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SEMICONDUCTOR GENERAL CATALOG

半導体製品総覧表2017年7月版

ASSPs
専用IC

Datasheet Live

Automotive ICs / 車載用

Communications ICs / 通信用

TV and Audio ICs / テレビ/ オーディオ用

Application Processors / アプリケーションプロセッサ

Interface Bridges / インタフェースブリッジ

Other Consumer Product ICs / その他機器用

Automotive ICs / 車載用

Image Recognition Processors / 画像認識プロセッサ

Part Number	Maximum Operating Frequency (MHz) MeP, MPE	Maximum Operating Frequency (MHz) ARM Cortex-A9 MPCore	Media Processing Engine [MPE]	Image Processing Accelerator										Video Input Interface (ch)	Video Output Interface (ch)	PCI Express® (lane)	UART (ch)	SPI (ch)	I ² C (ch)	CAN (ch)	CAN FD (ch)	PCM (ch)	Memory Controller	CPU Core		Package
				Affine Transformation	Pyramid	Filter	Histogram	Histogram of Oriented Gradients [HOG]	Enhanced CoHOG	Matching	SfM	Toshiba's Proprietary 32-bit RISC CPU MeP	ARM 32-bit RISC ARM® Cortex®-A9 MPCore													
TMPV7502XBG ☆	266.7	—	○	○	—	○	○	○	—	○	—	○	—	1	1	—	5	1	4	2	—	2	DDR2-SDRAM, SRAM, ROM, NOR Flash	○	—	PLFBGA324
TMPV7504XBG ☆	266.7	—	○	○	—	○	○	—	—	○	—	—	2	1	—	5	4	4	3	—	2	DDR2-SDRAM, SRAM, ROM, NOR Flash	○	—	PBGA516	
TMPV7506XBG ☆	266.7	—	○	○	—	○	○	○	—	○	—	—	4	1	1	5	4	4	3	—	2	DDR2-SDRAM, SRAM, ROM, NOR Flash	○	—	PBGA516	
TMPV7528XBG ☆	266.7	300	○	○	—	○	○	○	—	○	—	—	4	1	1	5	4	4	3	—	2	DDR2-SDRAM, SRAM, ROM, NOR Flash	○	○	PBGA516	
TMPV7602XBG **☆	266.7	—	○	○	○	○	○	○	○	○	—	—	2	1	—	5	4	4	2	2	2	LPDDR2-SDRAM, SRAM, ROM, NOR Flash	○	—	PLFBGA521	
TMPV7608XBG ☆	266.7	—	○	○	○	○	○	○	○	○	○	—	8	2	—	5	4	8	3	—	2	LPDDR2-SDRAM, SRAM, ROM, NOR Flash	○	—	PFBGA796	

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Automotive Display Controllers / 車載ディスプレイコントローラ

Part Number	Maximum Operating Frequency (MHz)	3D Graphic Accelerator	2D Graphic Accelerator	Display Controller (ch)	Video Capture (ch)	Stepper Motor Controller (ch)	DMAC (ch)	UART (ch)	SPI (ch)	I ² C (ch)	CAN (ch)	Timer (ch)	PWM (ch)	ADC (ch)	Memory Controller	Others	Package
TX4961XBG-240 ☆	240	—	○	1	1	—	8	3	2	1	3	8	6	8	NAND Flash, DDR-SDRAM, SRAM, ROM, NOR Flash	MLB, AC-link controller	PBGA456
TX4964FG-120 ☆	120	—	○	1	1	—	4	2	2	1	2	5	3	—	SRAM, ROM, NOR Flash	Embedded DRAM: 4 MBytes, I ² S: 2 ch	LQFP176
TX4966XBG-280 ☆	280	○	○	2	2	—	8	2	4	1	4	19	14	—	SDRAM, SRAM, ROM, NOR Flash	Embedded DRAM: 8 MBytes, APiX: 2 ch, MLB, I ² S: 2 ch	PBGA456
TMPR460XBG-300 ☆	300	—	○	1	1	4	8	2	2	1	2	10	10	8	Q-SPI Flash, LPDDR/SDRAM, SRAM, ROM, NAND/NOR Flash	I ² S: 2 ch, RTC, Voltage regulator	PBGA244
TMPR461XBG-300 ☆	300	—	○	2	1	5	8	2	2	1	3	10	24	14	Q-SPI Flash, LPDDR/SDRAM, SRAM, ROM, NAND/NOR Flash	I ² S: 2 ch, MLB, RTC, Voltage regulator	PBGA328

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Automotive Video Processors / 車載ディスプレイ用映像処理 IC (Dual/Single-Picture Video Processors) / (2画面/単画面映像処理 IC)

Part Number	Function	Package	ADC	Color Decoder	Overlay	Muteless Input Switch	New Picture Adjustment	LVDS Input I/F	Two Digital Video Output	Panel	Operating Temperature (°C)	Supply Voltage (V)
TC90195XBG ☆	Dual pictures processing	LFPGA293	1	1	○	○	○	○	○	WXGA+	-40 to +85	1.1 to 1.3 3.0 to 3.6
TC90175XBG ** ☆	Picture processing	LFPGA293	1	1	—	○	○	○	○	Full-HD		
TC90197XBG ☆	Dual pictures processing	LBGA 256	4	2	○	—	○	—	—	WVGA		1.4 to 1.6 2.3 to 2.7 3.0 to 3.6
TC90193SBG ☆	Quick display function for Rear view monitor	FBGA228	1	1	—	—	○	—	—			
TC90193ASBG ☆			1	1	—	○	○	—	—			
TC90202XBG ☆	LCD Timing control & Picture quality adjustment	FBGA121	—	—	—	—	○	—	—			
TC90205FG ☆		LQFP80	—	—	—	—	○	—	—			
TC90207FG ☆	LVDS to LVTTTL	LQFP64	—	—	—	—	—	○	—			1.4 to 1.6 3.0 to 3.6

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(Video Decoder ICs) / (ビデオデコーダIC)

Part Number	Function	Package	ADC	Color Decoder	Component Input (D2)	New Picture Adjustment	ITU-R BT.601 Output	ITU-R BT.656 Output	8 bit Serial Output (D2)	Operating Temperature (°C)	Supply Voltage (V)
TC90104AFG ☆	Video Decoder	LQFP64	3	1	○	—	○	○	○	-40 to +85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6
TC90106FG ☆			3	1	○	—	—	○	○		
TC90105FG ☆	Video Decoder with 2.5 V regulator	LQFP80	2	2	—	○	○	○	—		
TC90107FG ☆		LQFP64	1	1	—	○	—	○	—		

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System Power Supplies / システム電源

