TOSHIBA
Leading Innovation

SEMICONDUCTOR GENERAL CATALOG

ASSPs

Audio & Video Equipment ICs
Communications Equipment ICs
Radio-Frequency Power Amp ICs
Automotive ICs
Display Driver ICs
Peripheral Equipment LSIs
Other Consumer Product ICs

2009-8 SCE0004I

Audio & Video Equipment ICs

TV Set ICs (Liquid Crystal TV ICs)

Part Number	Package	Use	Functions and Features	Operating Supply Voltage (V)
TB1334FG ☆	HQFP64-P-1010-0.50	LCD TVs	PIF/SIF, PAL/NTSC/SECAM decoding, PC input switch, component video input D1-D5 pass-through switches	4.5 to 5.5 8.55 to 9.45 3.0 to 3.6
TC90196AFG ☆	LQFP208-P-2828-0.50B		YC separation, color demodulation, gamma correction, image-quality adjustment Liquid crystal display: 800 dots x 480 lines	
TC90192FG ☆	LQFP208-P-2828-0.50B		YC separation, color demodulation, gamma correction, image-quality adjustment Liquid crystal display: 800 dots x 480 lines	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6
TC90192XBG ☆	P-FBGA265-1515-0.80B6		YC separation, color demodulation, gamma correction, image-quality adjustment Liquid crystal display: 800 dots x 480 lines	
TC90194FG **	LQFP176-P-2424-0.50A		YC separation, color demodulation, gamma correction, image-quality adjustment Liquid crystal display: 400 dots x 234 lines or 480 dots x 234 lines	

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(Color Decoders with a Comb Filter)

Part Number	Package	Use	Functions and Features	Operating Supply Voltage (V)
TC90103AFG ☆	LQFP144-P-2020-0.5A	3D YC separation Color decoder	Motion-adaptive 3D YC separation (NTSC) Multicolor system 3-line YC separation Motion-adaptive 3D YNR and CNR SCART connectors supported (fast blanking input, RGB text mixing) ADC (4-ch) Picture improver ID1/WSS/CC/EDTV-II/Gemstar data slicer S/N detection Macrovision detection D2 detection AGC circuit I^2C bus supported	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6
TC90101FG ☆	L-QFP100-1414-0.5C	3-line YC separation Color decoder	Multicolor system 3-line YC separation ADC (3-ch) Picture improver ID1/CCD/WSS data slicer S/N detection Macrovision detection D1/D2 detection AGC circuit I^2C bus supported	1.4 to 1.65 2.3 to 2.7 3.0 to 3.6

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(Audio Output ICs)

Part Number	Package	Use	Functions and Features	Operating Supply Voltage (V)
TB2922HQ	P-HZIP12-1.78B	Audio output ICs	Sound output power: 20 W x 2, MOS output stage; Class AB, mute, standby, various protection circuits	9 to 26
TB2924AFG	P-HSOP36-450-0.65		Sound output power: 20 W x 2, PWM analog-input Class-D amp	11 to 20 (18)
TB2964FTG	P-QFN48-0707-0.50		Sound output power: 15 W x 2, I^2S signal-input Class-D amp	9 to 18

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(Other Optional ICs)

Part Number	Package	Use	Functions and Features	Operating Supply Voltage (V)
TC90A73UG ☆	P-LQFP-44-1010-0.80A	VBI slicer for Japanese terrestrial analog data broadcasting standard	One 6-bit ADC, synchronous separation circuit, transversal filter, error correction circuit, data buffer, asynchronous parallel interface control, Crystal oscillator	3.3
TC90173FG ☆	P-LQFP-48-0707-0.50C	VBI slicer for worldwide standards	One 8-bit ADC, self-clamping, synchronous playback, transversal filter, error correction circuit, data buffer, asynchronous parallel interface control, crystal oscillator (single 27-MHz clock)	1.5/2.5/3.3

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TV Tuning & Channel Decoder ICs (PIF, SIF ICs)

Part Number	Package	Use	Functions and Features	Operating Supply Voltage (V)
TB1338FNG/FTG ☆	P-SSOP24-300-0.65A QFN36-P-0606-0.50	Multi-standard PLL PIF/SIF	D/K, I, B/G, M, L, L', multi-standard PIF/SIF, FM radio receiver support, PIF VCO, audio trap, SIF filter, general-purpose SW port, split-carrier and intercarrier sound, I^2C bus	4.75 to 5.25
TB1350FNG/FTG ☆	P-SSOP24-300-0.65A QFN36-P-0606-0.50	D/K, I, B/G, M, PLL PIF/SIF	D/K, I, B/G, M, FM radio receiver support, PIF VCO, audio trap, SIF filter, general-purpose SW port, split-carrier and intercarrier sound, I^2C bus	4.75 to 5.25
TB1351FTG ☆	QFN36-P-0606-0.50	Multi-standard PLL PIF/SIF	D/K, I, B/G, M, L, L', multi-standard PIF/SIF, FM radio receiver support, PIF VCO, audio trap, SIF filter, general-purpose SW port, split-carrier and intercarrier sound, I^2C bus	4.75 to 5.25
TB1354FTG ☆	QFN36-P-0606-0.50	Multi-standard PLL PIF/SIF	D/K, I, B/G, M, L, L', multi-standard PIF/SIF, FM radio receiver support, PIF VCO, audio trap, SIF filter, general-purpose SW port, split-carrier and intercarrier sound, I^2C bus	4.75 to 5.25
TB1356FTG ** ☆	QFN36-P-0606-0.50	Multi-standard PLL PIF/SIF	D/K, I, B/G, M, L, L', multi-standard PIF/SIF, FM radio receiver support, PIF VCO, audio trap, SIF filter, general-purpose SW port, split-carrier and intercarrier sound, I^2C bus, TOP adjustment pin, analog AFT output	4.75 to 5.25

