Renesas Electronics America Inc - M30280F6HP#U3B Datasheet

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"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	M16C/60
Core Size	16-Bit
Speed	20MHz
Connectivity	I²C, IEBus, SIO, UART/USART
Peripherals	DMA, POR, PWM, Voltage Detect, WDT
Number of I/O	71
Program Memory Size	48KB (48K x 8)
Program Memory Type	FLASH
EEPROM Size	4K x 8
RAM Size	4K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 24x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	80-LQFP
Supplier Device Package	80-LQFP (12x12)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/m30280f6hp-u3b

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1. Overview

The M16C/28 Group (M16C/28 and M16C/28B) MCU are single-chip control MCU, fabricated using high-performance silicon gate CMOS technology with the M16C/60 series CPU core. The M16C/28 Group (M16C/28 and M16C/28B) are housed in 64-pin and 80-pin plastic molded LQFP packages and also in 85-pin plastic molded TFLGA (Thin Fine Pitch Land Grid Array) package. With a 1-Mbyte address space, this MCU combines advanced instruction manipulation capabilities to process complex instructions by less bytes and execute instructions at higher speed. It includes a multiplier and DMAC adequate for office automation, communication devices and other high-speed processing applications.

The M16C/28 has Normal-ver., T-ver., and V-ver.. The M16C/28B has Normal-ver. only.

This hardware manual describes the Normal-ver. only. Please contact Renesas Technology Corp. for T-ver./V-ver. information.

1.1 Applications

Audio, cameras, office equipment, communication equipment, portable equipment, home appliances (inverter solution), motor control, industrial equipment, etc.

1.2 Performance Overview

Table 1.1 and **1.2** outline performance overview of the M16C/28 Group (M16C/28, M16C/28B).

Table 1.1 M16C/28 Group (M16C/28, M16C/28) Performance (80/85-Pin Package)

	Item	Performance
CPU	Number of basic instructions	91 instructions
	Minimum instruction excution time	41.7 ns (f(BCLK) = 24 MHz, Vcc = 4.2 V to 5.5 V) (M16C/28B) 50 ns (f(BCLK) = 20 MHz, Vcc = 3.0 V to 5.5 V) (M16C/28, M16C/28B) 100 ns (f(BCLK) = 10 MHz, Vcc= 2.7 V to 5.5 V) (M16C/28, M16C/28B)
	Operation mode	Single chip mode
	Address space	1M bytes
	Memory capacity	See **Table 1.3**
Peripheral Function	I/O port	Input/Output : 71 lines
	Multifunction timer	TimerA:16 bits x 5 channels, TimerB:16 bits x 3 channels Three-phase Motor Control Timer TimerS (Input Capture/Output Compare) : 16bit base timer x 1 channel (Input/Output x 8 channels)
	Serial I/O	2 channels (UART0, UART1) UART, clock synchronous 1 channel (UART2) UART, clock synchronous, I^2C bus(1), or IEbus(2) 2 channels (SI/O3, SI/O4) Clock synchronous 1 channel (Multi-Master I^2C bus(1))
	A/D converter	10 bits x 24 channels
	DMAC	2 channels
	Watchdog timer	15 bits x 1 (with prescaler)
	Interrupt	25 internal and 8 external sources, 4 software sources, 7 levels
	Clock generation circuit	4 circuits • Main clock (*) • Sub-clock (*) • On-chip oscillator • PLL frequency synthesizer (*) Equipped with a built-in feedback resistor
	Oscillation Stop Detect Function	Main clock oscillation stop, re-oscillation detect function
	Voltage detection circuit	Available
Electrical Characteristics	Power supply voltage	Vcc = 4.2 V to 5.5 V (f(BCLK) = 24 MHz) (M16C/28B) Vcc = 3.0 V to 5.5 V (f(BCLK) = 20 MHz) (M16C/28, M16C/28B) Vcc = 2.7 V to 5.5 V (f(BCLK) = 10 MHz) (M16C/28, M16C/28B)
	Power consumption	16 mA (Vcc = 5V, f(BCLK) = 20 MHz) 25 µA (f(XCIN) = 32 KHz on RAM) 3.0 µA (Vcc = 3V, f(XCIN) = 32 KHz, in wait mode) 0.7 µA (Vcc = 3V, in stop mode)
Flash Memory	Program/erase supply voltage	2.7 V to 5.5 V
	Program and erase endurance	100 times (all space) or 1,000 times (Blocks 0 to 5) /10,000 times (Block A, Block B(3))
Operating Ambient Temperature		-20 to 85°C/-40 to 85°C(3)
Package		80-pin plastic mold LQFP, 85-pin plastic mold TFLGA

NOTES:
1. I^2C bus is a trademark of Koninklijke Philips Electronics N. V.
2. IEBus is a trademark of NEC Electronics Corporation.
3. Refer to **Table 1.5** to **1.7** for number of program/erase.
4. Use PLL frequency synthesizer to use M16C/28B at f(BCLK) = 24 MHz.

1.3 Block Diagram

Figure 1.1 is a block diagram of the M16C/28 Group (M16C/28, M16C/28B), 80-pin and 85-pin package.
Figure 1.2 is a block diagram of the M16C/28 Group (M16C/28, M16C/28B), 64-pin package.