Part Number	Package	Functions	Characteristics			Remarks	Supply Voltage (V)
			Output Voltage Typ. (V)	Input Voltage Max (V)	Power Dissipation Max (W)		
TB9004FNG	SSOP24 (0.65)	2 ch CPU voltage regulators Watchdog timer	3.4/2.5/1.5 5	45 (1 s)	0.85	Watchdog timer enable/disable All regulators enable/disable 5 V regulator enable/disable 2 reset outputs External transistor required	6 to 16
TB9005FNG ☆	SSOP20 (0.65)	CPU voltage regulator Watchdog timer	5	45 (60 s)	0.6	Low current consumption: 90 μA (typ.) Watchdog timer enable/disable Reset detection: 4.75 V or 4.25 V (selectable) External transistor required	6 to 18
TB9021FNG ☆	HTSSOP16	CPU voltage regulator Watchdog timer	5	50	2.8	Low current consumption: 30 μA (typ.) Output transistors included Window watchdog timer Reset detection: 4.7 V or 4.2 V (selectable)	6 to 18
TB9042FTG ** ☆	HQFN52	CPU voltage regulator Switching regulators Series regulators Watchdog timer SPI communications	1.5/1.2 5 5 5/3.3	40 (1 s)	5.5	2 switching regulators 1.2 V/1.5 V selectable 3 series regulators 2 watchdog timers SPI communications Diagnosis functions	7 to 20.1
TB9044FNG ** ☆	HTSSOP48	CPU voltage regulator Switching regulator Series regulator Trackers Watchdog timer SPI communications	5 5 5 5	40 (1 s)	3.84	Buck/Boost Switching regulator 1 series regulator 3 trackers 1 watchdog timer SPI communications Diagnosis functions	2.7 to 18

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Blushed DC Motor Driver ICs / ブラシ付きモータドライバ

Part Number	Package	Functions	Remarks	Output Current Max (A)	Supply Voltage (V)
TB9051FTG ☆	PQFN28 (0.65)	1-ch H-bridge driver	PWM control, Small package, Built-in overcurrent detection, etc.	5	4.5 to 28
TB9052FNG ☆	HTSSOP48 (0.5)	H-bridge pre-driver	High speed pre-driver = 250 ns (typ.) High speed current monitor = 3 V/μs (min) Sequence control logic Diagnostic function	1	6 to 18
TB9056FNG ☆	SSOP24 (0.65)	LIN-compatible H-bridge driver	LIN Rev. 1.3 Motor driver: R _{DS(on)} (H bridge: P-ch + N-ch) = 2.2 Ω (typ.) Potentiometer support	0.3	7 to 18
TB9057FG ☆	LQFP48 (0.5)	H-bridge pre-driver	High speed pre-driver = 250 ns (typ.) High speed current monitor = 3 V/μs (min) Motor rotation detection Diagnostic function	1	5 to 21
TB9101FNG ☆	SSOP24 (0.65)	2-ch H-bridge driver	Diagnostic function, standby function, P-ch + N-ch = 1.2 Ω (typ.)	1	7 to 18
TB9102FNG ☆	SSOP24 (0.65)	6-ch Half-bridge driver / 3-ch H-bridge driver	SPI communications, Diagnosis function P-ch + N-ch = 1.0 Ω (typ.)	1	7 to 18
TB9110FNG ☆	SSOP24 (0.65)	N-ch MOS gate driver	Diagnosis function and standby function, Built-in charge pump, Ta = 105°C	0.02 ⁽¹⁾	7 to 18
TB9110AFNG ** ☆	SSOP24 (0.65)	N-ch MOS gate driver	Diagnosis function and standby function, Built-in charge pump, Ta = 125°C	0.02 ⁽¹⁾	7 to 18

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Note (1): An external N-channel FET is required as a gate driver. / Gate Driver: 外付け Nch-FET 使用。

Stepping Motor Driver ICs / ステッピングモータドライバ

Part Number	Package	Functions	Remarks	Output Current Max (A)	Supply Voltage (V)
TB9120FTG ** ☆	QFN28 (Wettable half cut)	2-Phase Bipolar stepping motor driver (Clock-in controlled)	PWM controlled constant-current drive 1/32 microstep (maximum resolution), stall detect features and Mix DECAY mode	1	7.0 to 18

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Brushless Motor Driver ICs / ブラシレスモータドライバ

Part Number	Package	Functions	Characteristics	Supply Voltage (V)
TB9061FNG ☆	SSOP24 (0.65)	Sensorless control with 120 degree commutation, 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	5.5 to 18
TB9061AFNG ☆	SSOP24 (0.65)	Sensorless control with 120 degree commutation, 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 Output PWM Dynamic range expansion	5.5 to 18
TB9067FNG ☆	SSOP24 (0.65)	Hall IC, Pre-driver for 120 degree commutation	120-degree commutation logic Pre-drivers for a high-side P-ch FET and a low-side N-ch FET PWM pulse input control/DC level input control (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 ☆	LQFP48 (0.5)	Motor driver with a LIN transceiver	Motor driver R _{DS(on)} : 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
TB9080FG ☆	LQFP64 (0.5)	Hall elements, Pre-driver for sine-wave control	Supports both PWM and DC inputs for sine-wave driver logic. Motor RPM feedback, auto lead angle correction Abnormal condition detection such as overcurrent, overvoltage, overtemperature and motor lock Sleep mode	7 to 18
TB9081FG ** ☆	LQFP64 (0.5)	3-Phase Brushless Motor Pre-driver	5-channel safety relay Selectable operation on fault detection Initial diagnosis of detection circuits	4.5 to 18

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IGBT Gate-Pre Driver Control IC / IGBTゲートプリドライバコントロールIC

Part Number	Package	Functions	Characteristics	Supply Voltage (V)
TB9150FNG ** ☆	SSOP48 (0.5)	IGBT Gate-Pre driver control IC for in-vehicle inverters, Built-in isolation device (optical coupling) for primary-side and secondary-side	IGBT Gate-Pre driver control, IGBT temperature monitor, Short circuit detection (current sense, DESAT), UVLO, etc., Built-in fly-back controller	6 to 20 (GND1 Standard, Primary-side) 11 to 18 (VE Standard, Secondary-side)

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Interface Bridges / インタフェースブリッジ