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(Channel Decoder ICs)

Part Number	Package	Use	Functions and Features	Operating Supply Voltage (V)
TC90512XBG ☆	P-FBGA177-1313-0.80C	8PSK demodulator OFDM demodulator	Digital BS broadcasting in Japan, digital CS broadcasting, 8PSK, QPSK demodulation, error correction, digital terrestrial broadcasting in Japan, OFDM demodulation, error correction, A/D converter, memory	3.0 to 3.6 2.3 to 2.7 1.1 to 1.35
TC90522XBG ☆	P-FBGA177-1313-0.80C4	8PSK demodulator OFDM demodulator (Two channels each)	Digital BS broadcasting in Japan, digital CS broadcasting, 8PSK, QPSK demodulation, error correction, digital terrestrial broadcasting in Japan, OFDM demodulation, error correction, A/D converter, memory	3.0 to 3.6 1.1 to 1.3
TC90517WBG ☆	S-WFBGA76-040A01	OFDM demodulator	Digital terrestrial broadcasting in Japan, OFDM demodulation, error correction, A/D converter, memory	3.0 to 3.6 2.3 to 2.7 1.1 to 1.3
TC90517FG ☆	P-LQFP64-1010-0.50E			

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Audio ICs (AM/FM Receiver ICs)

Part Number	Package	Description	Intended Use			Functions				Functions and Features	Operating Voltage (V)
			Car Audio	General Audio	Other	AM	FM				
							F/E	IF	Stereo Demodu-lation		
TB2132FNG ☆	P-SSOP30-300-0.65	Single-chip AM/FM stereo tuner with PLL		○		■	■	■	■	TV bands, VCO for MPX, compliant with new FCC standards	1.8 to 5.5
TB2141AFNG ☆	P-SSOP30-300-0.65	1-V filter-less Single-chip tuner		○		■	■	■	■	1-V tuner Ceramic-filter-less compliant with new FCC standards	0.95 to 2.2

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(Power Amp ICs)

Part Number	Package	Intended Use			Output Power (P_{OUT})			Functions and Features	Operating Voltage (V)
		Car Stereos	Cassette Tape Recorders	TV/Home Stereos	Recom-mended V_{CC}	$R_L = 4\ \Omega$	$R_L = 8\ \Omega$		
TB2901HQ	P-HZIP25-1.00F	■			13.2 V	25 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, high-side switch, Maximum power: 47 W x 4 ch, $R_L = 2\ \Omega$ guaranteed	9 to 18
TB2902HQ	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, mute, Command-controlled standby mode, Maximum power: 41 W x 4 ch, $R_L = 2\ \Omega$ guaranteed I^2C-bus-controled self-diagnosis	9 to 18
TB2903HQ	P-HZIP25-1.00F	■			13.2 V	25 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 47 W x 4 ch	9 to 18
TB2904HQ	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 43 W x 4 ch, speaker burnout prevention	9 to 18
TB2905HQ	P-HZIP25-1.00F	■			13.2 V	25 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, Class-KB efficiency, Maximum power: 47 W x 4 ch, self-diagnosis	9 to 18
TB2906HQ	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 43 W x 4 ch, 34dB voltage gain, Speaker burnout prevention	9 to 18
TB2912HQ	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, mute, Command-controlled standby mode, Maximum power: 41 W x 4 ch, $R_L = 2\ \Omega$ guaranteed I^2C-bus-controled self-diagnosis	9 to 18
TB2913HQ	P-HZIP25-1.00F	■			13.2 V	25 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, clipping detector, Maximum power: 47 W x 4 ch	9 to 18
TB2921AHQ *	P-HZIP25-1.00F	■			13.2 V	25 W x 4	—	MOS amplifier for 4 BTL channels, standby switch, mute, high-side switch, Maximum power: 51 W x 4 ch, $R_L = 2\ \Omega$ guaranteed	8 to 18
TB2922HQ *	P-HZIP12-1.78B			■	18 V	37 W x 2	22 W x 2	MOS amplifier for 2 BTL channels, standby switch, mute	9 to 26
TB2923AHQ *	P-HZIP25-1.00F	■			13.2 V	25 W x 4	—	MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 51 W x 4 ch, $R_L = 2\ \Omega$ guaranteed	8 to 18
TB2924AFG *	HSOP36-P-450-0.65			■	15 V	19.5 W x 2	12 W x 2	Class D amplifier for 2 BTL channels, standby switch, mute, efficiency = 88%	11 to 18 (20)
TB2926CHQ *	P-HZIP25-1.00F	■			13.2 V	23 W x 4	—	MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 49 W x 4 ch	8 to 18
TB2929HQ *	P-HZIP25-1.00F	■			13.2 V	21 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 45 W x 4 ch, AUX amp	8 to 18
TB2932HQ *	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, mute, Command-controlled standby mode, $R_L = 2\ \Omega$ guaranteed I^2C-bus-controled self-diagnosis, Selectable voltage gain (26/12 dB)	8 to 18
TB2933HQ *	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, mute, Command-controlled standby mode, $R_L = 2\ \Omega$ guaranteed I^2C-bus-controled self-diagnosis, Selectable voltage gain (34/20 dB)	8 to 18
TB2934HQ	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, mute, Command-controlled standby mode, Maximum power: 41 W x 4 ch, $R_L = 2\ \Omega$ guaranteed I^2C-bus-controled self-diagnosis, 34dB voltage gain	9 to 18
TB2936HQ *	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 49 W x 4 ch, 34dB voltage gain	8 to 18
TB2946HQ *	P-HZIP25-1.00F	■			13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, standby switch, mute, offset detection, Maximum power: 49 W x 4 ch, $R_L = 2\ \Omega$ guaranteed	8 to 18

