 write, CD-R × 32 write, DVD × 16 playback, DVD-RAM read, DVD/CD digital servo, RF demodulation, error correction, copy protection for DVD-ROM, built-in ATAPI interface circuit, built-in DVD/CD-ROM decoder	

✧: Dry-packed product

Camera ICs (Film Camera ICs)

Part Number	Description	Features	Package
TA8312F	H bridge	Built-in bias resistors and free-wheeling diodes (lower side)	SSOP16
TA8313F	4-ch sink driver	LED driver, plunger driver for camera	SSOP16
TA8323F	H bridge	Built-in bias resistors and free-wheeling diodes.	SSOP16

(Digital Camera ICs)

Dynastron						
Optical format	Part number	Total pixel number	Color / Mono	Package	Power consumption	Digital signal processor
1/4 inch	TCM8210MD	698 × 502 (350K)	Color (R, G, B)	24-pin package with optical lens	100 mW (15 fps)	Incorporated

Communications Equipment ICs

Mobile Radio IC Series (Bipolar/Bi-CMOS ICs)

Part Number	Function	Use	Features		Package (pin pitch)
TA31136F	IF detection IC	Cordless telephone Car telephone Mobile telephone	Superior temperature characteristics, low operating voltage (1.8 V), RSSI and noise-detect functions		SSOP16 (1.0 mm)
TA31136FN					SSOP16 (0.65 mm)
✧ TA31137FN		Car telephone Mobile telephone	Superior temperature characteristics, low operating voltage (1.8 V), RSSI and noise-detect functions, built-in comparator		SSOP24 (0.65 mm)
✧ TA31180FN		Cordless telephone	Superior temperature characteristics, low operating voltage (1.8 V), external ceramic filter and discriminator not required, RSSI and noise-detect functions	For low-power cordless	SSOP24 (0.65 mm)
✧ TA31188FN				For CT1 cordless	SSOP24 (0.65 mm)
✧ TA31181FN		Mobile telephone	Superior temperature characteristics, external ceramic filter and discriminator not required, RSSI function	Supports AMPS.	SSOP24 (0.65 mm)
TA31142FN		Paging system remote controller	IF detection IC for high-speed transmission paging systems Low operating voltage (1.1 V) AFN type featuring ×2 RSSI slope	IF detection IC with built-in 2nd mixer	SSOP20 (0.65 mm)
TA31142F					SSOP20 (1.0 mm)
TA31145FN				Built-in 2nd mixer, RSSI function	SSOP20 (0.65 mm)
TA31145AFN					
✧ TA31149FN				4-level FSK comparator	SSOP24 (0.65 mm)
✧ TA31149AFN					
TA31161FN		Digital cordless telephone	Capable of 10.7-MHz operation, mixer operating frequency = 300 MHz		SSOP16 (0.65 mm)
✧ TA31165CFL	IF amp	PHS Digital cordless telephone	Built-in IQ modulator, up-converter, 10.8-MHz IF limiter amp; mixer operating frequency 40 MHz to 300 MHz, capable of independent BS control for transmit and receive; Small package, IQ input reference level, Differential: $0.8V_{P-P}$		QON24 (0.5 mm)
✧ TA31139BFL		Digital mobile radio system	High IF amp gain (95dB), Built-in RSSI buffer amp, Contained in small package, Ceramic filter impedance 2 kΩ		QON16 (0.65 mm)
TA31183BFN			Mixer operating frequency = 120 MHz to 140 MHz, external filters not required thanks to built-in 100-kHz channel-select filter, built-in IF amp and RSSI buffer amp, filter attenuation Fo ± 16 kHz, 10dB (typ.)		SSOP20 (0.65 mm)
✧ TA31172AFL			Direct IQ modulator for PDC 800 MHz, built-in 2nd mixer and IF limiter amp, capable of independent BS control for transmit and receive, small package		QON24 (0.5 mm)
✧ TA31331FT	Receive IF		Built-in wide dynamic range AGC amp (variable by 94dB (typ.)), local VCO Tr., IQ demodulator and off-set cancel function. Ultra compact leadless package		TQON24 (0.5 mm)
✧** TA31333FT			Built-in wide dynamic range AGC Amp (Variable by 95dB (typ.)). Current consumption; 7.8 mA (typ.). IF (Intermediate Frequency); 100 MHz to 500 MHz. Ultra compact leadless package		TQON16 (0.5 mm)
TB31202FN	PLL frequency synthesizer	Cordless telephone Specific low-power radio	Two 520-MHz channels (PLL + prescaler), low-voltage operation (1.9 V to 5.5 V), low current consumption (8 mA typ. when all circuits active), capable of independent standby control for each channel		SSOP16 (0.65 mm)
✧ TB31213FN			Two 520-MHz transmit/receive channels (PLL + prescaler + VCO transistor) + 1st mixer, low-voltage operation (1.9 V to 5.5 V), low current consumption (16 mA typ. when all circuits active), capable of independent standby control for transmit and receive		SSOP24 (0.65 mm)
✧ TB31214FN			Two 400-MHz transmit/receive channels (PLL + prescaler + VCO transistor) + 1st mixer, low-voltage operation (1.9 V to 5.5 V), low current consumption (16 mA typ. when all circuits active), capable of independent standby control for transmit and receive		SSOP24 (0.65 mm)
TB31206FN		Cordless telephone Mobile telephone	Two 1.1-GHz channels (PLL + prescaler), low-voltage operation (2.7 V to 5.5 V), low current consumption (16.5 mA (AFN: 14.5 mA) typ. when all circuits active), capable of independent standby control for each channel		SSOP16 (0.65 mm)

✧: Dry-packed product

**: Under development

Mobile Radio IC Series (Bipolar/Bi-CMOS ICs) (continued)