Part Number	Package	Applications	Functions and Features	Supply Voltage (V)
TC9560XBG ** ☆	PLFBGA170 (0.65)	Ethernet AVB Bridge Solution For Automotive Applications	Host (External application) I/F: PCIe I/F [Gen2.0 (5 GT/s), Endpoint, Single lane], Automotive I/F: Ethernet AVB [IEEE802.1AS, IEEE802.1Qav], MAC Audio I/F: I2S/TDM Peripheral I/F: I2C/SPI, Quad-SPI, UART, GPIO, INTC CPU Core: ARM Cortex-M3	1.8/3.3 for IO 1.8/2.5/3.3 for RGMII/RMII 1.1 for Core
TC9560AXBG ** ☆	PLFBGA170 (0.65)	Ethernet AVB Bridge Solution For Automotive Applications	Host (External application) I/F: PCIe I/F [Gen2.0 (5 GT/s), Endpoint, Single lane], Automotive I/F: Ethernet AVB [IEEE802.1AS, IEEE802.1Qav], MAC, 2ch CAN-FD Audio I/F: I2S/TDM Peripheral I/F: I2C/SPI, Quad-SPI, UART, GPIO, INTC CPU Core: ARM Cortex-M3	1.8/3.3 for IO 1.8/2.5/3.3 for RGMII/RMII 1.1 for Core
TC9560BxBG ** ☆	PLFBGA170 (0.65)	Ethernet AVB Bridge Solution For Automotive Applications	Host (External application) I/F: HSIC I/F (480 Mbps) Automotive I/F: Ethernet AVB [IEEE802.1AS, IEEE802.1Qav], MAC, 2ch CAN-FD Audio I/F: I2S/TDM Peripheral I/F: I2C/SPI, Quad-SPI, UART, GPIO, INTC CPU Core: ARM Cortex-M3	1.8/3.3 for IO 1.2 for HSIC 1.8/2.5/3.3 for RGMII/RMII 1.1 for Core

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Communications ICs / 通信用

Wireless Communications ICs / 無線通信用 IC

Part Number	Package (Pin Pitch)	Functions	Applications	Functions and Features	Supply Voltage (V)	
TC32306FTG ☆	QFN36 (0.5 mm)	RF-IC	Remote keyless entry (remote door lock/unlock), TPMS (tire pressure monitoring system), Remote control (AM/FM), etc.	Single-chip RF transceiver; Supported modulation: ASK/FSK. Use for four RF Band: 315, 434, 868/915-MHz, Fractional-N ΔΣ PLL Receiver sensitivity: under -116 dBm (At IF BW = 320 kHz, data rate = 600 Hz, frequency deviation = +/-40 kHz) Transmitter power: +10 dBm (typ. by maximum coarse step control) Two IF Filter bandwidths: wide 320 kHz (typ.) at IF = 230 kHz/ middle 270 kHz (typ.) at IF = 280 kHz Signal Detection: RSSI detection, noise detection (only for FSK), preamble detection Serial control (4 wire SPI) /EEPROM control (This IC also can be used as a specialized for receiving.)	TX: 12 mA (typ. /@Output level: +10 dBm) RX: 9.7 mA (typ.) Battery Saving: 0 μA (typ.)	3V Use: 2.0 to 3.3 5V Use: 2.4 to 5.5
TC32163FG ☆	LQFP48 (0.5 mm)		DSRC (Dedicated Short Range Communication), ETC (Electronic Toll Collection System)	5.8-GHz transceiver; ASK/QPSK, transmit power = -15 dBm to -2 dBm Transmitter EVM = 6.5% (typ.) ACPR $\leq 5\text{ MHz}$ = -42 dBc (typ.), receiver EVM = 8% (typ.)	RX (ASK/QPSK): 62 mA/66 mA (typ.) TX (ASK/QPSK): 75 mA/75 mA (typ.)	2.7 to 3.6
TC32166FNG ☆	SSOP10 (0.65 mm)		DSRC (Dedicated Short Range Communication), ETC (Electronic Toll Collection System)	5.8-GHz power amp; Power gain = 20 dB (typ.), ACPR (ASK/QPSK, $\leq 5\text{ MHz}$) = -44 dBc (@Output level: +14 dBm)	TX: 75 mA (typ. /@Output level: +14 dBm)	3.0 to 3.6
TC32168FTG ☆	QFN32 (0.5 mm)		ETC (Electronic Toll Collection System) for China	Single-Chip 5.8 GHz transceiver including Wakeup function and FM0 Modem Supported modulation: ASK/OOK Receiving sensitivity: -60 dBm (typ.) Wakeup sensitivity: -45 dBm (typ.) Transmit power: +3 dBm	Sleep: 5 μA RX: 30 mA (typ.) TX: 35 mA (typ.)	1.8 to 3.6

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Proximity Wireless Compliant Products / 近接無線対応製品

Part Number	Package	Applications	Functions and Features	Supply Voltage (V)
TC35420AXLG ☆	WFLGA81	Proximity wireless transceiver	TransferJet™-compliant Wireless IC On-chip RF circuitry, digital signal processing SDIO UHS-I support	3.3 to 1.8
TJM35420XLQ ☆	LGA68	Proximity wireless transceiver	TransferJet™-compliant Wireless Module Built-in RF components SDIO UHS-I support	3.3 to 1.8

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Bluetooth® ICs / Bluetooth® IC

(Bluetooth® Classic / Bluetooth® Classic_low energy dual ICs for Consumer) /

(民生用Bluetooth® Classic / Bluetooth® Classic low energy dual IC)

CPU	Host-IF	Other Interfaces
ARM7TDMI-S™	UART	I ² C/SPI /GPIO

Part Number	Bluetooth Core Spec.	Profiles	Features	Operating temperature (°C)	Supply Voltage (V)	Package					
TC35661SBG-203 ☆	Ver.4.2 Classic	SPP	<ul style="list-style-type: none"> · Receiver sensitivity -90 dBm · Transmit power 2 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA 	-40 to +85	1.7 to 1.9 or 2.7 to 3.6	BGA64 (0.5 mm Pitch) 5.0 mm x 5.0 mm					
TC35661SBG-007 ☆		HCI	<ul style="list-style-type: none"> · Receiver sensitivity -91 dBm · Transmit power 2 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA · Wide band Speech 				BGA64 (0.8 mm Pitch) 7.0 mm x 7.0 mm				
TC35661DBG-008 ☆			Ver.4.2 Classic/low energy dual			<ul style="list-style-type: none"> · Receiver sensitivity -90 dBm · Transmit power 2 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA 	BGA64 (0.5 mm Pitch) 5.0 mm x 5.0 mm				
TC35661SBG-009 ☆ *	Ver.4.0 Classic/low energy dual	SPP, GATT, SMP	<ul style="list-style-type: none"> · Receiver sensitivity -91 dBm · Transmit power 2 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA 			-40 to +85	1.7 to 1.9 or 2.7 to 3.6	BGA64 (0.8 mm Pitch) 7.0 mm x 7.0 mm			
TC35661SBG-501 ☆			<ul style="list-style-type: none"> · Receiver sensitivity -90 dBm · Transmit power 2 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA 						BGA64 (0.5 mm Pitch) 5.0 mm x 5.0 mm		
TC35661SBG-502 ☆			<ul style="list-style-type: none"> · Receiver sensitivity -91 dBm · Transmit power 2 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA 					BGA64 (0.8 mm Pitch) 7.0 mm x 7.0 mm			
TC35661DBG-501 ☆	Ver.4.2 Classic/low energy dual	SPP, GATT, SMP	<ul style="list-style-type: none"> · Receiver sensitivity -91 dBm · Transmit power 1 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA · LE Secure Connections 					-40 to +85	1.7 to 1.9 or 2.7 to 3.6	BGA64 (0.5 mm Pitch) 5.0 mm x 5.0 mm	
TC35661SBG-503 ☆			<ul style="list-style-type: none"> · Receiver sensitivity -90 dBm · Transmit power 2 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA 								BGA64 (0.5 mm Pitch) 5.0 mm x 5.0 mm
TC35661SBG-551 ☆ *			<ul style="list-style-type: none"> · Receiver sensitivity -91 dBm · Transmit power 1 dBm · Current consumption in TX/RX (peak) 63 mA · Current consumption in deep sleep mode 30 μA · LE Secure Connections 								BGA64 (0.5 mm Pitch) 5.0 mm x 5.0 mm