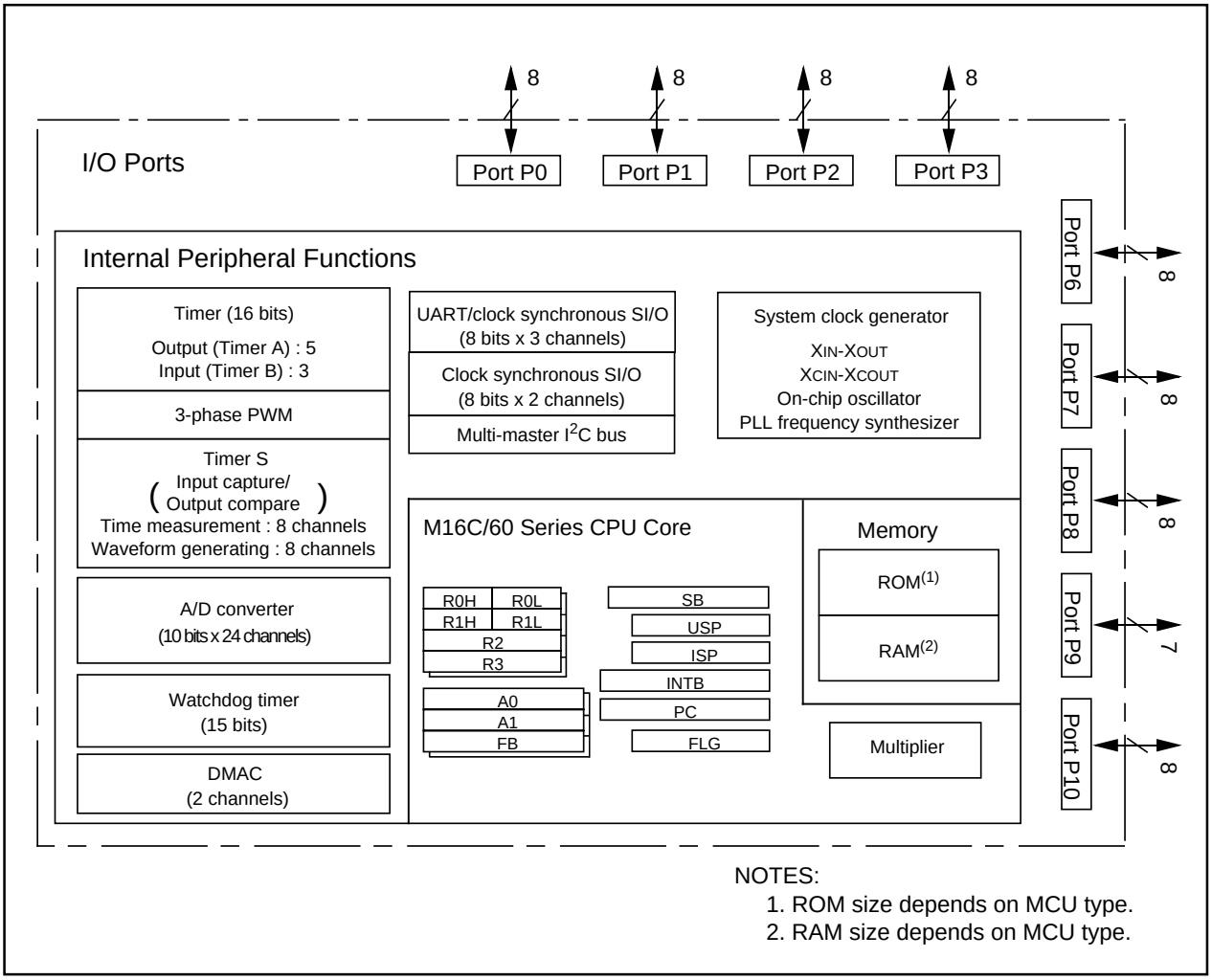


Figure 1.1 M16C/28 Group (M16C/28, M16C/28B), 80-Pin/85-Pin Block Diagram

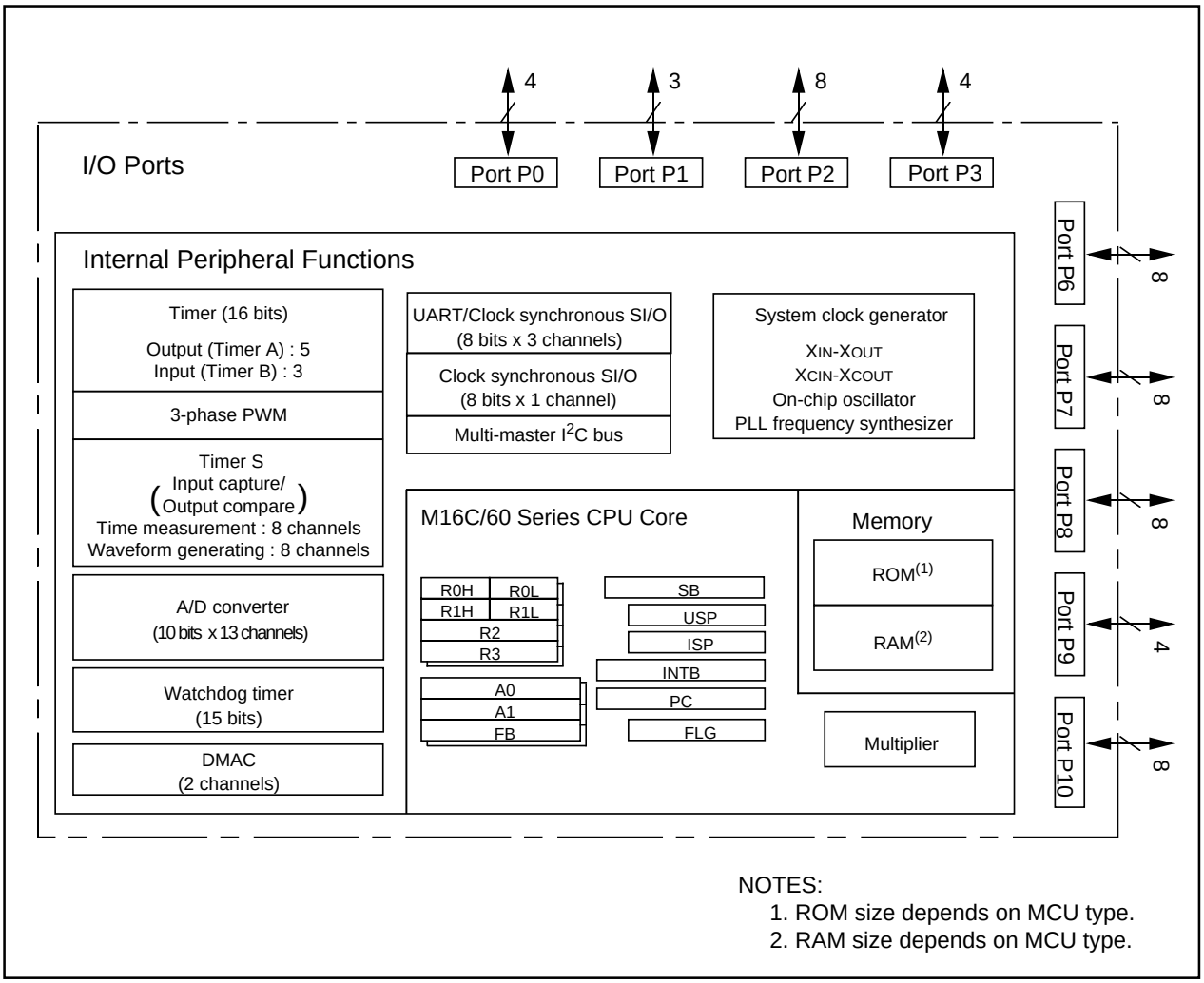


Figure 1.2 M16C/28 Group (M16C/28, M16C/28B), 64-Pin Block Diagram

1.4 Product Information

Tables 1.3 and **1.4** list the M16C/28 Group product information and **Figure 1.3** shows the product numbering system. The specifications are partially different between normal-ver.and T/ V-ver..

Table 1.3 M16C/28 Product List -Normal-ver. **As of September, 2006**

Type Number	ROM Capacity	RAM Capacity	Package Type	Remarks	Product Code
M30280F6WG (N)	48 K + 4 K	4 K	PTLG0085JB-A (85F0G)	Flash Memory	U3, U5, U7, U9
M30280F8WG (N)	64 K + 4 K	4 K			
M30280FAWG (N)	96 K + 4 K	8 K			
M30280F6HP (N)	48 K + 4 K	4 K	PLQP0080KB-A (80P6Q-A)		
M30280F8HP (N)	64 K + 4 K	4 K			
M30280FAHP (N)	96 K + 4 K	8 K			
M30280FCHP (N)	128 K + 4 K	12 K			
M30281F6HP (N)	48 K + 4 K	4 K	PLQP0064KB-A (64P6Q-A)		
M30281F8HP (N)	64 K + 4 K	4 K			
M30281FAHP (N)	96 K + 4 K	8 K			
M30281FCHP (N)	128 K + 4 K	12 K			