Part Number	Function	Use	Features	Package (pin pitch)
✧ TB31242FN	PLL frequency synthesizer	Digital mobile radio	1.8-GHz single PLL + prescaler; Current consumption: Total 6.0 mA (typ.)	SSOP10 (0.65 mm)
✧ TB31245FN			Designed for PHS, 1.6-GHz single PLL + prescaler, phase comparison frequency: 300 kHz (fixed); Current consumption: Total 6.0 mA (typ.)	SSOP10 (0.65 mm)
✧ TB31251FL			1.4 GHz + 1.4 GHz: 2-channel PLL + prescaler, capable of independent BS and power supply control for each channel, small package; Current consumption: Total 6.0 mA (typ.)	QON16 (0.65 mm)
✧ TB31257FT			2.6 GHz + 800 MHz for WCDMA: 2-channel PLL + prescaler, Realized fast lock-up by Fractional-N function, Ultra compact leadless package; Current consumption: Total 5.1 mA (typ.)	TQON16 (0.5 mm)
✧* TB31257FTG				VQON16 (0.5 mm)
✧ TB31356AFL			1.8 GHz + 600 MHz 2-channel PLL + prescaler, independent BS control each channel, Ultra compact leadless package; Current consumption: Total 3.7 mA (typ.)	QON16 (0.65 mm)
✧* TB31356AFT				TQON16 (0.5 mm)
✧ TB31167FL	RF single-chip IC	PHS Digital cordless telephone	IQ modulator, up-converter, AGC, 1.6 GHz + 233.15 MHz (fixed) dual PLL + prescaler independent BS control each circuit, small package; Current consumption: Transmitter 22 mA (Including PLL) (typ.) Receiver 8.4 mA (Including PLL) (typ.) PLL 4.2 mA (typ.)	QON48 (0.5 mm)
✧ TB31177FL		Digital mobile radio (PDC1.5G)	IQ modulator, 1.8 GHz + 600 MHz dual PLL + prescaler Built-in local MIX, buffer amp, 1st IF amp, 2nd MIX and limiter amp Capable of independent BS control for each circuit, small package; Current consumption: Transmitter: 26 mA (typ.) Receiver: 3.1 mA (typ.) PLL: 3.7 mA (typ.) Lo-MIX: 15 mA (typ.)	QON48 (0.5 mm)
TB31224CF		Cordless telephone	CT0 compatible PLL, IF detection, compander – all integrated into a single chip Built-in peripherals; Power-on reset function	QFP48 (0.8 mm)
✧ TB31261AF			900-MHz analog cordless compatible PLL, IF detection, compander – all integrated into a single chip	QFP52 (0.65 mm)
✧* TB31262F			Built-in peripherals; VCO, varicap, LNA, MIX, PA – all integrated into a single chip	QFP52 (0.65 mm)
✧* TB32301AFL		ISM Band radio	2.4 GHz, PLL, VCO, LNA, MIX, IF detection, PA - all integrated into an RF single-chip IC, receiver: analog/digital interface, small package	QON36 (0.5 mm)
✧** TA32305FN	RF-IF IC	Remote control (AM/FM system)	RF amp operating frequency: 240 kHz to 450 kHz, MIX, AM/FM demodulator, 2-level comparator, V_{CC} = 2.2 V to 5.5 V, built-in local ×8 multiple circuit, receiver/transmitter IC	SSOP30 (0.65 mm)
✧** TB31296XBG	RF IC	Bluetooth radio	PLL, VCO, LNA, MIX, BPF, IF-amp, detector, PA - all integrated into a single chip, small package; Current consumption: Transmitter 28 mA (typ.) Receiver 42 mA (typ.)	FBGA48 (0.5 mm)
✧ TA31272FN	RF-IF IC	Remote control (AM/FM system)	RF amp operating frequency: 450 MHz Built in MIX, AM/FM demodulator and 2-level comparator V_{CC} = 2.7 V to 5.5 V	SSOP24 (0.65 mm)
TA31273FN		Remote control (AM system)	RF amp operating frequency: 240 kHz to 450 kHz, MIX, AM demodulator, 2-level comparator, V_{CC} = 3.0 V to 5.5 V, built-in local ×8 multiple circuit	SSOP20 (0.65 mm)
✧* TA31275FN		Remote control (AM/FM system)	RF amp operating frequency: 240 kHz to 450 kHz, MIX, AM/FM demodulator, 2-level comparator, V_{CC} = 2.4 V to 5.5 V, built-in local ×8 multiple circuit	SSOP24 (0.65 mm)
TA31276FN	IF IC	Remote control (AM system)	40 MHz, built in AM comparator	SSOP16 (0.65 mm)

✧: Dry-packed product

*: New product

**: Under development

Fax Machine ICs

Part Number	Function	Features	Package
✧ TC35127AF	Single-chip 9600-bps modem	built-in 2-channel AD/DA converter, G3, 9600 bps to 2400 bps, HDLC procedure supported, DTMF-detect function, recording/playback function (bit rate 4.3 kbps), CNG tone-detect function, hands-free function, ruled synthesis (AF)	QFP100PIN
✧ TC35129F		G3, 9600 bps to 2400 bps, HDLC procedure supported, DTMF-detect function, recording/playback function (bit rate 20.736 kbps)	QFP80PIN
✧ TC35137FG	Single-chip 14,400-bps modem	G3, 14,400 bps to 2400 bps, HDLC procedure supported, DTMF-detect function, recording/playback function (bit rate 9.6 kbps/6.8 kbps), CNG tone detect function	QFP80PIN
✧ TC35136F		built-in 2-channel AD/DA converter, G3, 14,400 bps to 2400 bps, HDLC procedure supported, DTMF-detect function, recording/playback function (bit rate 4.3 kbps), CNG tone detect function, hands-free function	QFP100PIN
✧ TC351600FG	Single-chip facsimile processor (RISC)	14,400-bps FAX modem, V.34 Data modem, 64 gray-level image processing function, Toshiba original 32-bit RISC processor, built-in peripheral control circuit, recording/playback function, hands-free function	QFP256PIN
✧ TC351700F (Enfax®)	Single-chip facsimile processor	14,400-bps modem, 64 gray-level image processing function, Toshiba original 16-bit MPU, built-in peripheral control circuit, recording/playback function, hands-free function, Clock tripler	QFP240PIN
✧ TC35177F(Enfax®)		14,400-bps modem, 64 gray-level image processing function, Toshiba original 8-bit MPU, built-in peripheral control circuit, recording/playback function, hands-free function, Clock quadrupler	QFP208PIN
✧ TC35175F(Enfax®)		14,400-bps modem, 64 gray-level image processing function, Toshiba original 8-bit MPU, built-in peripheral control circuit	QFP208PIN
✧ TC35162F(Enfax®)		9600-bps modem, 64 gray-level image processing function, Toshiba original 8-bit MPU, built-in peripheral control circuit, recording/playback function, hands-free function, Clock quadrupler	QFP208PIN
✧ TC35165F(Enfax®)		9600-bps modem, 16 gray-level image processing function, Toshiba original 8-bit MPU, built-in peripheral control circuit	QFP176PIN
TC35133F	Modem analog front end used exclusively for Enfax®	Enfax (TC35162F, TC35177F, TC35175F), built-in 1-channel AD/DA converter	SOP16PIN
TC35123F		Enfax (TC35167F, TC35166F, TC35165F), built-in 1-channel AD/DA converter	SOP16PIN
✧ TC35140FG		Enfax (TC351700F), built-in 2-channel AD/DA converter	QFP44PIN
✧ TC35143DF/DFG	Modem analog front end for Enfax and Toshiba RISC processors	Enfax (TC351600F), built-in 2-channel AD/DA converter, touch screen interface	QFP64PIN
✧ TC35150FG	Analog front end for black and white image processing	Enfax (TC351600F), S/H, clamp, AGC, 8-bit AD converter	QFP44PIN