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Bluetooth® ICs / Bluetooth® IC

(Bluetooth® low energy ICs for Consumer) / (民生用Bluetooth® low energy IC)

Host-IF	Other Interfaces	Other functions
UART	I ² C/SPI/GPIO	ADC/PWM/DC-DC

Part Number	Bluetooth Core Spec.	Profiles	NFC Tag	CPU	Features	Operating temperature (°C)	Supply Voltage (V)	Package	
TC35667FTG-005 ☆	Ver.4.0 low energy	HCI, GATT, SMP		ARM® ARM7TDMI-S™	<ul style="list-style-type: none"> Receiver sensitivity -92 dBm Transmit power 0 dBm Current consumption in TX/RX (peak) 5.9 mA (3.3 V, -4 dBm TX power)/ 5.7 mA Current consumption in deep sleep mode 0.05 μA 	-40 to +85	1.8 to 3.6	QFN40 (0.5 mm Pitch) 6.0 mm x 6.0 mm	
TC35670FTG-005 ☆			✓			-30 to +85			
TC35667FTG-006 ☆	Ver.4.1 low energy					<ul style="list-style-type: none"> Receiver sensitivity -92 dBm Transmit power 0 dBm Current consumption in TX/RX (peak) 5.9 mA (3.3 V, -4 dBm TX power)/ 5.7 mA Current consumption in deep sleep mode 0.05 μA Scatternet 		-40 to +85	QFN40 (0.5 mm Pitch) 6.0 mm x 6.0 mm
TC35670FTG-006 ☆			✓		-30 to +85			QFN40 (0.5 mm Pitch) 6.0 mm x 6.0 mm	
TC35676FSG-001 ☆					-40 to +85			QFN40 (0.4 mm Pitch) 5.0 mm x 5.0 mm	
TC35675XBG-001 ☆			✓		BGA52 (0.5 mm Pitch) 4.5 mm x 4.5 mm				
TC35678FSG-002 ☆ *	Ver.4.2 low energy			Cortex®-M0	<ul style="list-style-type: none"> Receiver sensitivity -93.5 dBm Transmit power 0 dBm Current consumption in TX/RX (peak) 3.3 mA (3.0 V, 0 dBm TX power)/ 3.3 mA Current consumption in deep sleep mode 0.05 μA Scatternet LE Data Length Extension LE Secure Connections 	-40 to +85	QFN40 (0.4 mm Pitch) 5.0 mm x 5.0 mm		
TC35678FXG-002 ☆ *			QFN60 (0.4 mm Pitch) 7.0 mm x 7.0 mm						
TC35679FSG-002 ☆ *			QFN40 (0.4 mm Pitch) 5.0 mm x 5.0 mm						
TC3567CFSG-001 ☆ **									
TC3567DFSG-001 ☆ **									

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(Bluetooth® Classic / Bluetooth® Classic_low energy dual / Bluetooth® low energy ICs for Automotive) /
 (車載用Bluetooth® Classic / Bluetooth® Classic_low energy dual / Bluetooth® low energy IC)

Part Number	Bluetooth Core Spec.	Profiles	Features	Operating temperature (°C)	Supply Voltage (V)	Package
TC35661IDBG-203 ☆	Ver.4.2 Classic	SPP	<ul style="list-style-type: none"> Receiver sensitivity -90 dBm Transmit power 2 dBm Current consumption in TX/RX (peak) 63 mA Current consumption in deep sleep mode 30 μA 	-40 to +85	2.7 to 3.6	BGA64 (0.8 mm Pitch) 7.0 mm x 7.0 mm
TC35661IDBG-007 ☆		HCI	<ul style="list-style-type: none"> Receiver sensitivity -90 dBm Transmit power 2 dBm Current consumption in TX/RX (peak) 63 mA Current consumption in deep sleep mode 30 μA Wide band Speech 			
TC35661IDBG-008 ☆			<ul style="list-style-type: none"> Receiver sensitivity -91 dBm Transmit power 2 dBm Current consumption in TX/RX (peak) 63 mA Current consumption in deep sleep mode 30 μA Wide band Speech 			
TC35661IDBG-009 ☆ **	Ver.4.2 Classic/low energy dual	SPP, GATT, SMP	<ul style="list-style-type: none"> Receiver sensitivity -91 dBm Transmit power 2 dBm Current consumption in TX/RX (peak) 63 mA Current consumption in deep sleep mode 30 μA Wide band Speech 			
TC35661IDBG-503 ☆ **		<ul style="list-style-type: none"> Receiver sensitivity -93 dBm Transmit power 1 dBm Current consumption in TX/RX (peak) 174 mA On-chip DSP Wide band Speech 	3.0 to 3.6			
TC35668IXBG ☆	Ver.4.0 Classic	HFP, A2DP, AVRCP, PBAP, SPP	<ul style="list-style-type: none"> Receiver sensitivity -92 dBm Transmit power 0 dBm Current consumption in TX/RX (peak) 5.9 mA (3.3 V, -4 dBm TX power)/ 5.7 mA Current consumption in deep sleep mode 0.05 μA 	-40 to +105	1.8 to 3.6	QFN40 (0.5 mm Pitch) 6.0 mm x 6.0 mm
TC35667IFTG-005 ☆	Ver.4.0 low energy	HCI, GATT, SMP	<ul style="list-style-type: none"> Receiver sensitivity -92 dBm Transmit power 0 dBm Current consumption in TX/RX (peak) 5.9 mA (3.3 V, -4 dBm TX power)/ 5.7 mA Current consumption in deep sleep mode 0.05 μA Scatternet 			
TC35667IFTG-006 ☆ **	Ver.4.1 low energy		<ul style="list-style-type: none"> Receiver sensitivity -93.5 dBm Transmit power 0 dBm Current consumption in TX/RX (peak) 3.3 mA (3.0 V, 0 dBm TX power)/ 3.3 mA Current consumption in deep sleep mode 0.05 μA Scatternet LE Data Length Extension LE Secure Connections 			
TC35679IFTG-002 ☆ **	Ver.4.2 low energy					