M30280M8-XXXHP (N)	64 K	4 K	PLQP0080KB-A (80P6Q-A)	Mask ROM	U3, U5
M30280MA-XXXHP (N)	96 K	8 K			
M30280MC-XXXHP (N)	128 K	12 K			
M30281M8-XXXHP (N)	64 K	4 K	PLQP0064KB-A (64P6Q-A)		
M30281MA-XXXHP (N)	96 K	8 K			
M30281MC-XXXHP (N)	128 K	12 K			

(N): New

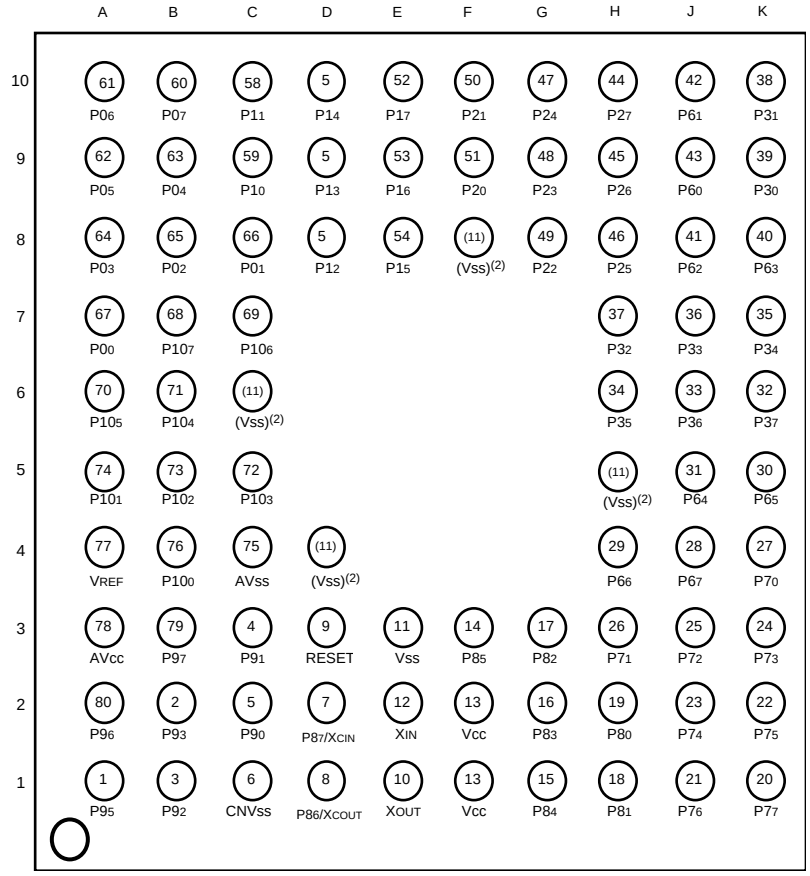
Table 1.4 M16C/28B Product List -Normal-ver. **As of September, 2006**

Type Number	ROM Capacity	RAM Capacity	Package Type	Remarks	Product Code
M30280FCBHP (D)	128 K + 4 K	12 K	PLQP0080KB-A (80P6Q-A)	Flash memory	U7
M30281FCBHP (D)	128 K + 4 K	12 K	PLQP0064KB-A (64P6Q-A)		

(D): Under development

1.5 Pin Assignment

Figures 1.5 to 1.7 show the pin Assignments (top view).



NOTES :
1. The numbers in each grid (circle) show the pin numbers of the M30280FAHP (80P6Q-A package)
2. Connect grids written as (Vss) to Vss(GND) or leave them open.
3. Set PACR2 to PACR0 bits in the PACR register to "0112" before you input and output it after resetting to each pin. When the PACR register is not set, the input and output function of some pins are disabled.