✧: Dry-packed product

Note 1: Part number suffix G: Lead-free package

Bluetooth™ ICs

Part Number	Feature	Description	Package
TC356510XB TC356510XBG	BaseBand-LSI (HCI model/Complete model)	• Complies with Bluetooth specifications Ver. 1.1. • Supports HCI/Complete models • Built-in upper protocol stack and profile (Complete model) • ARM7TDMI (Note 2) CPU with clock frequency of 13/26 MHz • Built-in SRAM (also equipped with external RAM (for expansion)) • System LSI interfaces: High-speed UART (921.6 kbps), PCM interface (voice), SDIO • Multi-RF interface • 113-pin TFBGA (8 × 8 × 1.2 mm) • Supports Flip Chip	TFBGA Flip chip
TC356510XL ** TC356510XLG	BaseBand-LSI (HCI model/Complete model)	TC356510XB thin package: 113-pin WFLGA (8 × 8 × 0.8 mm)	WFLGA Flip chip

Bluetooth is a property owned by its proprietor and used by Toshiba under license.

**: Under development

Note 1: Part number suffix G: Lead-free package

Note 2: A registered trademark of ARM Ltd.

High-Frequency Power Amp ICs

MMICs

Part Number	Package	Structure	Applications	Electrical Characteristics (Ta = 25°C)
TG2006F	SM8	GaAs linear power amp	Power amp for PHS, 1.9 GHz band amp	Po > 21dBmW, Gp = 23dB (Typ.), It = 130 mA (Typ.) @f = 1.9 GHz, Vd = 3 V
TG2401F	HSOP20	GaAs linear Power AMP + antenna switch	Power AMP & antenna switch for PHS (1.9 GHz band)	PA: $G_P \geq 32$dB, $I_{total} \leqq 170$ mA @f = 1.893 GHz, Po = 20.5dBmW SW: $L_{OSS\ RX} = 0.8$dB $ISL_{TX} = 25$dB $ISL_{RX} = 15$dB @f = 1.893 GHz, $V_C = 0$ V/3 V
TG2402FC	CS20	GaAs linear Power AMP + antenna switch	Power AMP & antenna switch for PHS (1.9 GHz band)	PA: $G_P \geq 33$dB, $I_{total} \leqq 180$ mA @f = 1.92 GHz, Po = 20.2dBmW SW: $L_{OSS\ RX} = 0.8$dB $ISL_{TX} = 25$dB $ISL_{RX} = 15$dB @f = 1.92 GHz, $V_C = 0$ V/3 V

Modules

Part Number	Application		Frequency Range f (MHz)	Po (Min) (W)	ηT (Min) (%)	ρi (Max)	Test Conditions	
							Pi (mW)	V_{GG}/V_{DD} (V)
S-AV32	VHF	50-W professional-use radio	134 to 174	60	45	3	50	5/12.5
S-AV33		25-W professional-use radio	134 to 174	32	45	3	50	5/12.5
S-AV35		25-W marine radio	154 to 162	32	50	3	10	5/12.5
S-AU50L	UHF	5-W FM professional-use radio	400 to 430	7	40	3.0	50	4/9.6
S-AU50M			430 to 480	7	40	3.0	50	4/9.6
S-AU50H			470 to 520	6.5	40	4.5	50	4/9.6
S-AU57		5-W FM handy amateur-use radio	430 to 450	7	40	3.0	20	4/9.6
S-AU68L		5-W FM handy professional-use radio	400 to 420	7	35 (@Po = 7 W)	5.0 (@Po = 7 W)	20	4/9.6
S-AU68M			450 to 470	7	40 (@Po = 7 W)	2.5 (@Po = 7 W)	20	4/9.6
S-AU82L		50-W professional-use radio	400 to 470	60	40	3	50	5/12.5
S-AU82H		50-W professional-use radio	450 to 520	60	40	3	50	5/12.5
S-AU83L		25-W professional-use radio	400 to 470	32	40	3	50	5/12.5
S-AU83H		25-W professional-use radio	450 to 520	32	40	3	50	5/12.5
S-AU86	800-MHz band digital MCA		889 to 915	10	40	2.5	100	$I_{DD} = 1.7$ A adjusted/12.0

Surface Mount Small Package Modules (MicroPA)

Part Number	Application	Frequency Range f (MHz)	Po (Min) (dBmW)	Icc (Typ.) (mA)	Gp (Typ.) (dB)	ACPR1 (Typ.) (dB)	ACPR2 (Typ.) (dB)	Vcc (V)	Vbb (V)	Input Signal
** S-AL54	W-CDMA/UMTS	1920 to 1980	26.5	290	26.5	−40 (@Δf = 5 MHz)	−50 (@Δf = 10 MHz)	3.5	2.85	
S-AU84	Japan CDMA 2000 1X	887 to 925	27.5	415	27.5	−49 (@Δf = 900 kHz)	−59 (@Δf = 1.98 MHz)	3.5	2.8	1X
S-AU85	North America, South Korea, China CDMA 2000 1X	824 to 849	27.5	415	27.5	−49 (@Δf = 900 kHz)	−59 (@Δf = 1.98 MHz)	3.5	2.8	1X
** S-AU87	Japan CDMA 2000 1X	887 to 925	27.0	355	27	−49 (@Δf = 900 kHz)	−60 (@Δf = 1.98 MHz)	3.5	2.8	1X