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** : Under development / 開発中

TV and Audio ICs / テレビ/オーディオ用

TV Tuning & Channel Decoder ICs / TVチューナ/伝送復調用IC

(Channel Decoder ICs) / (伝送復調用IC)

Part Number	Package	Use	Features	Supply Voltage (V)
TC90532XBG ☆	FBGA177	8PSK demodulator OFDM demodulator	Digital BS broadcasting, digital CS broadcasting (ISDB-S), 8PSK, QPSK demodulation, error correction, Digital terrestrial broadcasting (ISDB-T), OFDM demodulation, error correction, A/D converter, memory	3.0 to 3.6 1.1 to 1.3
TC90522XBG ☆	FBGA177	8PSK demodulator OFDM demodulator (Two channels each)	Digital BS broadcasting, digital CS broadcasting (ISDB-S), 8PSK, QPSK demodulation, error correction, Digital terrestrial broadcasting (ISDB-T), OFDM demodulation, error correction, A/D converter, memory	3.0 to 3.6 1.1 to 1.3
TC90527AFG ☆	LQFP48	OFDM demodulator	Digital terrestrial broadcasting (ISDB-T), OFDM demodulation, error correction, A/D converter, memory	3.0 to 3.6 1.1 to 1.3

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Audio ICs / オーディオ用IC

(Power Amp ICs) / (パワーアンプIC)

Part Number	Package	Intended Use		Output Power (P _{OUT})			Features	Supply Voltage (V)
		Car Stereos	Engine Sound	Recommended V _{CC}	R _L = 4 Ω THD = 10%	R _L = 8 Ω THD = 10%		
TB2909FNG	HTSSOP16		○	12 V		2 W x 1	MOS amplifier for 1 SEPP channel, Standby function, Mute function, Maximum power: 5 W x 1 ch, Output short detection, Thermal detection, Speaker open detection, Overvoltage detection	6 to 16
TB2931HQ	SPP25	○		13.2 V	24 W x 4		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 49 W x 4 ch, R _L = 2 Ω operation guaranteed, Output DC offset detection, Output short detection, +B overvoltage detection, Half short detection	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)
TB2938HQ	SPP25	○		13.2 V	24 W x 4		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 49 W x 4 ch, Output DC offset detection, Output short detection, +B overvoltage detection, Half short detection, Speaker burning prevention	6 to 18
TB2959HQ	SPP25	○		13.2 V	23 W x 4		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 47 W x 4 ch, AUX amp, +B overvoltage detection, Speaker burning prevention	6 to 18
TB2941HQ	SPP25	○		13.2 V	24 W x 4		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 49 W x 4 ch, R _L = 2 Ω operation guaranteed, High-side-switch, Output DC offset detection, 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)
TB2952AHQ	SPP25	○		13.2 V	24 W x 4		MOS amplifier for 4 BTL channels, Command-controlled standby and mute mode, Hardware-standby mode, Maximum power: 49 W x 4 ch, I ² C-bus controlled self-diagnosis, R _L = 2 Ω operation guaranteed, Selectable voltage gain (26/12 dB), 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)

Audio ICs / オーディオ用IC
(Power Amp ICs) / (パワーアンプIC)

Part Number	Package	Intended Use		Output Power (P _{OUT})			Features	Supply Voltage (V)
		Car Stereos	Engine Sound	Recommended V _{CC}	R _L = 4 Ω THD = 10%	R _L = 8 Ω THD = 10%		
TB2975HQ	SPP25	○		13.2 V	24 W x 4		MOS amplifier for 4 BTL channels, Command-controlled standby, and mute mode, Hardware-standby mode, Maximum power: 49 W x 4 ch, Class-KB efficiency, I ² C-bus controlled self-diagnosis, Cross-wiring detection, R _L = 2 Ω operation guaranteed, Selectable voltage gain (26/16 dB), 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)
TB2925HQ	SPP25	○		13.2 V	24 W x 4		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 49 W x 4 ch, Class-KB efficiency, R _L = 2 Ω operation guaranteed, Output DC offset detection, Output short detection, +B overvoltage detection, Cross-wiring detection, 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)
TB2996HQ	SPP25	○		13.2 V	24 W x 4		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 49 W x 4 ch, R _L = 2 Ω operation guaranteed, High quality sound, Output DC offset detection, Output short detection, +B overvoltage detection, 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)
TCB001HQ	SPP25	○		13.2 V	22 W x 4		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 45 W x 4 ch, Output DC offset detection, Output short detection, +B overvoltage detection, 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω)
TCB501HQ	SPP25	○		13.2 V	24 W		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 49 W x 4 ch, R _L = 2 Ω operation guaranteed, High-side-switch (include of back flow preventing circuit), Fulltime Output DC offset detection, 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)
TCB502HQ	SPP25	○		13.2 V	24 W		MOS amplifier for 4 BTL channels, Standby function, Mute function, Maximum power: 49 W x 4 ch, R _L = 2 Ω operation guaranteed, Full time Output DC offset detection, 6 V operations (Engine idling reduction capability), Proof against from GSM	6 to 18 (R _L = 4 Ω) 6 to 16 (R _L = 2 Ω)

(Compact Disc Player IC) / (コンパクトディスクプレーヤ用IC)

Part Number	Package	Classification	Features	Supply Voltage (V)
TC94B16FG ☆	LQFP80	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, multi-bit D/A converter, head amp On-chip 3.3-to-1.5-V regulator, x4 playback mode for CD-DA/R	3.3/1.5

☆: Dry-packed / 防湿梱包品

(CD/MP3 Player ICs) / (CDMP3プレーヤ用IC)

Part Number	Package	Classification	Features	Supply Voltage (V)
TC94A92FG ☆	LQFP80	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 D/A converter	3.3/1.5
TC94A93MFG ☆	LQFP80	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 D/A converter, shock-proof feature	3.3/1.5