Package: PTLG0085JB-A(85F0G)

Figure 1.5 Pin Assignment (Top View) of 85-pin Package

Table 1.8 Pin Characteristics for 85-pin Package

Pin No.	Control Pin	Port	Interrupt Pin	Timer Pin	Timer S Pin	UART Pin	Multi-master I^2C bus Pin	Analog Pin	PLQP0080KB-A Pin Number
A1		$P9_5$				CLK_4		$AN2_5$	1
A2		$P9_6$				$SOUT_4$		$AN2_6$	80
A3	AVcc								78
A4	V_{REF}								77
A5		$P10_1$						AN_1	74
A6		$P10_5$	$\overline{KI}_1$					AN_5	70
A7		$P0_0$						$AN0_0$	67
A8		$P0_3$						$AN0_3$	64
A9		$P0_5$						$AN0_5$	62
A10		$P0_6$						$AN0_6$	61
B1		$P9_2$		TB_{2IN}					3
B2		$P9_3$						$AN2_4$	2
B3		$P9_7$				SIN_4		$AN2_7$	79
B4		$P10_0$						AN_0	76
B5		$P10_2$						AN_2	73
B6		$P10_4$	$\overline{KI}_0$					AN_4	71
B7		$P10_7$	$\overline{KI}_3$					AN_7	68
B8		$P0_2$						$AN0_2$	65
B9		$P0_4$						$AN0_4$	63
B10		$P0_7$						$AN0_7$	60
C1	CNVss								6
C2		$P9_0$		TB_{0IN}					5
C3		$P9_1$		TB_{1IN}					4
C4	AVss								75
C5		$P10_3$						AN_3	72
C6	V_{SS}(1)								(11)
C7		$P10_6$	$\overline{KI}_2$					AN_6	69
C8		$P0_1$						$AN0_1$	66
C9		$P1_0$						$AN2_0$	59
C10		$P1_1$						$AN2_1$	58
D1	X_{COUT}	$P8_6$							8
D2	X_{CIN}	$P8_7$							7
D3	$\overline{RESET}$								9
D4	V_{SS}(1)								(11)
D8		$P1_2$						$AN2_2$	57
D9		$P1_3$						$AN2_3$	56
D10		$P1_4$							55
E1	X_{OUT}								10
E2	X_{IN}								12
E3	Vss								11

Table 1.9 Pin Characteristics for 80-Pin Package (Continued)

Pin No.	Control Pin	Port	Interrupt Pin	Timer Pin	Timer S Pin	UART Pin	Multi-master I^2C bus Pin	Analog Pin
41		$P6_2$				RxD_0		
42		$P6_1$				CLK_0		
43		$P6_0$				$\overline{RTS_0}$ / $\overline{CTS_0}$		
44		$P2_7$			$OUTC1_7$ / $INPC1_7$			
45		$P2_6$			$OUTC1_6$ / $INPC1_6$			
46		$P2_5$			$OUTC1_5$ / $INPC1_5$			
47		$P2_4$			$OUTC1_4$ / $INPC1_4$			
48		$P2_3$			$OUTC1_3$ / $INPC1_3$			
49		$P2_2$			$OUTC1_2$ / $INPC1_2$			
50		$P2_1$			$OUTC1_1$ / $INPC1_1$		SCL_{MM}	
51		$P2_0$			$OUTC1_0$ / $INPC1_0$		SDA_{MM}	
52		$P1_7$	$\overline{INT_5}$	IDU	$INPC1_7$			
53		$P1_6$	$\overline{INT_4}$	IDW				
54		$P1_5$	$\overline{INT_3}$	IDV				$\overline{ADTRG}$
55		$P1_4$						
56		$P1_3$						$AN2_3$
57		$P1_2$						$AN2_2$
58		$P1_1$						$AN2_1$
59		$P1_0$						$AN2_0$
60		$P0_7$						$AN0_7$
61		$P0_6$						$AN0_6$
62		$P0_5$						$AN0_5$
63		$P0_4$						$AN0_4$
64		$P0_3$						$AN0_3$
65		$P0_2$						$AN0_2$
66		$P0_1$						$AN0_1$
67		$P0_0$						$AN0_0$
68		$P10_7$	$\overline{KI_3}$					AN_7
69		$P10_6$	$\overline{KI_2}$					AN_6
70		$P10_5$	$\overline{KI_1}$					AN_5
71		$P10_4$	$\overline{KI_0}$					AN_4
72		$P10_3$						AN_3
73		$P10_2$						AN_2
74		$P10_1$						AN_1
75	AVss							
76		$P10_0$						AN_0
77	V_{REF}							
78	AVcc							
79		$P9_7$				SIN_4		$AN2_7$
80		$P9_6$				$SOUT_4$		$AN2_6$

Table 1.10 Pin Description (64-Pin, 80-Pin and 85-Pin Packages) (Continued)

Classification	Symbol	I/O Type	Function
Timer S	INPC10 to INPC17	I	Input pins for the time measurement function
	OUTC10 to OUTC17	O	Output pins for the waveform generating function
I/O Ports	P00 to P03 P15 to P17 P20 to P27 P30 to P33 P60 to P67 P70 to P77 P80 to P87 P100 to P107	I/O	I/O ports for CMOS. Each port can be programmed for input or output under the control of the direction register. An input port can be set, by program, for a pull-up resistor available or for no pull-up resister available in 4-bit units
	P90 to P93	I/O	I/O ports having equivalent functions to P0

I : Input O : Output I/O : Input and output

Table 1.10 Pin Description (80-Pin and 85-Pin Packages only) (Continued)

Classification	Symbol	I/O Type	Function
Serial I/O	CLK4	I/O	Inputs and outputs the transfer clock
	SIN4	I	Inputs serial data
	SOUT4	O	Outputs serial data
A/D Converter	AN04 to AN07 AN20 to AN23 AN25 to AN27	I	Analog input pins for the A/D converter
I/O Ports	P04 to P07 P10 to P14 P34 to P37	I/O	I/O ports for CMOS. Each port can be programmed for input or output under the control of the direction register. An input port can be set, by program, for a pull-up resistor available or for no pull-up resister available in 4-bit units
	P95 to P97	I/O	I/O ports having equivalent functions to P0

I : Input O : Output I/O : Input and output

4. Special Function Register (SFR)

SFR (Special Function Register) is the control register of peripheral functions. **Tables 4.1** to **4.7** list the SFR information.