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*: New product

(Headphone Amp ICs)

Part Number	Package	Intended Use			Output Power	Functions and Features	Operating Voltage (V)
		Headphone Stereos	Digital Portable Stereos	Mobile Phones			
TB2173FTG ☆	P-VQON44-P-0606-0.4		■	■	9.5 mW (+B = 1.2 V, 16 Ω)	Support for 2 sources, electric volume, bass boost with AGC, OCL/output capacitor coupling, G_V = 8dB/24dB, beep, standby switch, mute, port expansion circuit	+B = 0.9 to 4.5 V_{DD} = 1.8 to 4.5 V_{CC} = 1.8 to 4.5

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(Digital Tuning Systems (DTS))

Part Number	Package	System No.	Remarks	Features					Operating Voltage (V)
				Crystal Oscillator	ROM Size	RAM Size	Display Format	I/O Ports	
TC9324FG ☆	P-QFP100-1420-0.65Q	DTS-20	Single chip Suitable for car stereos	4.5 MHz/ 75 kHz	16 bits x 16K	4 bits x 4096	LCD drive: 1/4, 1/3 & 1/2 duty, 1/2 & 1/3 bias	IN: 35 lines OUT: 13 lines I/O: 40 lines	4.5 to 5.5
TC9318AFAG ☆	P-LQFP64-1010-0.50E	DTS-21	Low-voltage operation Single chip Suitable for portables	75 kHz	16 bits x 4K	4 bits x 256	LCD drive: 1/3 duty, 1/2 bias	IN: 11 lines OUT: 33 lines I/O: 10 lines	1.8 to 3.6
TC9327BFG ☆	P-QFP80-1212-0.50F		Low-voltage operation Single chip Suitable for portables	75 kHz	16 bits x 7K	4 bits x 256	LCD drive: 1/4 duty, 1/2 bias	IN: 9 lines OUT: 33 lines I/O: 24 lines	1.8 to 3.6
TC9328AFG ☆	P-QFP80-1212-0.50F		Low-voltage operation Single chip Suitable for portables	75 kHz	16 bits x 8K	4 bits x 512	LCD drive: 1/4 duty, 1/2 bias	IN: 8 lines OUT: 21 lines I/O: 36 lines	0.9 to 1.8
TC9329AFAG ☆	P-LQFP64-1010-0.50A P-TFP64-1010-0.50C		Low-voltage operation Single chip Suitable for portables	75 kHz	16 bits x 4K	4 bits x 256	LCD drive: 1/4 duty, 1/2 bias	IN: 4 lines OUT: 16 lines I/O: 28 lines	0.9 to 1.8
TC9349AFG ☆	P-LQFP64-1010-0.50E		Low-voltage operation Single chip Suitable for portables	75 kHz	16 bits x 8K	4 bits x 512	LCD drive: 1/4 duty, 1/2 & 1/3 bias	IN: 4 lines OUT: 2 lines I/O: 45 lines	0.9 to 1.8

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(Analog Switches)

Part Number	Package	Features	Operating Voltage (V)	
			V_{DD}	V_{SS}
TC9162CNG/CFG	P-SDIP28-400-1.78 P-SOP28-450-1.27B ☆	High breakdown voltage, analog function switch array	6.0 to 17.0	−17.0 to −6.0
TC9163CNG/CFG			6.0 to 17.0	−17.0 to −6.0
TC9164CNG/CFG			6.0 to 17.0	−17.0 to −6.0
TC9273CNG/CFG	P-SDIP28-400-1.78 P-SOP28-450-1.27B ☆	High breakdown voltage, analog function switch array semi-customization available	6.0 to 17.0	−17.0 to −6.0
TC9274CNG/CFG	P-SDIP42-600-1.78 P-QFP44-1414-0.80K ☆		6.0 to 17.0	−17.0 to −6.0
TC94A46CNG/CFG	P-SDIP42-600-1.78 P-QFP80-1420-0.80M ☆	High breakdown voltage, analog function switch array 14-circuit, 3-contact analog switch x 2	6.0 to 17.0	−17.0 to −6.0
TC94A88FG *	P-QFP80-1420-0.80M ☆	High breakdown voltage, analog function switch array 13-circuit, 4-contact analog switch x 2	6.0 to 17.0	−17.0 to −6.0

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(Electronic Volume Control ICs)