**: Under development

Automotive ICs

System Power Supplies

Part Number	Function	Output Voltage (typ.) (V)	Output Current (max) (mA)	Input Voltage (max) (V)	Power Dissipation (max) (W)	Package	Remarks
TA7900S	CPU regulator, built-in watchdog timer	5	10	40	0.5	SIP9	Reset detection 92%
TA7900F	CPU regulator, built-in watchdog timer	5	10	40	0.28	SOP14	Reset detection 92%
TA8000S	CPU regulator, built-in watchdog timer	5	10	80 (1 s)	0.5	SIP9	Reset detection 85%
TA8000F	CPU regulator, built-in watchdog timer	5	10	80 (1 s)	0.28	SOP14	Reset detection 85%
TA8001S	Regulator with reset timer	5	20	30	0.5	SIP7	Built-in output transistor
TA8002S/AS	Regulator with reset timer	5	0.5	40	0.5	SIP7	External output transistor
TA8005S	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.5	SIP9	Standby current = 0.85 mA (typ.)
TA8005F	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.28	SOP14	Standby current = 0.85 mA (typ.)
TA8006ASN	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.5	SSIP12	Standby current = 0.3 mA (typ.)
TA8006SN	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.5	SSIP12	Standby current = 0.3 mA (typ.)
TA8007S	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.5	SIP9	Standby current = 0.6 mA (typ.) Reset detection 92%
TA8007F	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.6	SSOP16	Standby current = 0.6 mA (typ.) Reset detection 92%
TA8007AS	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.5	SIP9	Standby current = 0.6 mA (typ.) Reset detection 88%
TA8008F	CPU regulator, built-in watchdog timer	5	10	60 (1 s)	0.5	SSOP16	Standby current = 0.5 mA (typ.) Built-in wake-up timer
TA8041HA	CPU dual regulator, built-in watchdog timer	5 5	250 100	40 (1 s)	2.5 (Note)	HZIP12	Built-in output transistor Note: Without a PCB
TA8041F	CPU dual regulator, built-in watchdog timer	5 5	250 100	40 (1 s)	1.0 (Note)	HSOP20	Built-in output transistor Note: Without a PCB
TA8042F	CPU regulator, built-in watchdog timer	5	100	60 (1 s)	1.0 (Note)	HSOP20	Built-in output transistor Note: Without a PCB
TA8044F	CPU dual regulator, built-in watchdog timer	3.3 5.0	10 10	60 (1 s)	0.5	SSOP16	3.3-V CPU regulator Current limiter: 250 mA
TA8044AF	CPU dual regulator, built-in watchdog timer	3.3 5.0	10 10	60 (1 s)	0.5	SSOP16	3.3-V CPU regulator Current limiter: 150 mA
TA8045BF	CPU regulator, built-in watchdog timer	5	50	60 (1 s)	0.6	SSOP16	Built-in output transistor Vth: 4.6 V (typ.)
** TA8045SF	CPU regulator, built-in watchdog timer	5	50	60 (1 s)	0.6	SSOP16	Built-in output transistor Vth: 3.65 V (typ.)
TB9000F	CPU regulator, built-in watchdog timer	5	10	45 (1 s)	0.6	SSOP16	Low current consumption: 120 μA Watchdog timer OFF function
TB9001FN	CPU regulator, built-in watchdog timer	5	5	45 (1 s)	0.68	SSOP20(0.65)	Low current consumption: 95 μA Built-in 32-kHz clock

**: Under development

Drivers (H-bridge Drivers)

Part Number	Function	Output Voltage (typ.) (V)	Output Current (max) (mA)	Input Voltage (max) (V)	Power Dissipation (max) (W)	Package	Test Conditions
TA8050AK	H-bridge driver	—	1500	60 (1 s)	1.9 (Note)	HSIP7	Note: Without a PCB
TA8050P	H-bridge driver	—	1500	60 (1 s)	1.9 (Note)	HSIP7	Note: Without a PCB
TA8050F	H-bridge driver	—	1500	60 (1 s)	1.0 (Note)	HSOP20	Note: Without a PCB
TA8051P	H-bridge driver	—	3000	60 (1 s)	2.5 (Note)	HZIP12	Note: Without a PCB
TA8052S	H-bridge driver	—	300	50 (1 s)	0.92	SIP7	
TA8052AS	H-bridge driver	—	300	50 (1 s)	0.92	SIP7	
TA8053H	H-bridge driver	—	3000	60 (1 s)	2.5 (Note)	HZIP12	Note: Without a PCB
TA8080K	H-bridge driver	—	1000	60 (1 s)	1.9 (Note)	HSIP7	Note: Without a PCB
TA8081P	H-bridge driver	—	700	60 (1 s)	1.6	DIP16	
TA8082H	H-bridge driver	—	1500	60 (1 s)	3.1 (Note)	HZIP15	Note: Without a PCB
TA8083P	H-bridge driver	—	500	60 (1 s)	1.4 (Note)	DIP16	Note: Without a PCB
TA8083F	H-bridge driver	—	500	60 (1 s)	1.0 (Note)	HSOP20	Note: Without a PCB
TA8083AF	H-bridge driver	—	700	60 (1 s)	1.0 (Note)	HSOP20	Note: Without a PCB
** TB9050F	H-bridge driver	—	1500	40 (1 s)	0.6	SSOP16	

**: Under development

(High-side Drivers)

Part Number	Function	Output Voltage (typ.) (V)	Output Current (max) (mA)	Input Voltage (max) (V)	Power Dissipation (max) (W)	Package	Test Conditions
TA8061H	Dual high-side driver	—	−1500	60 (1 s)	2.5 (Note)	HZIP12	Note: Without a PCB
TA8062S	Dual high-side driver	—	−300	50 (1 s)	0.92	SIP7	
TA8063F	Quad high-side driver	—	−500	60 (1 s)	1.0 (Note)	HSOP20	Note: Without a PCB

(Low-side Drivers)

Part Number	Function	Output Voltage (typ.) (V)	Output Current (max) (mA)	Input Voltage (max) (V)	Power Dissipation (max) (W)	Package	Test Conditions
TA8066AS	Dual low-side switch	—	300	50 (1 s)	0.92	SIP7	
TA8068L	Quad low-side switch	—	1500	60 (1 s)	2.5 (Note)	HSIP12	Note: Without a PCB
TA8068F	Quad low-side switch	—	1500	60 (1 s)	1.0 (Note)	HSOP20	Note: Without a PCB
TA8069F	Quad low-side switch	—	500	60 (1 s)	1.0 (Note)	HSOP20	Note: Without a PCB

3-Phase Controller

Part Number	Function	Output Voltage (typ.) (V)	Output Current (max) (mA)	Input Voltage (max) (V)	Power Dissipation (max) (W)	Package	Remarks
TB9060FNG	Sensorless 3-phase full-wave controller	—	20	6	0.85	SSOP24 (0.65)	3-phase full-wave PWM control