Table 4.1 SFR Information(1)[1]

Address	Register	Symbol	After Reset
0000₁₆			
0001₁₆			
0002₁₆			
0003₁₆			
0004₁₆	Processor mode register 0	PM0	00₁₆
0005₁₆	Processor mode register 1	PM1	00001000₂
0006₁₆	System clock control register 0	CM0	01001000₂
0007₁₆	System clock control register 1	CM1	00100000₂
0008₁₆			
0009₁₆	Address match interrupt enable register	AIER	XXXXXX00₂
000A₁₆	Protect register	PRCR	XX000000₂
000B₁₆			
000C₁₆	Oscillation stop detection register [2]	CM2	0X000010₂
000D₁₆			
000E₁₆	Watchdog timer start register	WDTS	XX₁₆
000F₁₆	Watchdog timer control register	WDC	00XXXXXX₂
0010₁₆	Address match interrupt register 0	RMAD0	00₁₆
0011₁₆			00₁₆
0012₁₆			X0₁₆
0013₁₆			
0014₁₆	Address match interrupt register 1	RMAD1	00₁₆
0015₁₆			00₁₆
0016₁₆			X0₁₆
0017₁₆			
0018₁₆			
0019₁₆	Voltage detection register 1 [3]	VCR1	00001000₂
001A₁₆	Voltage detection register 2 [3]	VCR2	00₁₆
001B₁₆			
001C₁₆	PLL control register 0	PLC0	0001X010₂
001D₁₆			
001E₁₆	Processor mode register 2	PM2	XXX00000₂
001F₁₆	Low voltage detection interrupt register	D4INT	00₁₆
0020₁₆	DMA0 source pointer	SAR0	XX₁₆
0021₁₆			XX₁₆
0022₁₆			XX₁₆
0023₁₆			
0024₁₆	DMA0 destination pointer	DAR0	XX₁₆
0025₁₆			XX₁₆
0026₁₆			XX₁₆
0027₁₆			
0028₁₆	DMA0 transfer counter	TCR0	XX₁₆
0029₁₆			XX₁₆
002A₁₆			
002B₁₆			
002C₁₆	DMA0 control register	DM0CON	00000X00₂
002D₁₆			
002E₁₆			
002F₁₆			
0030₁₆	DMA1 source pointer	SAR1	XX₁₆
0031₁₆			XX₁₆
0032₁₆			XX₁₆
0033₁₆			
0034₁₆	DMA1 destination pointer	DAR1	XX₁₆
0035₁₆			XX₁₆
0036₁₆			XX₁₆
0037₁₆			
0038₁₆	DMA1 transfer counter	TCR1	XX₁₆
0039₁₆			XX₁₆
003A₁₆			
003B₁₆			
003C₁₆	DMA1 control register	DM1CON	00000X00₂
003D₁₆			
003E₁₆			
003F₁₆			

NOTES:
1. The blank spaces are reserved. No access is allowed.
2. The CM20, CM21, and CM27 bits do not change at oscillation stop detection reset.
3. This register does not change at software reset, watchdog timer reset and oscillation stop detection reset.

X : Undefined

Table 4.2 SFR Information(2)(1)

Address	Register	Symbol	After Reset
0040₁₆			
0041₁₆			
0042₁₆			
0043₁₆			
0044₁₆	INT3 interrupt control register	INT3IC	XX00X000₂
0045₁₆	IC/OC 0 interrupt control register	ICOC0IC	XXXXX000₂
0046₁₆	IC/OC 1 interrupt control register, I²C bus interface interrupt control register	ICOC1IC, IICIC	XXXXX000₂
0047₁₆	IC/OC base timer interrupt control register, SCLSDA interrupt control register	BTIC, SCLDAIC	XXXXX000₂
0048₁₆	SI/O4 interrupt control register, INT5 interrupt control register	S4IC, INT5IC	XX00X000₂
0049₁₆	SI/O3 interrupt control register, INT4 interrupt control register	S3IC, INT4IC	XX00X000₂
004A₁₆	UART2 Bus collision detection interrupt control register	BCNIC	XXXXX000₂
004B₁₆	DMA0 interrupt control register	DM0IC	XXXXX000₂
004C₁₆	DMA1 interrupt control register	DM1IC	XXXXX000₂
004D₁₆	Key input interrupt control register	KUPIC	XXXXX000₂
004E₁₆	A/D conversion interrupt control register	ADIC	XXXXX000₂
004F₁₆	UART2 transmit interrupt control register	S2TIC	XXXXX000₂
0050₁₆	UART2 receive interrupt control register	S2RIC	XXXXX000₂
0051₁₆	UART0 transmit interrupt control register	S0TIC	XXXXX000₂
0052₁₆	UART0 receive interrupt control register	S0RIC	XXXXX000₂
0053₁₆	UART1 transmit interrupt control register	S1TIC	XXXXX000₂
0054₁₆	UART1 receive interrupt control register	S1RIC	XXXXX000₂
0055₁₆	Timer A0 interrupt control register	TA0IC	XXXXX000₂
0056₁₆	Timer A1 interrupt control register	TA1IC	XXXXX000₂
0057₁₆	Timer A2 interrupt control register	TA2IC	XXXXX000₂
0058₁₆	Timer A3 interrupt control register	TA3IC	XXXXX000₂
0059₁₆	Timer A4 interrupt control register	TA4IC	XXXXX000₂
005A₁₆	Timer B0 interrupt control register	TB0IC	XXXXX000₂
005B₁₆	Timer B1 interrupt control register	TB1IC	XXXXX000₂
005C₁₆	Timer B2 interrupt control register	TB2IC	XXXXX000₂
005D₁₆	INT0 interrupt control register	INT0IC	XX00X000₂
005E₁₆	INT1 interrupt control register	INT1IC	XX00X000₂
005F₁₆	INT2 interrupt control register	INT2IC	XX00X000₂
0060₁₆			
0061₁₆			
0062₁₆			
0063₁₆			
0064₁₆			
0065₁₆			
0066₁₆			
0067₁₆			
0068₁₆			
0069₁₆			
006A₁₆			
006B₁₆			
006C₁₆			
006D₁₆			
006E₁₆			
006F₁₆			
0070₁₆			
0071₁₆			
0072₁₆			
0073₁₆			
0074₁₆			
0075₁₆			
0076₁₆			
0077₁₆			
0078₁₆			
0079₁₆			
007A₁₆			
007B₁₆			
007C₁₆			
007D₁₆			
007E₁₆			
007F₁₆			

Note 1: The blank spaces are reserved. No access is allowed.