Part Number	Package	Classification	Features	Operating Voltage (V)	
				V_{DD}	V_{SS}
TC9235APG/AFG	P-DIP16-300-2.54A P-SOP16-300-1.27 ☆	Volume control	Up/down-type electronic volume control	4.5 to 12.0	—
TC9260APG/AFG			Serial-data-controlled electronic volume control	4.5 to 12.0	—
TC9459BNG/BFG	P-SDIP28-400-1.78 P-SOP28-450-1.27B ☆	High-breakdown-voltage volume control	High breakdown voltage, serial-data-controlled electronic volume control + loudness control	6.0 to 17.0	−17.0 to −6.0
TC9482BNG/BFG	P-SDIP28-400-1.78 P-SOP28-450-1.27B ☆		High breakdown voltage, 6-channel serial-data-controlled electronic volume control	6.0 to 17.0	−17.0 to −6.0
TC94A32BFG	P-SOP28-450-1.27B ☆		High breakdown voltage, serial-data-controlled electronic volume control with trim volume	6.0 to 17.0	−17.0 to −6.0
TC94A27BUG	P-LQFP44-1010-0.80A ☆		4-channel serial-data-controlled electronic volume control with trim volume	6.0 to 17.0	−17.0 to −6.0
TC94A81UG	P-LQFP44-1010-0.80A ☆		High breakdown voltage, 2-channel serial-data-controlled electronic volume control with trim volume, 4-input selector and zero crossing detection circuit	6.0 to 17.0	−17.0 to −6.0
TC94A95FG **	P-QFP80-1420-0.80M ☆		High breakdown voltage, 4-channel serial-data-controlled electronic volume control with trim volume, 4-input selector and zero crossing detection circuit	6.0 to 17.0	−17.0 to −6.0
TC9422ANG/AFG	P-SDIP28-400-1.78 P-SOP28-450-1.27B ☆	Single-chip volume control	Volume, 2-band tone control, 4-input selector	6.0 to 12.0	—
TC9498ANG/AFG *			6-channel serial-data-controlled electronic volume control with trim volume settings (single power supply)	4.5 to 14.0	—
TC9499ANG/AFG			6-channel serial-data-controlled electronic volume control with trim volume settings (dual power supplies)	4.5 to 7.0	−7.0 to −4.5

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**: Under development

(PLLs, Prescalers)

Part Number	Package	Classification	Features	Operating Voltage (V)
TC9256APG	P-DIP16-300-2.54A P-SOP16-300-1.27 ☆	PLL	High-speed PLL incorporating a DTS prescaler	4.5 to 5.5
TC9256AFG				4.5 to 5.5
TC9257APG	P-DIP20-300-2.54A P-SOP20-300-1.27 ☆			4.5 to 5.5
TC9257AFG				4.5 to 5.5

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(Compact Disc Player ICs)

Part Number	Package	Classification	Features			Operating Voltage (V)
TC94A15FG ☆	P-LQFP100-1414-0.50C	Single-chip processor	Sync separation, EFM demodulation, error detection/correction, error-corrected output, microcontroller interface, search control, digital equalizer, text data decoding, variable-speed playback, x8 oversampling digital filter, 1-bit DA converter, Integrated head amp	x4 play back mode for CD-DA/R	CD-RX system	3.3/5

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(CD/MP3 Player IC)

Part Number	Package	Classification	Features	Operating Voltage (V)
TC94A92FG ☆	P-LQFP80-1212-0.50F	Single-chip processor	CD-DA/R/RW: x2 playback, low power consumption, 1-Mbit SRAM (128 Kwords x 8 bits), standby mode Supports various compressed audio formats: MP3, WMA, AAC RF amp, CD digital servo, 8fs digital filter Multi-bit DA converter	3.3/1.5

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(Digital Signal Processor for Digital Amp System Applications)

Part Number	Package	Classification	Features	Operating Voltage (V)
TC94A34FG ☆	P-LQFP64-1010-0.50E	Audio digital signal processor	Low power consumption, 1-Mbit SRAM (128 Kwords x 8 bits) Supports various compressed audio formats: MP3, WMA, AAC Program ROM (20 K), program RAM (4 K), standby mode	3.3/1.5

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Communications Equipment ICs