Note: Lead-free package

Special Function

Part Number	Function	Output Voltage (typ.) (V)	Output Current (max) (mA)	Input Voltage (max) (V)	Power Dissipation (max) (W)	Package	Remarks
TA8020S/AS	Dual voltage sensor	—	20	16	0.5	SIP9	Automotive lamp failure sensor
TA8021S	Triple voltage sensor	—	20	16	0.5	SIP9	Automotive lamp failure sensor
TA8025F	Sensor I/O	—	10	36	0.28	SOP8	Pick-up sensor interface
TA8025P	Sensor I/O	—	10	36	0.28	DIP8	Pick-up sensor interface
TA8026AP	Flasher controller	—	300	28	0.3	DIP8	
TA8026P	Flasher controller	—	300	28	0.3	DIP8	
TA8028S	Duty controller	—	300	6.2	0.3	SIP7	
TA8029S	Frequency/voltage converter	—	30	5.5	0.35	SIP9	
TA8030S	Watchdog timer for CPU systems	—	10	17	0.3	SIP7	
TA8030F	Watchdog timer for CPU systems	—	10	17	0.28	SOP8	
TD6347S	Timer	—	250	30	0.5	SIP9	Long-duration timer
TD6347F	Timer	—	250	30	0.4	SSOP10	Long-duration timer

Microcomputer Peripheral Control LSIs (Car Clock & Display LSI)

Part Number	Function	Features	Package
TC9538NG/✧UG	VFD-display digital car clock	Hours/minutes (VFD display), built-in power-on reset, variable dimming function (1/128 to 3/8), 12H/24H selection	SDIP42/μQFP44

✧: Dry-packed product

◆ The part number suffix “G” denotes a lead-free product. For some products, lead-free alternatives may not be available yet. Please consult us about this point before placing an order for Toshiba products.

Display Driver ICs

Driver ICs for LED (LED Panel Driver ICs)

Part Number	Package	Use	Structure
TB62702P/F	DIP20/SOP20	10-segment display	10-bit DMOS sink driver (SIPO, latch), 30 V/30 mA
TB62705CP/**CF**/CFN	DIP16/SSOP16	Small LED panel	8-bit constant-current sink driver (SIPO, latch), 17 V/90 mA
TB62706BN/**BF**	SDIP24N/SSOP24	Large LED panel	16-bit constant-current sink driver (SIPO, latch), 17 V/90 mA
TB62707F	SSOP24	Full-color LED panel	8-bit constant-current sink driver (PIPO, latch), 17 V/90 mA
TB62708N	SDIP30N	Large LED panel	16-bit constant-current source driver (SIPO, latch), 17 V/−90 mA
TB62709N/F	SDIP24N/SSOP24	7-segment display	4-digit 7-segment display (anode common) decoder + constant-current driver (SIPO), 17 V/50 mA, −400 mA/digit
TB62710P/F/FN	DIP20/SSOP24/SSOP20	Small LED panel	8-bit constant-current source driver (SIPO, latch), 17 V/−90 mA
TB62713N/F	SDIP24N/SSOP24	7 × 5 dot display	7 × 5 dot display (common cathode rows) decoder + constant-current driver (SIPO), 17 V/60 mA, −420 mA/digit
TB62715FN	SSOP20	Small LED panel	8-bit constant-current sink driver (SIPO, latch), 17 V/150 mA
TB62717N/F	SDIP42N/QFP48	Full-color LED panel	24-bit constant-current sink driver (SIPO, latch), 17 V/50 mA
TB62718AF	HQFP64	Full-color LED panel	PWM control 256-level gray scale + current compensation, 16-bit constant-current sink driver, 26 V/80 mA
TB62719AF	HQFP64	Full-color LED panel	PWM control 256-level gray scale + current compensation, 16-bit constant-current sink driver, 26 V/80 mA (upward compatible with the TB62718AF)
TB62725AP/**AF**/AFN	DIP16/SSOP16/SSOP16	Small LED panel	3.3-V to 5-V drive, 8-bit constant-current sink driver (SIPO, latch), 17 V/90 mA
TB62726AN/**AF**	SDIP24N/SSOP24	Large LED panel	3.3-V to 5-V drive, 16-bit constant-current sink driver (SIPO, latch), 17 V/90 mA

SIPO: Serial-in parallel-out

PIPO: Parallel-in parallel-out

Toshiba manufactures the products in bold in the factories in Malaysia and Thailand as well as in Japan. We ship the products from the factories for overseas assembly of end products.

(White LED Driver ICs)

Part Number	Package	Use	Structure
TB62731FUG	SOT23-6pin	White color LED back light driver	Constant current step-up DC/DC converter (output: 320 mW, efficiency: 80%, maximum output voltage: 30 V, maximum switching current: 0.3 A)
TB62732FUG			
** TB62733FTG	VQON24	White color LED back light driver	Charge-pump DC/DC converter, output current: 200 mA
** TB62734FMG	SON8	White color LED back light driver	Constant current step-up DC/DC converter, efficiency: 85% (max), output: 500 mW
** TB62735FTG	VQON24	White color LED back light driver	Charge-pump DC/DC converter + constant-current driver

**: Under development

Driver ICs for Large TFT-LCD Module (PC/TV Module Driver ICs)

Part Number	Function	Functions/Features	Supply Voltage (V)		No. of LCD Drive Outputs	Package
			Logic (Min)	LCD (Max)		
T6L37A	TFT source driver	Data transfer: bidirectional shift, 64 gray levels	3.0	5.5	300/309	TCP
T6L52	TFT gate driver	Data transfer: bidirectional shift, 3-level output	2.7	42	258	TCP
T6L58	TFT gate driver	Data transfer: bidirectional shift, 2-level output	2.7	42	256	TCP
T6L60	TFT gate driver	Data transfer: bidirectional shift, 2-level output	3.0	40	150/154	TCP
T6L70	TFT gate driver	Data transfer: bidirectional shift, 3-level output	2.7	40	211/241	TCP
T6L76E	TFT source driver	Data transfer: bidirectional shift, 256 gray levels	3.0	13	384	TCP
T6L79	TFT source driver	Data transfer: bidirectional shift, 64 gray levels	3.0	10	384	TCP
** T6L92	TFT source driver	Data transfer: bidirectional shift, 64 gray levels, RSDS interface	2.7	15.5	384	TCP/COF
** T6L94	TFT source driver	Data transfer: bidirectional shift, 256 gray levels, Mini-LVDS interface	2.3	16.5	480	COF
T6L97	TFT gate driver	Data transfer: bidirectional shift, 2-level output	2.7	43.5	263/256/240	TCP/COF
** T6LA0	TFT gate driver	Data transfer: bidirectional shift, 2-level output	2.7	43.5	263/256/240/200	TCP/COF