☆: Dry-packed / 防湿梱包品

Application Processors / アプリケーションプロセッサ

TZ1000 Series / TZ1000 シリーズ

Part Number	Package (package size) (ball pitch)	CPU	CPU Frequency (MHz)	SRAM (KB)	NOR Flash (MB)	Accelerometer	Gyroscope	Magnetometer	Bluetooth® core specification version	Bluetooth® Low Energy Controller	Quad SPI for Flash Connection	GPIO (ch)	I ² C (Master/Slave) (ch)	UART (ch)	DMA (ch)	AES	True Random Number Generator	SPI (ch)	PWM (ch)	32-bit Timer	Watchdog Timer	12-bit ADC	24-bit ADC	USB	Operating Temperature (°C)
TZ1011MBG	PLFBGA153 (8.50 mm x 9.80 mm) (0.5 mm)	ARM Cortex-M4F	48	288	(1) 1	●	●	●	4.0	●	●	(2) 24 [32]	(2) 2 [3]	(2) 2 [3]	8	128/192/256-bits key length	1	(2) 3 [4]	4	2	1	4	3	USB 2.0 Device	Ta = -20 to 70
TZ1021MBG	PVFBGA110 (6.70 mm x 4.00 mm) (0.4 mm)					-	-	-	-	32		3	3	4											
TZ1031MBG	PLFBGA153 (8.50 mm x 9.80 mm) (0.5 mm)					●	●	-	4.0	●		(2) 24 [32]	(2) 2 [3]	(2) 2 [3]				(2) 3 [4]							
TZ1041MBG	PLFBGA136 (6.70 mm x 8.00 mm) (0.5 mm)					-	-	-	4.1	●		(2) 24 [32]	(2) 2 [3]	(2) 2 [3]				(2) 3 [4]							

Note (1): NOR Flash is connected internally via SPI. / Nor FlashはSPI経由で内部接続。

(2): Number inside the bracket means the channel counts of internal MCU. / []内の数字は内蔵のMCUのチャネル数を含めた数です。

TZ1200 Series / TZ1200 シリーズ

Part Number	Package (package size) (ball pitch)	CPU	CPU Frequency (MHz)	SRAM (MB)	e-MMC (ch)	External bus	2D Graphics Accelerator	MIPI® DBI Type B	MIPI® DBI Type C	MIPI® DSI	Quad SPI for Flash Connection	GPIO (ch)	I ² C (Master/Slave) (ch)	UART (ch)	DMA (ch)	True Random Number Generator	Compressor & Decompressor	SPI (ch)	PWM (ch)	32-bit Timer	Watchdog Timer	12-bit ADC	24-bit ADC	DAC	USB	LED driver	Operating Temperature (°C)
TZ1201XBG	PUFBGA210 (8.0 mm x 8.0 mm) (0.4 mm)	ARM Cortex-M4F	96 (up to 120)	2.2	2	1	●	●	●	●	●	120	2	4	16	1	1	4	8	2	1	16	4	1	USB 2.0 Device	4	Ta = -20 to 70

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TZ2000 Series / TZ2000 シリーズ

Part Number	Package (package size) (ball pitch)	CPU	CPU Frequency	SRAM (MByte)	L1 I Cache (Kbyte)	L1 D Cache (Kbyte)	L2 Cache (Kbyte)	DRAM Controller	External Extended Bus Interface	2D Graphic Engine	LCD Controller	USB	UART	I ² C	I ² S	SPIB	SPIM	PWM	12bit ADC	SDIO/e-MMC	GPIO	DMA controller	Timer/Counter	RTC	Secure Boot System & Encrypt Data Function	FPU	Camera I/F	Operating Temperature (°C)		
TZ2002XBG	PLFBGA280 (15 mm x 15 mm) (0.8 mm pitch)	ARM® Cortex®-A9 MPCore	200	1	16	16	—	DDR3/DDR3L x 8 bit	—	Toshiba original graphics accelerator	WVGA (800 x 480 pixel) 60 fps, 24 bit Parallel I/F	USB2.0 host/device	4	5	2	2	2	5	4	2	64	●	9	1	—	—	—	Ta = -20 to 70 Ta = -40 to 85 (1)		
TZ2003XBG	PLFBGA280 (15 mm x 15 mm) (0.8 mm pitch)		300	1 MB + 32 KB	32	32	128	DDR3/DDR3L x 16 bit	Address: 27 bit, Data: 32 bit	Toshiba original graphics accelerator	WVGA (800 x 480 pixel) 60 fps, 24 bit Parallel I/F	USB2.0 host /device	4	4	2	2	7	6	4	3	128	●	9	1	●	●	●	Ta = -20 to 80 Ta = -40 to 85 (1)		
TZ2100XBG	PLFBGA310 (16 mm x 16 mm) (0.8 mm pitch)		600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TZ2101XBG			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TZ2102XBG			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Note(1): Extended temperature range / 温度拡張品

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TZA300 Series / TZA300 シリーズ

Part Number	Package (package size)	Video I/O Interface	Video Input Port	Video Output Port	Feature	Applications	Supply Voltage (V)
TZA300XBG	PFBGA448 (19 mm x 19 mm) (0.8 mm pitch)	<ul style="list-style-type: none"> LVC MOS Parallel I/O - YUV/RGB 444 (24 bit) - YUV 422 (16 bit) - YUV 422 (8 bit) (1) 	1	2	<ul style="list-style-type: none"> Up to 1080p @ 60 fps (2) Video Dynamic Range Enhancing Ultra-low latency processing (100 pixel clock cycles or less) 3D Noise Reduction Control Interface: I²C BUS 	Surveillance camera system Surveillance monitor system	Core, PLL: 1.2 DDR3 I/F: 1.5/2.5 I/O: 1.8/3.3

Note(1): YC multiplex for only 480p/576p

(2): Special license file is required for performing dynamic range enhancer processing of input videos other than VGA, 480p and 576p. For more information kindly contact the sales division. / VGA、480P及び576P以外の入力映像に対する鮮明化には特別なライセンスファイルが必要です。詳細については、営業部門にお問い合わせください。