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

Part Number	Package (Pin Pitch)	Functions	Applications	Features	Power Supply Voltage (V)
TB31345WLG	WCSP96 (0.4 mm)	RF IC	Digital mobile and Wireless equipment	Freq. bands: Band I (2-GHz band), Band V/VI(800-MHz band), Band IX (1.7-GHz band) Reduced external parts: Direct conversion transmitter and receiver Low EVM: Tx = 3% (typ.); Rx = 10% (typ.) Fast lock & low noise: Fractional-N PLL + VCO + loop filter Reduced interference: LPF for GSM and CDMA2000 Ultra-small, thin package WCSP96 (4.13 mm x 4.16 mm x 0.6 mm) Current consumption: Transmitter: 66 mA (typ.) (@ +4-dBm output) Receiver: 36 mA (typ.)	2.8 to 3.1
TB31224CF	QFP48 (0.8 mm)		Cordless phones	CT0-compatible PLL, IF detection and compander integrated into a single chip on-chip peripherals Power-on reset	2.0 to 6.0
TB31261AF ☆	QFP52 (0.65 mm)			900-MHz PLL, IF detection and compander integrated into a single chip, on-chip peripherals VCO, varicap, LNA, MIX and PA integrated into a single chip	2.7 to 5.5
TB31262F ☆	QFP52 (0.65 mm)				2.0 to 5.0
JTB32303-AS	Chip		Transceiver (FRS/GMRS/PMR)	Chip supply PLL, XOUT, LNA, MIX, IF amp, RSSI, Noise detector, Audio amp and TX-buffer into a single chip	2.5 to 4.5
TA32305FNG ☆	SSOP30 (0.65 mm)		Remote control (AM/FM)	240 kHz to 450 MHz RF amp, MIX, AM/FM demodulator, 2-level comparator, Vcc = 2.2 V to 5.5 V, on-chip local x8 multiplier, receiver/transmitter	2.2 to 5.5
TC31298IXBG ☆	FBGA52 (0.5 mm)		Bluetooth (RF for chipset)	PLL, VCO, LNA, MIX, BPF, IF-amp, Digital detector, ADC, DAC, PA, antenna SW, PLL loopfilter integrated into a single chip Current consumption: Transmitter: 65 mA (typ.) Receiver: 65 mA (typ.)	3.0 to 3.6
TC31299IXBG ☆	FBGA52 (0.5 mm)		Bluetooth EDR (RF IC chip)	Bluetooth EDR-compliant single-chip RF IC with PLL, VCO, LNA, MIX, BPF, IF amp, digital detector, DAC, ADC, PA, antenna switch and PLL loop filter Current consumption: Transmitter: 65 mA (typ.) Receiver: 60 mA (typ.)	
TA31273FNG	SSOP20 (0.65 mm)		Remote control (AM)	240 kHz to 450 MHz RF amp, MIX, AM demodulator, 2-level comparator, on-chip local x8 multiplier	3.0 to 5.5
TA31275FNG ☆	SSOP24 (0.65 mm)		Remote control (AM/FM)	240 kHz to 450 MHz RF amp, narrow band system, MIX, AM/FM demodulator, 2-level comparator, on-chip local x8 multiplier	2.4 to 5.5
TB31370FNG ☆	SSOP24 (0.65 mm)			RF operating frequency: 315 MHz on-chip VCO, IF filter, detector	4.0 to 5.5
TB31371FNG ☆	SSOP24 (0.65 mm)			RF operating frequency: 433.92 MHz on-chip VCO, IF filter, detector	3.6 to 5.5
TB31372FNG * ☆	SSOP24 (0.65 mm)		Remote control (AM/FM)	RF operating frequency: 315 MHz on-chip VCO, IF filter, detector, on-chip high-speed comparator	3.6 to 5.5
TB31373FNG * ☆	SSOP24 (0.65 mm)			RF operating frequency: 433.92 MHz on-chip VCO, IF filter, detector, on-chip high-speed comparator	

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Radio-Frequency Power Amp ICs

Modules (Analog)

Part Number	Package	Structure	Applications		Features				Test Conditions	Power Supply (V)	
					Frequency Range f (MHz)	Po (Min) (W)	ηT (Min) (%)	ρi (Max)	Pi (mW)	V_{GG}	V_{DD}
S-AV36A	5-53P	Modules	VHF	60-W FM professional radios	134 to 174	80	45	3	50	5	12.5
S-AV32A	5-53P			50-W FM professional radios	134 to 174	60	45	3	50	5	12.5
S-AV33A	5-53P			25-W FM professional radios	134 to 174	32	45	3	50	5	12.5
S-AV35A	5-32G			25-W FM marine radios	154 to 162	32	50	3	10	5	12.5
S-AV37A	5-32G			25-W FM marine radios	154 to 162	32	50	3	10	5	12.5
S-AV40	5-32G			25-W FM professional radios	220 to 246	30	40	3	50	5	12.5
S-AU82ASL	5-53P		UHF	50-W FM professional radios	350 to 390	60	40	3	50	5	12.5
S-AU82AVL	5-53P				378 to 440	60	40	3	50	5	12.5
S-AU82AL	5-53P				400 to 470	60	40	3	50	5	12.5
S-AU82AH	5-53P				450 to 520	60	40	3	50	5	12.5
S-AU93A	5-53P			50-W FM professional radios	430 to 500	60	40	3	50	5	12.5
S-AU83AL	5-53P			25-W FM professional radios	400 to 470	32	40	3	50	5	12.5
S-AU83AH	5-53P				450 to 520	32	40	3	50	5	12.5
S-AU94	5-23F			5-W FM handheld professional radios	450 to 490	7.55	40	4.5	25	4	9.6
S-AU99L *	5-23F				400 to 470	7	44	3	20	4	9.6
S-AU99H *	5-23F				450 to 520	7	45	3	20	4	9.6

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Modules (Digital)

Part Number	Package	Structure	Applications		Features		Test Conditions			Power Supply (V)	
					Frequency Range f (MHz)	ACP (dB) (Max)	I_{DD} (A)	Po (dBmW)	Pi (dBmW) (Note 1)	V_{DD}	V_{GG}
S-AV34	5-32F	Modules	VHF	Digital professional radios	150 to 165	−34	2.8	39	adjusted	10.8	adjusted
S-AV38	5-23F				260 to 266	−35	1.7	35		7.2	
S-AU86	5-28C		900 MHz	Digital MCA	889 to 915	−39	1.7	35		12	
S-AU100	5-23F				905 to 915	−37	1.8	35		10.8	