X : Undefined

Table 4.3 SFR Information(3)(1)

Address	Register	Symbol	After Reset
≈			≈
01B016			
01B116			
01B216			
01B316	Flash memory control register 4 (2)	FMR4	010000002
01B416			
01B516	Flash memory control register 1 (2)	FMR1	000XXX0X2
01B616			
01B716	Flash memory control register 0 (2)	FMR0	000000012
01B816			
01B916			
≈			≈
021016	Low-power Consumption Control 0	LPCC0	X00000012
021116			
021216			
021316			
021416			
021516			
021616			
021716			
021816			
021916			
≈			≈
025016			
025116			
025216			
025316			
025416			
025516			
025616			
025716			
025816			
025916			
025A16			
025B16			
025C16	On-chip oscillator control register	ROCR	X00001012
025D16	Pin assignment control register	PACR	0016
025E16	Peripheral clock select register	PCLKR	000000112
025F16	Low-power Consumption Control 1	LPCC1	0016
≈			≈
02E016	I^2C0 data shift register	S00	XX16
02E116			
02E216	I^2C0 address register	S0D0	0016
02E316	I^2C0 control register 0	S1D0	0016
02E416	I^2C0 clock control register	S20	0016
02E516	I^2C0 start/stop condition control register	S2D0	000110102
02E616	I^2C0 control register 1	S3D0	001100002
02E716	I^2C0 control register 2	S4D0	0016
02E816	I^2C0 status register	S10	0001000X2
02E916			
02EA16			
≈			≈
02FE16			
02FF16			

Note 1:The blank spaces are reserved. No access is allowed.
Note 2:This register is included in the flash memory version.

X : Undefined

Table 4.4 SFR Information(4)(1)

Address	Register	Symbol	After Reset
0300₁₆ 0301₁₆	TM, WG register 0	G1TM0, G1PO0	XX16 XX16
0302₁₆ 0303₁₆	TM, WG register 1	G1TM1, G1PO1	XX16 XX16
0304₁₆ 0305₁₆	TM, WG register 2	G1TM2, G1PO2	XX16 XX16
0306₁₆ 0307₁₆	TM, WG register 3	G1TM3, G1PO3	XX16 XX16
0308₁₆ 0309₁₆	TM, WG register 4	G1TM4, G1PO4	XX16 XX16
030A₁₆ 030B₁₆	TM, WG register 5	G1TM5, G1PO5	XX16 XX16
030C₁₆ 030D₁₆	TM, WG register 6	G1TM6, G1PO6	XX16 XX16
030E₁₆ 030F₁₆	TM, WG register 7	G1TM7, G1PO7	XX16 XX16
0310₁₆	WG control register 0	G1POCR0	0X00XX002
0311₁₆	WG control register 1	G1POCR1	0X00XX002
0312₁₆	WG control register 2	G1POCR2	0X00XX002
0313₁₆	WG control register 3	G1POCR3	0X00XX002
0314₁₆	WG control register 4	G1POCR4	0X00XX002
0315₁₆	WG control register 5	G1POCR5	0X00XX002
0316₁₆	WG control register 6	G1POCR6	0X00XX002
0317₁₆	WG control register 7	G1POCR7	0X00XX002
0318₁₆	TM control register 0	G1TMCR0	0016
0319₁₆	TM control register 1	G1TMCR1	0016
031A₁₆	TM control register 2	G1TMCR2	0016
031B₁₆	TM control register 3	G1TMCR3	0016
031C₁₆	TM control register 4	G1TMCR4	0016
031D₁₆	TM control register 5	G1TMCR5	0016
031E₁₆	TM control register 6	G1TMCR6	0016
031F₁₆	TM control register 7	G1TMCR7	0016
0320₁₆ 0321₁₆	Base timer register	G1BT	XX16 XX16
0322₁₆	Base timer control register 0	G1BCR0	0016
0323₁₆	Base timer control register 1	G1BCR1	0016
0324₁₆	TM prescale register 6	G1TPR6	0016
0325₁₆	TM prescale register 7	G1TPR7	0016
0326₁₆	Function enable register	G1FE	0016
0327₁₆	Function select register	G1FS	0016
0328₁₆ 0329₁₆	Base timer reset register	G1BTRR	XX16 XX16
032A₁₆	Divider register	G1DV	0016
032B₁₆			
032C₁₆			
032D₁₆			
032E₁₆			
032F₁₆			
0330₁₆	Interrupt request register	G1IR	XX16
0331₁₆	Interrupt enable register 0	G1IE0	0016
0332₁₆	Interrupt enable register 1	G1IE1	0016
0333₁₆			
0334₁₆			
0335₁₆			
0336₁₆			
0337₁₆			
0338₁₆			
0339₁₆			
033A₁₆			
033B₁₆			
033C₁₆			
033D₁₆			
033E₁₆	NMI digital debounce register	NDDR	FF16
033F₁₆	P17 digital debounce register	P17DDR	FF16

Note 1:The blank spaces are reserved. No access is allowed.