Interface Bridges / インタフェースブリッジ

MPD: Mobile Peripheral Devices

Part Number	Package (Package Size) (Ball Pitch)	Functions		Feature/Supported Resolution	Applications	Supply Voltage (V)
		Rx (input)	Tx (output)			
TC358743XBG ☆	P-TFPGA64 (6 mm x 6 mm) (0.65 mm)	HDMI® 1.4	MIPI® CSI-2 1.01	HDMI® to MIPI® CSI-2 Camera Serial Interface Bridge HDMI® Video format: Up to FHD (1920 x 1080, 60 fps, 24 bpp (bits per pixel))	Smart TV, smart monitor, smart set-top box, Digital Media Adapter (DMA)	1.2 (MIPI®/Core) 3.3 (HDMI®) 1.8 to 3.3 (I/O) 2.5 (APLL)
TC358749XBG ☆	P-VFBGA80 (7 mm x 7 mm) (0.65 mm)	HDMI® 1.4b	MIPI® CSI-2 1.01	HDMI® to MIPI® CSI-2 Camera Serial Interface Bridge Video de-interlacing, Video scaling HDMI® Video format: Up to FHD (1920 x 1080, 60 fps, 24 bpp)	Smart TV, smart monitor, smart set-top box, DMA	1.2 (MIPI®/Core/PLL) 3.3 (HDMI®) 1.8 to 3.3 (I/O)
TC358840XBG ☆	P-VFBGA80 (7 mm x 7 mm) (0.65 mm)	HDMI® 1.4b	MIPI® CSI-2 1.01	HDMI® to MIPI® CSI-2 Camera Serial Interface Bridge HDMI® Video format: Up to 4K Ultra HD (3840 x 2160, 30 fps, 24 bpp)	Smart set top box, smart TV, smart monitor, DMA	1.2 MIPI® 1.1 CORE/PLL 3.3 (HDMI®) 1.8 to 3.3 (I/O)
TC358779XBG ☆	P-VFBGA80 (7 mm x 7 mm) (0.65 mm)	HDMI® 1.4b	MIPI® DSI 1.1	HDMI® to MIPI® DSI Display Serial Interface Bridge Video de-interlacing, Video scaling HDMI® Video format: Up to FHD (1920 x 1080, 60 fps, 24 bpp)	Tablet, digital still camera (DSC), LCD displays, video projector, head mounted display (HMD), game accessory, other integrated display panel application with MIPI® DSI interface	1.2 (MIPI®/CORE/PLL) 3.3 (HDMI®) 1.8 to 3.3 (I/O)
TC358870XBG ☆	P-VFBGA80 (7mm x 7mm) (0.65 mm)	HDMI® 1.4b	MIPI® DSI 1.1	HDMI® to MIPI® DSI Display Serial Interface Bridge HDMI® Video format: Up to 4K Ultra HD (3840 x 2160, 30 fps, 24 bpp)	HMD, mobile devices, gaming accessories, wearable computers display	1.2 MIPI® 1.1 CORE/PLL 3.3 (HDMI®) 1.8 to 3.3 (I/O)
TC358746XBG ☆	P-VFBGA72 (4.5 mm x 4.5 mm) (0.40 mm)	(1) MIPI® CSI-2 1.01 (2) Parallel	(1) Parallel (2) MIPI® CSI-2 1.01	MIPI® CSI-2 to Parallel Camera Interface Bridge Parallel to MIPI® CSI-2 Camera Interface Bridge Up to 100 MHz PCLK frequency for Output mode, and 166 MHz for Input mode.	Smartphone, tablet, VOIP phone, industrial device	1.2 (MIPI®/Core) 1.8 to 3.3 (I/O)
TC358748XBG ☆	P-VFBGA80 (7 mm x 7 mm) (0.65 mm)					
TC358762XBG ☆	P-VFBGA64 (5 mm x 5 mm) (0.50 mm)	(1) MIPI® DSI 1.01 (2) MIPI® DSI 1.01	(1) MIPI® DPI 2.0 (2) MIPI® DBI-2 2.0	MIPI® DSI to MIPI® DPI/DBI Display Interface Bridge Up to WXGA (1366 x 768, 60 fps, 24 bpp)	Tablet, smartphone, smart watch, HMD, portable navigation device (PND)	1.2 (MIPI®/Core) 1.8 to 3.3 (I/O)
TC358763XBG ☆	P-VFBGA72 (4.5 mm x 4.5 mm) (0.40 mm)	(1) MIPI® DPI 2.0 (2) MIPI® DBI-2 2.0	(1) MIPI® DSI 1.01 (2) MIPI® DSI 1.01	MIPI® DPI/DBI to MIPI® DSI Display Interface Bridge Up to XGA (1024 x 768, 60 fps, 24 bpp)	Smartphone, DSC, digital video camera (DVC), smart watch, HMD, PND	1.2 (MIPI®/Core) 1.8 to 3.3 (I/O)
TC358764XBG ☆	P-TFPGA49 (5 mm x 5 mm) (0.65 mm)	MIPI® DSI 1.01	LVDS	MIPI® DSI to LVDS Display Interface Bridge (single link) Up to WXGA (1366 x 768, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 3.3 (LVDS) 1.8 to 3.3 (I/O)
TC358765XBG ☆	P-TFPGA64 (6 mm x 6 mm) (0.65 mm)	MIPI® DSI 1.01	LVDS	MIPI® DSI to LVDS Display Interface Bridge (dual link) Up to UXGA (1600 x 1200, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 3.3 (LVDS) 1.8 to 3.3 (I/O)
TC358766XBG ☆	P-VFBGA120 (6 mm x 6 mm) (0.50 mm)	(1) MIPI® DSI 1.01 (2) MIPI® DPI 2.0 (3) MIPI® DSI 1.01	(1) VESA DisplayPort™ 1.1a (2) VESA DisplayPort™ 1.1a (3) MIPI® DPI 2.0	MIPI® DSI to DisplayPort® Display Interface Bridge MIPI® DPI to DisplayPort® Display Interface Bridge MIPI® DSI to MIPI® DPI Display Interface Bridge Up to WUXGA (1920 x 1200, 60 fps, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 1.2 & 1.8 (DisplayPort®) 1.8 (I/O)
TC358767AXBG ☆	P-VFBGA81 (5 mm x 5 mm) (0.50 mm)	(1) MIPI® DSI 1.01 (2) MIPI® DPI 2.0	(1) VESA DisplayPort™ 1.1a (2) VESA DisplayPort™ 1.1a	MIPI® DSI to DisplayPort® Display Interface Bridge MIPI® DPI to DisplayPort® Display Interface Bridge Up to WUXGA (1920 x 1200, 60 fps, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 1.2 & 1.8 (DisplayPort®) 1.8 (I/O)
TC358768AXBG ☆	P-VFBGA72 (4.5 mm x 4.5 mm) (0.40 mm)	RGB	MIPI® DSI 1.02	RGB to MIPI® DSI Display Interface Bridge Up to WUXGA (1920 x 1200, 60 fps, 24-bit/pixel)	Smartphone, tablet, Ultrabook™	1.2 (MIPI®/Core) 1.8 to 3.3 (I/O)
TC358778XBG ☆	P-VFBGA80 (7 mm x 7 mm) (0.65 mm)					
TC358770AXBG ☆	P-VFBGA100 (5 mm x 5 mm) (0.40 mm)	MIPI® DSI 1.02	VESA DisplayPort™ 1.1a	MIPI® DSI to DisplayPort® Display Interface Bridge Up to (QSXGA 2560 x 2048, 60 fps, 24 bit per pixel)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 1.2 & 1.8 (DisplayPort®) 1.8 (I/O)
TC358777XBG ☆	P-VFBGA80 (7 mm x 7 mm) (0.65 mm)					