Note 1: Modulating signal: π/4DQPSK (α = 0.5, 32 kbps), Bandwidth: 16 kHz, Detuning frequency: 25 kHz

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Automotive ICs

System Power Supplies

Part Number	Package	Functions	Characteristics				Remarks	Supply Voltage (V)
			Output Voltage Typ. (V)	Output Current Max (mA)	Input Voltage Max (V)	Power Dissipation Max (W)		
TB9000FG	SSOP16	CPU voltage regulator, watchdog timer	5	10 (Max) (Note)	45 (1 s)	0.6	Low current consumption: 120 μA (typ.) Reset on watchdog timeout Reset detection: 4.7 V External transistor required	6 to 16
TB9000AFG	SSOP16	CPU voltage regulator, watchdog timer	5	10 (Max) (Note)	45 (1 s)	0.6	Low current consumption: 120 μA (typ.) Reset on watchdog timeout Reset detection: 4.2 V External transistor required	6 to 16
TB9000CFNG	SSOP20 (0.65)	CPU voltage regulator, watchdog timer	5	10 (Max) (Note)	45 (1 s)	0.68	Low current consumption: 120 μA (typ.) Reset on watchdog timeout Reset detection: 4.7 V External transistor required	6 to 16
TB9001FNG	SSOP20 (0.65)	CPU voltage regulator, watchdog timer	5	5 (Max) (Note)	45 (1 s)	0.68	Low current consumption: 95 μA (typ.) Internal 32 kHz clock External transistor required	6 to 16
TB9004FNG ☆	SSOP24 (0.65)	CPU dual voltage regulator, watchdog timer	3.4/2.5/1.5 5.0	10 (Max) (Note)	45 (1 s)	0.85	3.4/2.5/1.5 V selectable 2 reset pins Low current consumption: 0 μA (V_{CC}1/2: off) (typ.) External transistor required	6 to 16
TB9005FG **	SSOP20	CPU voltage regulator, watchdog timer	5	10 (Max) (Note)	45 (1 s)	0.68	Low current consumption: 90 μA (typ.) Reset on watchdog timeout Reset detection: 4.7 V or 4.2 V (selectable) External transistor required	6 to 18

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Note: An external transistor is required. The gain varies with the transistor.

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Actuator Drivers (DC Motor Drivers)

Part Number	Package	Functions	Characteristics				Remarks	Supply Voltage (V)
			Output Voltage Typ. (V)	Output Current Max (mA)	Input Voltage Max (V)	Power Dissipation Max (W)		
TA8050AFG	HSOP20	H-bridge driver	—	1500	60 (1 s)	2.0	Standby function	8 to 16
TA8050FG	HSOP20	H-bridge driver	—	1500	60 (1 s)	2.0		6 to 16
TA8083PG	DIP16	H-bridge driver	—	500	60 (1 s)	1.4	Diagnosis function and standby function	8 to 16
TA8083FG	HSOP20	H-bridge driver	—	500	60 (1 s)	2.0	Diagnosis function and standby function	8 to 16
TA8083AFG	HSOP20	H-bridge driver	—	800	60 (1 s)	2.0	Diagnosis function and standby function	8 to 16
TB9056FNG ☆	SSOP24 (0.65)	LIN-compatible H-bridge driver	—	300	40 (1 s)	0.85	LIN Rev. 1.3 Motor driver: R_{DSON} (H bridge: P-ch + N-ch) = 2.2 Ω (typ.) Potentiometer support	7 to 18

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(Brushless Motor Drivers)

Part Number	Package	Functions	Features	Supply Voltage (V)
TB9061FNG ** ☆	SSOP24 (0.65)	3-phase sensorless motor pre-driver	3-phase, full-wave sensorless drive PWM pulse input control/DC level input control (selectable) Comparator for induced voltage detection Thermal shutdown, overcurrent detection, overvoltage detection 5-V regulated voltage, 5.12-MHz oscillator	5.5 to 18
TB9065FG ☆	QFP64 (0.65)	3 phase motor pre-driver	Charge-pump brushless pre-driver LIN transceiver 5 V power supply for a microcontroller (Requires external PNP transistors.) Watchdog timer, power-on-reset timer 3 ch analog comparator for Hall-effect devices Op-amp/comparator for motor overcurrent detection	7 to 18
TB9066FG ☆	QFP48 (0.5)	3-phase motor driver	Motor driver R_{DSON}: P-ch = 1 Ω (typ.), N-ch = 1 Ω (typ.) 120-degree commutation logic LIN 1.3-based transceiver 5-V supply for a microcontroller (external PNP transistor required) Watchdog timer, power-on reset timer Three analog comparators for Hall devices	7 to 18
TB9067FNG ☆	SSOP24 (0.65)	3-phase motor pre-driver	120-degree commutation logic Pre-drivers for a high-side P-ch FET and a low-side N-h FET Internal PWM drive/external direct drive (selectable) Two options for setting the output duty cycle (pulse input, analog input) Overcurrent detection, thermal shutdown, supply voltage increase, supply voltage decrease Soft start	6 to 18
TB9068FG ** ☆	QFP48 (0.5)	3-phase motor driver	Motor driver R_{DSON}: P-ch = 1 Ω (typ.), N-ch = 1 Ω (typ.) 120-degree commutation logic LIN 1.3-based transceiver 5-V supply for a microcontroller (external PNP transistor required) Watchdog timer, power-on reset timer Three analog comparators for Hall devices	7 to 18