**: Under development

Driver ICs & Controllers for TFT-LCD Mobile Module (PDA Module Driver ICs)

Part Number	Function	Functions/Features	Supply Voltage (V)		No. of LCD Drive Outputs	Package
			Logic (Min)	LCD (Max)		
JBT6L77-AS	TFT source driver	Data transfer: bidirectional shift, 64 gray levels, R-DAC method	2.5	5.5	240	BUMP CHIP
JBT6L78-AS	TFT gate driver	Data transfer: bidirectional shift, 2-level output	2.5	36	162	BUMP CHIP

(Cellular Phone Module Driver ICs)

Part Number	Function	Functions/Features	Supply Voltage (V)		No. of LCD Drive Outputs	Package
			Logic (Min)	LCD (Max)		
JBT6K47-AS	TFT source driver	Gray scale data: Digital 18-bit parallel transfer 2/16/64 level gray scale switching, gamma correction	2.5	5.6	264	Bump chip
JBT6K48-AS	TFT gate driver	220/240 output switching Data transfer: Bidirectional shift	2.5	33	240	Bump chip
JBT6K49-AS	Power supply IC	Power supply for the T6K47/48, built-in DC/DC converter, oscillator, regulator and level shifter	2.7	26	—	Bump chip
JBT6K57-AS	TFT source driver	Used for LTPS, built-in 760320-bit RAMs, 262144 colors (64 levels), 18-/16-/9-/8-bit MPU bus (high-speed mode = 10 MHz) interface, dual-screen partial display function, superimpose function	2.5	5.5	528	Bump chip
JBT6K58-AS	Power supply IC	Gate drive power supply, Op-amp power supply, gamma correction power supply, VCOM power supply (variable), LTPS signal level shifter, high-precision regulator (temperature slope: 0.0%/°C typ.), built-in CR oscillator for DC/DC converter	2.5	—	—	Bump chip
** JBT6K65-AS	TFT source driver	Used for LTPS, built-in 1,622,016-bit RAM, 262,144 colors max, 18-/16-/9-/8-bit MPU bus (high speed mode = 20 MHz) interface, 18-/16-/8-bit RGB bus interface, serial interface, normal/partial display mode (1-/2-frame), on screen display function	1.7	5.5	256	Bump chip
** JBT6K66-AS	Power supply IC	Analog power supply circuit for gate driver and op-amp, built-in gamma correction circuit, COM voltage generator (adjustable voltage by setting), level shifter for LTPS gate driver, high precision regulator (TC (typ.): 0.0%/°C) and CR oscillator for DC-DC converter	1.7	−9.0 +10.0	—	Bump chip
** JBT6K68-AS	TFT source/gate driver	Built-in 313,632-bit RAM, 262,144 colors max, Built-in DC-DC converter, high precision regulator (TC (typ.): 0.0%/°C), op-amp, gamma correction circuit and COM voltage generator normal/partial display mode (1-/2-frame)	1.7	−15.0 +15.0	396 sources 132 gates	Bump chip

**: Under development

Driver ICs & Controllers for STN-LCD Mobile Module (Graphic Type Driver ICs)

Part Number	Function	Functions/Features	Supply Voltage (V)		No. of LCD Drive Outputs	Package
			Logic (Min)	LCD (Max)		
T7932	STN column driver	Data transfer: 8-bit parallel from CPU Built-in 1600-bit RAM, switchable pin assignment	4.5	V_{DD}-11	50	FP80
T7933	STN row driver	1/8, 1/12, 1/16, 1/24, 1/32 duty cycles Built-in power supply-dividing resistor	4.5	V_{DD}-11	32	FP60
T6B65A	STN column driver	Data transfer: 8-bit parallel from CPU Built-in 5120-bit display RAM + 80-bit flag RAM	2.7	V_{DD}-16	80	FP100
T6B66B	STN row driver	Selectable 1/17, 1/33, 1/49, 1/65 duty cycle Built-in power supply dividing resistor and DC/DC converter	2.7	V_{DD}-16	65	FP100
T6C23	STN column driver	Data transfer: 8-bit parallel from CPU Built-in 38,400-bit RAM, display-off function	2.7	30	160	TCP
T6C24	STN row driver	1/240 duty cycle, display-off function	2.7	30	240	TCP
T6K01	STN column driver	Data transfer: 8-bit parallel from CPU Built-in 38,400-bit RAM, display-off function	2.7	26	240	TCP
T6B79	STN column/row driver	Selectable 1/16, 1/32, 1/48 duty cycle, built-in 3072-bit RAM Built-in LCD drive power supply and DC/DC converter	2.7	V_{DD}-16	64 columns 48 rows	TCP
T6C84	STN column/row driver	1/34 duty cycle, built-in 4624-bit RAM, LCD drive power supply circuit and DC/DC converter	2.7	V_{DD}-16	136 columns 34 rows	TCP
T6K04	STN column/row driver	Selectable 1/32, 1/48, 1/56, 1/64 duty cycle, built-in 8192-bit RAM, LCD drive power supply circuit and DC/DC converter	2.7	V_{DD}-16.5	128 columns 64 rows	TCP
T6K11	STN column/row driver	Selectable 1/35, 1/49, 1/57, 1/64 duty cycle, built-in 10,400-bit RAM, LCD drive power supply circuit, voltage regulator and DC/DC converter, Icon display mode	1.8	16.5	160 columns 65 rows	TCP, Bump chip
T6K14	STN column/row driver	For reflecting color STN LCD, 4-color display, Built-in 16640-bit RAM, Temperature compensation circuit, voltage regulator and DC/DC converter, Icon display mode	2.4	16.5	128 columns 65 rows	TCP, Bump chip
T6K18	STN column/row driver	Selectable 1/18, 1/26 duty cycle. Built-in 2080-bit RAM, regulator for OSC circuit, regulator for LCD power, and DC/DC converter. Current consumption; 10 μA (typ.) (Note)	1.8	5.44	80 columns 26 rows	TCP, Bump chip

Note: V_{DD} = 3 V, HALT, LCD ON, No load, No data access.