X : Undefined

Table 4.5 SFR Information(5)(1)

Address	Register	Symbol	After Reset
034016			
034116			
034216	Timer A1-1 register	TA11	XX16
034316			XX16
034416	Timer A2-1 register	TA21	XX16
034516			XX16
034616	Timer A4-1 register	TA41	XX16
034716			XX16
034816	Three-phase PWM control register 0	INVC0	0016
034916	Three-phase PWM control register 1	INVC1	0016
034A16	Three-phase output buffer register 0	IDB0	001111112
034B16	Three-phase output buffer register 1	IDB1	001111112
034C16	Dead time timer	DTT	XX16
034D16	Timer B2 interrupt occurrence frequency set counter	ICTB2	XX16
034E16	Position-data-retain function control register	PDRF	XXXX00002
034F16			
035016			
035116			
035216			
035316			
035416			
035516			
035616			
035716			
035816			
035916			
035A16			
035B16			
035C16			
035D16			
035E16	Interrupt request cause select register 2	IFSR2A	00XXXXX02(2)
035F16	Interrupt request cause select register	IFSR	0016
036016	SI/O3 transmit/receive register	S3TRR	XX16
036116			
036216	SI/O3 control register	S3C	010000002
036316	SI/O3 bit rate generator	S3BRG	XX16
036416	SI/O4 transmit/receive register	S4TRR	XX16
036516			
036616	SI/O4 control register	S4C	010000002
036716	SI/O4 bit rate generator	S4BRG	XX16
036816			
036916			
036A16			
036B16			
036C16			
036D16			
036E16			
036F16			
037016			
037116			
037216			
037316			
037416	UART2 special mode register 4	U2SMR4	0016
037516	UART2 special mode register 3	U2SMR3	000X0X0X2
037616	UART2 special mode register 2	U2SMR2	X0000000 2
037716	UART2 special mode register	U2SMR	X0000000 2
037816	UART2 transmit/receive mode register	U2MR	0016
037916	UART2 bit rate generator	U2BRG	XX16
037A16	UART2 transmit buffer register	U2TB	XX16
037B16			XX16
037C16	UART2 transmit/receive control register 0	U2C0	000010002
037D16	UART2 transmit/receive control register 1	U2C1	000000102
037E16	UART2 receive buffer register	U2RB	XX16
037F16			XX16

Note 1: The blank spaces are reserved. No access is allowed.
Note 2: Write 1 to bit 0 after reset.

X : Undefined

Table 4.6 SFR Information(6)(1)

Address	Register	Symbol	After Reset
038016	Count start flag	TABSR	0016
038116	Clock prescaler reset flag	CPSRF	0XXXXXXX2
038216	One-shot start flag	ONSF	0016
038316	Trigger select register	TRGSR	0016
038416	Up-down flag	UDF	0016
038516			
038616	Timer A0 register	TA0	XX16
038716			XX16
038816	Timer A1 register	TA1	XX16
038916			XX16
038A16	Timer A2 register	TA2	XX16
038B16			XX16
038C16	Timer A3 register	TA3	XX16
038D16			XX16
038E16	Timer A4 register	TA4	XX16
038F16			XX16
039016	Timer B0 register	TB0	XX16
039116			XX16
039216	Timer B1 register	TB1	XX16
039316			XX16
039416	Timer B2 register	TB2	XX16
039516			XX16
039616	Timer A0 mode register	TA0MR	0016
039716	Timer A1 mode register	TA1MR	0016
039816	Timer A2 mode register	TA2MR	0016
039916	Timer A3 mode register	TA3MR	0016
039A16	Timer A4 mode register	TA4MR	0016
039B16	Timer B0 mode register	TB0MR	00XX00002
039C16	Timer B1 mode register	TB1MR	00XX00002
039D16	Timer B2 mode register	TB2MR	00XX00002
039E16	Timer B2 special mode register	TB2SC	X00000002
039F16			
03A016	UART0 transmit/receive mode register	U0MR	0016
03A116	UART0 bit rate generator	U0BRG	XX16
03A216	UART0 transmit buffer register	U0TB	XX16
03A316			XX16
03A416	UART0 transmit/receive control register 0	U0C0	000010002
03A516	UART0 transmit/receive control register 1	U0C1	000000102
03A616	UART0 receive buffer register	U0RB	XX16
03A716			XX16
03A816	UART1 transmit/receive mode register	U1MR	0016
03A916	UART1 bit rate generator	U1BRG	XX16
03AA16	UART1 transmit buffer register	U1TB	XX16
03AB16			XX16
03AC16	UART1 transmit/receive control register 0	U1C0	000010002
03AD16	UART1 transmit/receive control register 1	U1C1	000000102
03AE16	UART1 receive buffer register	U1RB	XX16
03AF16			XX16
03B016	UART transmit/receive control register 2	UCON	X00000002
03B116			
03B216			
03B316			
03B416			
03B516			
03B616			
03B716			
03B816	DMA0 request cause select register	DM0SL	0016
03B916			
03BA16	DMA1 request cause select register	DM1SL	0016
03BB16			
03BC16			
03BD16			
03BE16			
03BF16			

Note 1:The blank spaces are reserved. No access is allowed.

X : Undefined

Table 4.7 SFR Information(7)(1)