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Display Driver ICs

LED Driver ICs (LED Panel Drivers)

Part Number	Package	Applications	Description	Power Supply Voltage (V)
TCA62746AFNG/AFG * ☆	SSOP24	Large LED panels	5-V drive, 16-bit constant-current sink driver (SIPO/latch), 16 V/50 mA	6
TB62777FNG *	SSOP16	8-ch LED drive	8-channel, constant-current LED driver	6
TB62778FNG *	SSOP16	8-ch LED drive	8-ch constant-current driver (with gain control)	6
TB62747AFG/AFNG *	SSOP24/VSOP24	16-ch constant-current driver	16-ch constant-current driver, 16-channel constant-carrent driver	6
TB62721FNG *	SSOP24	16-ch PWM control driver	16-ch constant-current driver with PWM dimming and total luminance control	6
TB62596FNG/AFWG *	SSOP16/SOL-16	8-ch SW driver	8-ch SW driver	6
TB62779FNG *	VSOP20	9-ch constant-current driver with I^2C interface	9-ch constant-current driver with I^2C interface	6

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SIPO: Serial-in parallel-out

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(White LED Drivers)

Part Number	Package	Applications	Description	Power Supply Voltage (V)
TB62734FMG	SON8	White LED backlighting	Constant current step-up DC/DC converter, efficiency: 85% (max), output: 600 mW, (overvoltage protection)	6
TCA62735AFLG	QFN16	White LED backlighting	Charge-pump DC/DC converter and constant-current driver (4-ch or 3-ch), output current: 120 mA	6
TB62736FUG	6-pin SOT23	White LED backlighting	Constant-current step-up DC/DC converter, efficiency: 87% (max)	6
TB62737FUG	6-pin SOT23	White LED backlighting	Constant-current step-up DC/DC converter, efficiency: 87% (max), (overvoltage protection)	6
TB62752AFUG	6-pin SOT23	White LED backlighting	Constant-current step-up DC/DC converter, efficiency: 87% (max), can drive many LEDs	6
TB62752BFUG	6-pin SOT23	White LED backlighting	Constant-current step-up DC/DC converter, efficiency: 87% (max), can drive many LEDs	6
TB62754AFNG	SSOP20	White LED backlighting	Constant-current step-up DC/DC converter, designed for large-LCD backlighting	6
TB62750FTG **	VQON24	White LED backlighting	Constant-current step-up DC/DC converter, designed for large-current camera flashes, output: 800 mA	6
TCA62753FUG	6-pin SOT23	White LED backlighting	Charge-pump DC/DC converter, 5-V constant voltage output, output current: 100 mA	6
TB62758FTG	VQON24	White LED backlighting	Constant-current step-up DC/DC converter, backlight driver for notebook PCs	6
TB62763FMG	SON8	White LED backlighting	Constant-current step-up DC/DC converter. designed for large-current drive	6

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(RGB LED Drivers)

Part Number	Package	Applications	Description	Power Supply Voltage (V)
TCA62723FMG *	SON-10	3-ch RGB LED illumination	Output: 150 mA, parallel-in/parallel-out control	6
TCA62724FMG	SON-10	3-ch RGB LED illumination	Output: 150 mA, I^2C bus support	6

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

Part Number	Package	Functions	No. of LCD Drive Outputs	Features	Supply Voltage (V)	
					Logic (Min)	LCD (Max)
T6LD4	COF	TFT gate driver	350/342	Data transfer: bidirectional shift, 2-level output	2.3	43.5
T6LE2	COF	TFT gate driver	300/263/256	Data transfer: bidirectional shift, 2-level output	2.3	43.5

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

Part Number	Package	Functions	No. of LCD Drive Outputs	Features	Supply Voltage (V)	
					System (Min)	LCD (Max)
T6B65AFG ☆	QFP100	STN column driver	80	Data transfer: 8-bit parallel input from CPU 5120-bit display RAM and 8-bit flag RAM	2.7	V_{DD}-16
T6B66BFG ☆	QFP100	STN row driver	65	Selectable duty cycle: 1/17, 1/33, 1/49, 1/65 power supply dividing resistor and step-up DC-DC converter	2.7	V_{DD}-16
T6C23	TCP	STN column driver	160	Data transfer: 8-bit parallel input from CPU 38,400-bit RAM, display-off function	2.7	30
T6C24	TCP	STN row driver	240	1/240 duty cycle, display-off function	2.7	30
T6K04	TCP	STN column/row driver	128 columns 64 rows	Selectable duty cycle: 1/32, 1/48, 1/56, 1/64, 8192-bit RAM, LCD power supply circuit, step-up DC-DC converter	2.7	V_{DD}-16.5
T6K14	TCP, BUMP CHIP	STN column/row driver	128 columns 65 rows	For reflective color STN LCD, 4-level color display, temperature compensation, voltage regulator, step-up DC-DC converter, Icon display mode	2.4	16.5
JBT6K73-AS	BUMP CHIP	STN column/row driver	160 columns 65 rows	Selectable duty cycle: 1/35, 1/49, 1/57, 1/65, 10,400-bit RAM op amp for LCD power supply, step-up DC-DC converter, contrast control, Icon display mode	2.4	16.5