(Character Type Driver ICs)

Part Number	Function	Functions/Features	Supply Voltage (V)		No. of LCD Drive Outputs	Package
			Logic (Min)	LCD (Max)		
T7934	LCD controller/driver	Serves dual purposes as driver and controller; built-in CG ROM	4.5	5.5	40 columns 16 rows	FP80
T6B20	LCD controller/driver	Serve dual purposes as driver and controller built-in 8 × 8 key matrix / 8 × 2 LED controller	4.5	V_{DD}-11	50 columns 16 rows	FP100
T6A41	STN column driver	Data transfer: serial, bidirectional shift	4.5	5.5	64	FP92
T6A92	STN column driver	Data transfer: serial, bidirectional shift	4.5	5.5	80	FP100
T6B23	STN column driver	Data transfer: serial, bidirectional shift	4.5	V_{DD}-11	80	FP100

(Controllers)

Part Number	Function	Functions/Features	Supply Voltage (V)		No. of LCD Drive Outputs	Package
			Logic (Min)	LCD (Max)		
T6963C	LCD controller	Designed for both character and graphic use	4.5	—	—	FP67
T7779	LCD controller	CRTC/LCDC that is software compatible with HD6845S	4.5	—	—	FP100

(PDA Module Driver ICs)

Part Number	Function	Functions/Features	Supply Voltage (V)		No. of LCD Drive Outputs	Package
			Logic (Min)	LCD (Max)		
JT6J14-AS	STN column driver	Data transfer: 4-bit bidirectional, medium module type	2.7	28	120	CHIP
JT6J15A-AS	STN row driver	Built-in DC/DC converter, built-in op-amp, built-in contrast control circuit	2.7	28	80	CHIP

Network & Interface ICs

Bluetooth™ ICs

Part Number	Feature	Description	Package
TC356510XB TC356510XBG	BaseBand-LSI (HCI model/Complete model)	• Complies with Bluetooth specifications Ver. 1.1. • Supports HCI/Complete models • Built-in upper protocol stack and profile (Complete model) • ARM7TDMI (Note 2) CPU with clock frequency of 13/26 MHz • Built-in SRAM (also equipped with external RAM (for expansion)) • System LSI interfaces: High-speed UART (921.6 kbps), PCM interface (voice), SDIO • Multi-RF interface • 113-pin TFBGA (8 × 8 × 1.2 mm) • Supports Flip Chip	TFBGA Flip chip
TC356510XL ** TC356510XLG	BaseBand-LSI (HCI model/Complete model)	TC356510XB thin package: 113-pin WFLGA (8 × 8 × 0.8 mm)	WFLGA Flip chip

Bluetooth is a property owned by its proprietor and used by Toshiba under license.

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Note 1: Part number suffix G: Lead-free package

Note 2: A registered trademark of ARM Ltd.

Peripheral Equipment LSIs

Part Number	Function	Output Voltage (typ.) (V)	Output Current (max) (mA)	Input Voltage (max) (V)	Power Dissipation (max) (W)	Package	Remarks
TA8505P	Power supply monitor	—	−1 mA, 16 mA	—	0.096	DIP8	
TA8532F	Battery charger for lead batteries	—	—	—	0.2	SOP18	1 to 6 lead cells
TA8532P	Battery charger for lead batteries	—	—	—	0.2	DIP16	1 to 6 lead cells
TA8552AFN	PLL for data synthesizers	—	—	—	0.3	VSOP30	Supports DAT streamer, tape streamer.
TA8576AFN	APC for optical disk	—	200	—	0.385	VSOP20	Designed for optical disk
TA6009FM	Shock sensor amp (voltage amp)	—	—	—	0.012	SON10	3.3-V/5.0-V operation, 1 channel, small package
TA6009FN/FNG	Shock sensor amp (voltage amp)	—	—	—	0.012	VSOP10	3.3-V/5.0-V operation, 1 channel
TA6038FN/FNG	Shock sensor amp (charge amp)	—	—	—	0.0125	VSOP10	3.3-V/5.0-V operation, charge amp, 1 channel
TA6039FN	Shock sensor amp (low-noise voltage amp)	—	—	—	0.0135	VSOP10	3.3-V/5.0-V operation, 1 channel, low-noise
* TB6066FNG	Shock sensor amp (low-noise charge amp)	—	—	—	0.025	VSOP16	3.3-V/5.0-V operation, charge amp, 3-ch op amp, low-noise
TA6015F-A5	Laser power control for optical disk (MO)	—	4	—	0.45	VQFP64	Designed for optical disk
TC9357FM	High-frequency modulation for laser diode (2-ch)	—	—	—	—	SON8	Designed for dual wavelength laser
TC9384FU/FUG	High-frequency modulation for laser diode	—	—	—	—	SSOP6	Semiconductor laser use
TC9364FN	Laser driver	—	300	—	0.072	VSOP20	Designed for optical disk
TC9376FNG	Laser driver	—	300	—	0.072	VSOP16	Designed for optical disk
TC9358FN	Laser driver	—	300	—	0.072	VSOP20	Designed for optical disk
TC9386AFU/AFUG	High-frequency modulation for laser diode (2-ch)	—	—	—	—	SSOP6	Designed for dual wavelength laser, Small package
** TC9381FN/FNG	Laser driver	—	400	—	—	VSOP16	Designed for optical disk
TC9383FN/FNG	Laser driver	—	400	—	—	VSOP20	Designed for optical disk
** TC9382FLG	DVD/CD 2-output laser driver	—	—	—	—	QON24	Designed for optical disk
** TC9390FNG	Laser driver	—	—	—	—	VSOP16	Designed for optical disk
TC9350AFN	USB mouse controller	—	—	—	0.025	VSOP16	Designed for USB ball type/optical mouse
TC9350BFN	USB optical mouse controller	—	—	—	0.025	VSOP16	Designed for USB ball type/optical mouse

*: New product

**: Under development

Digital Temperature Compensation ICs

Overview

The digital temperature compensation ICs operate in the temperature range between −20 and 70°C (−40 and 85°C for the TC7MTX02FK) with an accuracy of ±4°C (±6°C for the TC7MTX02FK).

Features

- Temperature compensation accuracy: ±4°C (±6°C for the TC7MTX02FK)
- Analog output
- Built-in EEPROM

TCXO ICs

Part Number	Pin	Function	Package	Mass Production
TC7MTX01FK	16	Digital temperature compensation (−20 to 70°C)	US16	☐
TC7MTX02FK	16	Digital temperature compensation (−40 to 85°C)	US16	☐
TC7MTX03FK	16	Digital temperature compensation (−20 to 70°C)	US16	**

☐: Domestic mass production only **: Under development

For package dimensions and standard codes, please refer to page 114.