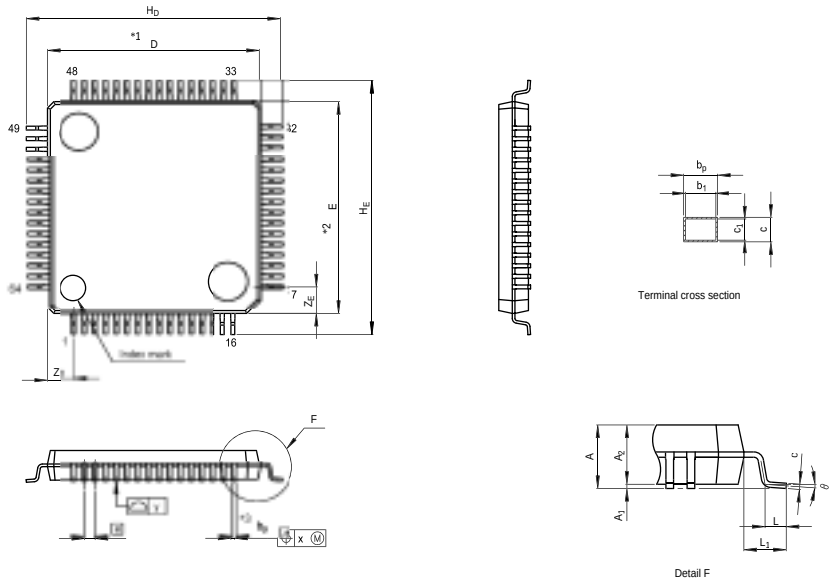
Address	Register	Symbol	After Reset
03C0₁₆	A/D register 0	AD0	XX₁₆
03C1₁₆			XX₁₆
03C2₁₆	A/D register 1	AD1	XX₁₆
03C3₁₆			XX₁₆
03C4₁₆	A/D register 2	AD2	XX₁₆
03C5₁₆			XX₁₆
03C6₁₆	A/D register 3	AD3	XX₁₆
03C7₁₆			XX₁₆
03C8₁₆	A/D register 4	AD4	XX₁₆
03C9₁₆			XX₁₆
03CA₁₆	A/D register 5	AD5	XX₁₆
03CB₁₆			XX₁₆
03CC₁₆	A/D register 6	AD6	XX₁₆
03CD₁₆			XX₁₆
03CE₁₆	A/D register 7	AD7	XX₁₆
03CF₁₆			XX₁₆
03D0₁₆			
03D1₁₆			
03D2₁₆	A/D trigger control register	ADTRGCON	00₁₆
03D3₁₆	A/D convert status register 0	ADSTAT0	00000X00₂
03D4₁₆	A/D control register 2	ADCON2	00₁₆
03D5₁₆			
03D6₁₆	A/D control register 0	ADCON0	00000XXX₂
03D7₁₆	A/D control register 1	ADCON1	00₁₆
03D8₁₆			
03D9₁₆			
03DA₁₆			
03DB₁₆			
03DC₁₆			
03DD₁₆			
03DE₁₆			
03DF₁₆			
03E0₁₆	Port P0 register	P0	XX₁₆
03E1₁₆	Port P1 register	P1	XX₁₆
03E2₁₆	Port P0 direction register	PD0	00₁₆
03E3₁₆	Port P1 direction register	PD1	00₁₆
03E4₁₆	Port P2 register	P2	XX₁₆
03E5₁₆	Port P3 register	P3	XX₁₆
03E6₁₆	Port P2 direction register	PD2	00₁₆
03E7₁₆	Port P3 direction register	PD3	00₁₆
03E8₁₆			
03E9₁₆			
03EA₁₆			
03EB₁₆			
03EC₁₆	Port P6 register	P6	XX₁₆
03ED₁₆	Port P7 register	P7	XX₁₆
03EE₁₆	Port P6 direction register	PD6	00₁₆
03EF₁₆	Port P7 direction register	PD7	00₁₆
03F0₁₆	Port P8 register	P8	XX₁₆
03F1₁₆	Port P9 register	P9	XX₁₆
03F2₁₆	Port P8 direction register	PD8	00₁₆
03F3₁₆	Port P9 direction register	PD9	000X0000₂
03F4₁₆	Port P10 register	P10	XX₁₆
03F5₁₆			
03F6₁₆	Port P10 direction register	PD10	00₁₆
03F7₁₆			
03F8₁₆			
03F9₁₆			
03FA₁₆			
03FB₁₆			
03FC₁₆	Pull-up control register 0	PUR0	00₁₆
03FD₁₆	Pull-up control register 1	PUR1	00₁₆
03FE₁₆	Pull-up control register 2	PUR2	00₁₆
03FF₁₆	Port control register	PCR	00₁₆

Note 1:The blank spaces are reserved. No access is allowed.

X : Undefined

Appendix 1. Package Dimensions

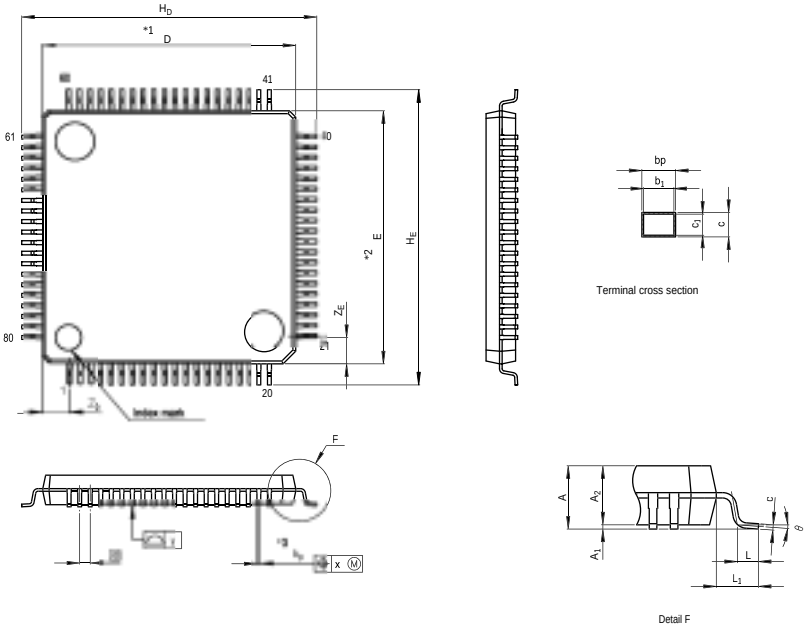
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-LQFP64-10x10-0.50	PLQP0064KB-A	64P6Q-A / FP-64K / FP-64KV	0.3g



NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	9.9	10.0	10.1
E	9.9	10.0	10.1
A_2	—	1.4	—
H_D	11.8	12.0	12.2
H_E	11.8	12.0	12.2
A	—	—	1.7
A_1	0.05	0.1	0.15
b_p	0.15	0.20	0.25
b_1	—	0.18	—
c	0.09	0.145	0.20
c_1	—	0.125	—
θ	0°	—	8°
e	—	0.5	—
x	—	—	0.08
y	—	—	0.08
Z_D	—	1.25	—
Z_E	—	1.25	—
L	0.35	0.5	0.65
L_1	—	1.0	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-LQFP80-12x12-0.50	PLQP0080KB-A	80P6Q-A	0.5g



NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	11.9	12.0	12.1
E	11.9	12.0	12.1
A_2	—	1.4	—
H_D	13.8	14.0	14.2
H_E	13.8	14.0	14.2
A	—	—	1.7
A_1	0	0.1	0.2
b_p	0.15	0.20	0.25
b_1	—	0.18	—
c	0.09	0.145	0.20
c_1	—	0.125	—
θ	0°	—	10°
e	—	0.5	—
x	—	—	0.08
y	—	—	0.08
Z_D	—	1.25	—
Z_E	—	1.25	—
L	0.3	0.5	0.7
L_1	—	1.0	—

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