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Peripheral Equipment LSIs

Part Number	Package	Device Type	Characteristics				Remarks	Power Supply Voltage (V)
			Output Voltage Typ. (V)	Output Current Max (mA)	Input Voltage Max (V)	Power Dissipation Max (W)		
TB6066FNG	VSOP16	Shock sensor amp (low-noise charge amp)	—	—	—	0.025	1 channel, Window Comparator	2.7 to 5.5
TB6073AFNG	VSOP16	Shock sensor amp (low-noise charge amp)	—	—	—	0.0225	2 channel	2.7 to 5.5
TB6078AFUG	SM8	Shock sensor amp (low-noise charge amp)	—	—	—	0.0195	1 channel, small package, low-noise	2.7 to 5.5
TB6079AFNG *	VSOP16	Shock sensor amp (Sensor signal processor)	—	—	—	0.022	Two I/O rail-to-rail op amps, reference amp, Window Comparator	2.3 to 5.5
TB6079AFKG *	US16	Shock sensor amp (Sensor signal processor)	—	—	—	0.022	Two I/O rail-to-rail op amps, reference amp, Window Comparator, small package	2.3 to 5.5
TB6082FNG *	VSOP10	Shock sensor amp (low-noise charge amp)	—	—	—	0.03	1 channel, Circuitry used to build a notch filter, low-noise	2.3 to 5.5
TC9384FUG	SSOP6	High-frequency modulator for optical disk drives	—	—	—	—	Designed for laser diodes	4.5 to 5.5
TC9350BFNG	VSOP16	USB optical mouse controller	—	—	—	0.026	USB optical mouse controller	4.35 to 5.25
TC93A02FUG/AFUG	SSOP6	High-frequency modulator for optical disk drives (2-ch)	—	—	—	—	Designed for dual-wavelength laser diodes	4.5 to 5.5
TC9399FNG	VSOP16	Laser diode driver for CD-RW drives	—	400	—	—	Designed for optical disk drives	4.5 to 5.5
TC93A04FNG/FTG	VSOP16 /TSSOP16	Laser diode driver for combo drives	—	400	—	—	Designed for dual-wavelength laser diodes	4.5 to 5.5
TC93A05FNG	VSOP16	Laser diode driver for combo drives	—	400	—	—	Designed for dual-wavelength laser diodes	4.5 to 5.5
TB6073AFNG	VSOP16	Shock sensor amp (2-ch low-noise charge amp)	—	—	—	0.0225	3.3-V/5.0-V operation, 2 channel, low-noise	2.7 to 5.5
TC93A14FUG	SSOP6	High-frequency modulator for optical disk drives (2-ch)	—	—	—	—	Spectrum diffusion type	4.5 to 5.5
TC93A16FTG	VQON24☆	Laser diode driver for BlueRay playback	—	100	—	—	3-terminal	4.5 to 12

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Other Consumer Product ICs

Remote Controller ICs

Part Number	Package	Description/Use	Functions and Features	Operating Voltage (V)
TC9243APG TC9243AFG	P-DIP20-300-2.54A P-SOP20-300-1.27☆	Remote control transmitter suitable for TVs, VCRs and audio equipment	Used for transmission, 32 functions controllable through simultaneous multiple key presses	2.0 to 4.0

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Mixed-Signal Controllers

Part Number	ROM (Kbytes)	RAM (Bytes)	Minimum Instruction Execution Times (μs)	SIO (Ch)	I^2C (Ch)	10-Bit AD Converter (Ch)	18-Bit Timer/Counter (Ch)	16-Bit Timer/Counter (Ch)	10-Bit Timer/Counter (Ch)	8-Bit Timer/Counter (Ch)	Watchdog Timer	Clock Gear	Power-On Reset	Sensor Sampling Circuit	Offset Voltage Adjustment Circuit	On-chip Debug Function	Internal Oscillator (High-Speed)	Internal Oscillator (Low-Speed)	I/O Port (Pins)	Power Supply Voltage (V)	Operating Temperature (°C)	Package
TMP89FH00DUG **	16	1024	0.2	1	1	4		1			Yes	Yes	Yes	(Note1) Yes	Yes	Yes	Yes	Yes	15	2.2 to 3.6	−40 to 85	LQFP48 (7×7 mm)
TMP89FH00WBG **	16	1024	0.2	1	1	4		1			Yes	Yes	Yes	(Note1) Yes	Yes	Yes	Yes	Yes	15	2.2 to 3.6	−40 to 85	WCSP39 (3.8×3.8 mm)

Note1) Supports 1- to 4-axis resistive-bridge-type acceleration sensors.

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- For information about part numbers and packages, refer to "Part Numbering Nomenclature."
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CLC (Common Line Communication) ICs

Part Number	Package	Applications	Features	Supply Voltage (V)
T6B70BFG ☆	SOP16-P-300-1.27	Interface IC for boilers	Carrier receiver, carrier identification, carrier pseudo-sine wave generator	4.5 to 5.5
T6B70BFNG	SSOP16-P-225-0.65B	Interface IC for boilers	Carrier receiver, carrier identification, carrier pseudo-sine wave generator Smaller package version of T6B70BFG	4.5 to 5.5

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