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MPD: Mobile Peripheral Devices

Part Number	Package (Package Size) (Ball Pitch)	Functions		Feature/Supported Resolution	Applications	Supply Voltage (V)
		Rx (input)	Tx (output)			
TC358771XBG ☆	P-VFBGA49 (5 mm x 5 mm) (0.65 mm)	MIPI® DSI 1.01	LVDS	MIPI® DSI to LVDS Display Interface Bridge with Back Light Control (single link) Up to UXGA (1600 x 1200, 60 fps, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 1.8 (LVDS) 1.8 to 3.3 (I/O)
TC358772XBG ☆	P-VFBGA 64 (6 mm x 6 mm) (0.65 mm)	MIPI® DSI 1.01	LVDS	MIPI® DSI to LVDS Display Interface Bridge with Back Light Control (dual link) Up to WUXGA (1920 x 1200, 60 fps, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 1.8 (LVDS) 1.8 to 3.3 (I/O)
TC358774XBG ☆	P-VFBGA49 (5 mm x 5 mm) (0.65 mm)	MIPI® DSI 1.01	LVDS	MIPI® DSI to LVDS Display Interface Bridge (single link) Up to UXGA (1600 x 1200, 60 fps, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 1.8 (LVDS) 1.8 to 3.3 (I/O)
TC358775XBG ☆	P-VFBGA64 (6 mm x 6 mm) (0.65 mm)	MIPI® DSI 1.01	LVDS	MIPI® DSI to LVDS Display Interface Bridge (dual link) Up to WUXGA (1920 x 1200, 60 fps, 24 bpp)	Tablet, Ultrabook™	1.2 (MIPI®/Core) 1.8 (LVDS) 1.8 to 3.3 (I/O)
TC358860XBG ☆	P-VFBGA65 (5 mm x 5 mm) (0.5 mm)	VESA Embedded DisplayPort (eDP™) ver1.4	MIPI® DSI 1.02	4K2K VESA's Embedded Display Port (eDP™) to MIPI® DSI Display Serial Interface Bridge Up to 4K Ultra HD (4096 x 2048, 60 fps, 3840 x 2160@, 24 bpp)	Phablet, tablet, portable game and PC, HMD	1.2 (MIPI®) 1.1 (Core, MIPI® D-PHY, eDP-PHY) 1.8 (eDP™-PHY) 1.8 or 3.3 (I/O, HPD)

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I/O Expander

Part Number	Package (Pin Pitch)	Functions	Applications	Functions and Features	Supply Voltage (V)
TC35894XBG ☆	P-TFBGA36 (0.5 mm)	I/O expander	I/O port expansion	Up to 24 GPIO ports. GPIO ports can be used for key matrix (up to 96 keys) or PWM/timer (up to 3 channels). Chattering reduction, internal clock oscillator, internal pull-up/pull-down resistors Up to 26-port direct key functionality (when GPIOs are not used).	1.62 to 3.60
TC35894FG ☆	P-LQFP44 (0.8 mm)			Up to 24 GPIO ports. GPIO ports can be used for key matrix (up to 96 keys) or PWM/timer (up to 3 channels). Chattering reduction, internal clock oscillator, internal pull-up/pull-down resistors Up to 26-port direct key functionality (when GPIOs are not used)	1.62 to 3.60

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Other Product ICs / その他機器用

Shock Sensor ICs / ショックセンサIC

Part Number	Package	Device Type	Output Source Current Min (μ A)	Output Sink Current Min (μ A)	Window-Comparator Detection Voltage Levels Typ. (V)	Supply Current ($T_a = 25^\circ\text{C}$) Max (mA)	Supply Voltage (V)	Remarks
TB6082FNG	VSOP10	Shock sensor amp (low-noise charge amp)	80 (OP-AMP2) (@ $V_{CC} - 0.3\text{ V}$)	500 (OP-AMP2) (@ 0.3 V)	—	5.0 ($V_{CC} = 2.5\text{ V}$, $V_{ref} = 1.0\text{ V}$)	2.3 to 5.5	1 channel, Built-in amplifier for notch filter, low-noise
TB6082FTG	QFN16	Shock sensor amp (low-noise charge amp)	80 (OP-AMP2) (@ $V_{CC} - 0.3\text{ V}$)	500 (OP-AMP2) (@ 0.3 V)	—	5.0 ($V_{CC} = 2.5\text{ V}$, $V_{ref} = 1.0\text{ V}$)	2.3 to 5.5	1 channel, Built-in amplifier for notch filter, low-noise
TB6086FTG	QFN16	Shock sensor amp (Sensor signal Amplifier)	100 (OP-AMP) (@ $V_{CC} - 0.3\text{ V}$)	100 (OP-AMP) (@ 0.3 V)	2.05 (High) 1.25 (Low)	4.0 ($V_{CC} = 3.3\text{ V}$, $V_{ref} = 1.65\text{ V}$)	3.0 to 5.5	1 channel, Built-in amplifier for notch filter, Window Comparator
TC93A33FTG	QFN16	Shock sensor amp (low-noise charge amp)	80 (OP-AMP2) (@ $V_{CC} - 0.3\text{ V}$)	80 (OP-AMP2) (@ 0.3 V)	—	4.5 ($V_{CC} = 1.8\text{ V}$, $EN = H$)	1.6 to 2.3	1 channel, Built-in amplifier for notch filter, low-noise

High-Frequency Modulator ICs / 高周波重畳IC

Part Number	Package	Device Type	Frequency (MHz)	Amplitude (mApp)	Operating Current Consumption ($V_{DD} = 5.0\text{ V}$, $T_a = 25^\circ\text{C}$) Max (mA)	Supply Voltage (V)	Remarks
TC93A14AFUG	SSOP6	High-frequency modulator for optical disk (2-ch)	250 to 450	25 to 80	21.5	4.5 to 5.5	Spread spectrum type

Interface ICs for Hot Water Dispensers / 給湯器用インタフェースIC

Part Number	Package	Features	Applications	Supply Voltage (V)
T6B70BFG	SOP16	Carrier receiver, carrier identification, carrier pseudo-sine wave generator	Communication for hot water dispensers	4.5 to 5.5
T6B70BFNG	SSOP16	Carrier receiver, carrier identification, carrier pseudo-sine wave generator Smaller package version of T6B70BFG	Communication for hot water dispensers	4.5 to 5.5

SEMICONDUCTOR GENERAL CATALOG

半導体製品総覧表

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