Other Consumer Product ICs & LSIs

Nonvolatile Memory Embedded Serial Port LSIs

Part Number	CPU	EEPROM (bytes)	ROM (bytes)	RAM (bytes)	Exponential/ Surplus Operation	Random Number Generation	Operating Frequency	Operating Voltage (V)	Operating Temperature	Sleep Mode	Number of I/O Ports
JT6N37B-XXXXS	Z80™	8 K	20 K	512 + 640	1024 bits	Yes	1 M to 5.0 MHz	2.7 to 5.5 V	−5 to 85°C	Yes	1
JT6N55-XXXXS			48 K	1 K + 608	2048 bits	Yes	1 M to 5.0 MHz	2.7 to 5.5 V	−35 to 85°C	Yes	
JT6N44A-XXXXS		4 K	20 K	512	—	Yes	1 M to 5.0 MHz	2.7 to 5.5 V	−5 to 85°C	Yes	
JT6N90A-XXXXS		8 K	32 K	1 K	—	Yes	1 M to 5.0 MHz	2.7 to 5.5 V	−25 to 85°C	Yes	
JT6NA0A-XXXXS		8 K	32 K	1 K + 640	1024 bits			2.7 to 5.5 V			
JT6N91-XXXXS		16 K	32 K	1 K	—			2.7 to 5.5 V			
JT6N92B-XXXXS	TLCS900/L1	32 K	120 K	4 K + 608	2048 bits			1.62 to 1.98 V 2.7 to 5.5 V			
JT6N57S	—	4 K	—	—	—	—	1 k to 1 MHz 1 k to 100 kHz (at page write mode)	2.7 to 5.5 V	−40 to 85°C	—	

Note: Z80™ is a trademark of Zilog Inc.

RF-ID LSIs (RF-ID System LSIs)

Part Number	Description	Features	Package	Maximum Applied Current
JT6N38AS	System LSI for RFID with built-in EEPROM	EEPROM 512 bytes, full-wave rectifier, shunt regulator, built-in digital PLL, PSK modulation, carrier frequency 100 kHz to 500 kHz, multi-read function, command response specifications	Chip	30 mA (2 to 3.1 V)
JT6N46AS	System LSI for RFID with built-in EEPROM	EEPROM 128 bytes, carrier frequency 100 kHz to 200 kHz, read-compatible with T6N38AS	Chip	40 mA (2 to 3.1 V)
JT6N78AS	System LSI for RFID with built-in EEPROM	EEPROM 128 bytes, carrier frequency 100 kHz to 500 kHz, read-compatible with T6N38AS	Chip	40 mA (2 to 3.1 V)
JBT6N81S	System LSI for RFID with built-in EEPROM	EEPROM 256 bytes, half-wave rectifier, series regulator, ISO 14443 type-B (original command) Reception: ASK 10% modulation NRZ Transmitting: 847 kHz subcarrier, BPSK modulation Band rate: 106 kbps (default), 212 kbps (changed by command)	Chip with bump	20 mA
JBT6NA8S	System LSI for RFID with built-in EEPROM	EEPROM 8,192 bytes, full-wave rectifier, series regulator, ISO 1443 type-B (original command) Reception: ASK 10% modulation NRZ Transmitting: 847 kHz subcarrier, BPSK modulation Band rate: 106 kbps (default), 212 kbps (changed by command)	Chip with bump	18 mA

(RF-ID Reader LSIs)

Part Number	Description	Features	Package	Power Supply Voltage
T6N71B (Package)	I/F LSI for RFID Reader	Digital PLL circuit, modulation/demodulation circuit, synchronous/asynchronous serial interface, PC serial interface, 2 receive amplifier circuit, oscillation circuit, voltage detector (2 levels) Modulation/demodulation: NRZ, NRZI, manchester, differential manchester, PSK, DPSK ISO 14443 (Type B), ISO 10536	LQFP48	2.5 to 3.3 V 4.5 to 5.5 V

Home Appliance ICs/LSIs

Part Number	Description	Features	Package	
TA7510S	Earth leakage breaker	High sensitivity (V_{trip} = 7 mV), compact	SIP7	①
TA7555P	General-purpose timer	Times set using 2 resistors and 1 external capacitor	DIP8	①
TA7555F	General-purpose timer	Times set using 2 resistors and 1 external capacitor	FLP8	①
TB1004AF	Charging control timer	From one minute up to 8 hours, low current consumption, built-in battery voltage detection comparator, operating voltage 4 V to 6 V	SSOP10	②
TA7326P/F	Long duration timer	One to 50 hours, operating voltage 5 V to 12 V	SIP7/FLP8	②
TA8316S	IGBT gate driver	Built-in 18 V block regulating circuit, source current = 200 mA (max), sink current = 1 A (max), operating voltage 16.2 V to 19.8 V	SIP7	②
TA8316AS	IGBT gate driver	Source current = 200 mA (max), sink current = 1 A (max), supply voltage 7 V to 24 V The device is functionally equivalent to the TA8316S, except it does not incorporate a 18-V regulator.	SIP7	②

Remote Controller ICs

Part Number	Package	Description/Use	Functions/Features	Operating Voltage
TC9028PG/FG-XXX	P-DIP20-300-2.54A P-SOP20-300-1.27	Remote control transmission IC Ideal for TVs, VCRs and audio equipment	Used for transmission, programmable transmission format, 32 standard keys	2.0 to 4.0 V
TC9243PG/FG	P-DIP20-300-2.54A P-SOP20-300-1.27	Remote control transmission IC Ideal for TVs, VCRs and audio equipment	Used for transmission, 32 functions controlled by pressing more than one key at once Receiver ICs: TC9244P, TC9259N, TC9285P	2.0 to 4.0 V

ICs for Personal Equipments

Part Number	Applications	Built-in Memory	Supply Voltage (V)	Ports			Built-in LCD Driver Column × Row	Built-in Peripheral Circuits	Min Instruction Execution Time (μs)	Current Consumption in SLEEP mode (μA) max	Package
				IN	OUT	I/O					
JT6H82-XXS T6H82-XXX	Cameras, health appliances, home appliances, toys	ROM: 32 Kbytes RAM: 1 Kbyte	1.8 to 5.5	—	—	64	40 × 4	Timer/counter	0.5 @ 3 V/8 MHz	10	Chip/ TQFP100
JT6H87-XXXS T6H87-XXXX	Cameras, health appliances, home appliances, toys	ROM: 24 Kbytes RAM: 1 Kbyte	1.8 to 5.5	—	—	44	24 × 4	Timer/counter	0.5 @ 3 V/8 MHz	10	Chip/ LQFP80