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Electrical Characteristics

Absolute maximum ratings

These are stress ratings only and functional operation of the device at these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Voltage Characteristics

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Symbol	Ratings	Min	Max	Unit
$V_{DD} - V_{SS}$	External main supply voltage (VDD)	-0.3	3.6	V
V_{IN}	Input voltage on IO pins	VSS - 0.3	3.6	V
S_{VDDH}	I/O Power on slope	3.3V/Sec	1V/uSec	-
ΔV_{DD}	Variations between difference VDD power pins		50	mV
ΔV_{SS}	Variations between different ground pins		50	mV

Current Characteristics

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Symbol	Ratings	Max	Unit
I_{VDD_SUM}	Total current into sum of all VDD power lines (source)	100	mA
I_{VDD}	Maximum current into each ADD power pin (source)	90	mA
I_{IO_PAD}	Total output current sunk by sum of all IOs and control pins	75	mA
I_{INJ_PAD}	Single pin input injected current	± 10	mA
I_{INJ_SUM}	Sum of all input injected current	± 50	mA

Thermal Characteristics

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#fff;} .tg th{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#f0f0f0;} .tg .tg-s6z2{text-align:center} .tg .tg-huh2{font-size:14px;text-align:center}

Symbol	Ratings	Min	Max	Unit
$T_{Storage}$	Storage temperature range	-55	+150	°C

T_{Junc} Maximum junction temperature under bias 0 +150 °C

Operating conditions

General Operating Conditions

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#fff;} .tg th{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#f0f0f0;} .tg .tg-s6z2{text-align:center} .tg .tg-huh2{font-size:14px;text-align:center}

Symbol	Parameter	Conditions	Min	Max	Unit
f_{FCLK}	Internal CPU clock frequency		0	48	MHz
V_{DD}	Standard operating voltage		2.7	3.6	V
V_{IO}	Input voltage on PIN		$V_{SS} - 0.3$	3.6	V
T_A	Ambient temperature		0	70	°C
T_J	Junction Temperature range		0	105	°C

Supply Current Characteristics

Normal operation

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#fff;} .tg th{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#f0f0f0;} .tg .tg-s6z2{vertical-align:middle; text-align:center} .tg .tg-huh2{font-size:14px;text-align:center}

Symbol	Parameter	Conditions 1	Condition 2	Typ	Unit
I_{DD_NOR}	Supply current	Active mode; code	System clock = 10MHz	6.14	mA
		While(1) { }	System clock = 20MHz	8.82	mA
		Executed from flash memory	System clock = 40MHz	14.09	mA

Sleep mode

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#fff;} .tg th{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#f0f0f0;} .tg .tg-s6z2{vertical-align:middle; text-align:center} .tg .tg-huh2{font-size:14px;text-align:center}

Symbol	Parameter	Conditions 1	Condition 2	Typ	Unit
I_{DD_SLP}	Supply current	After enter sleep mode	System clock = 10MHz	3.51	mA
		All peripheral clocks ON	System clock = 20MHz	5.65	mA
		(same as system clock)	System clock = 40MHz	9.61	mA

Deep sleep mode

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-

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Symbol	Parameter	Conditions1	Condition2	Typ	Unit
I_{DD_SLP}	Supply current	After enter deep sleep mode All peripheral clocks OFF	-	2.49	

I/O PAD Characteristics

DC Specification

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#fff;} .tg th{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#f0f0f0;} .tg .tg-s6z2{vertical-align:middle;text-align:center} .tg .tg-huh2{font-size:14px;text-align:center}

Symbol	Parameter	Conditions	Min	Max	Unit
V _{IH}	I/O Input high voltage		2.145		V
V _{IL}	I/O Input low voltage			1.155	V
V _{HYS}	Schmitt trigger hysteresis		0.33		V
I _{IH}	I/O Input high current			1	uA
I _{IL}	I/O Input low current		-1		uA
V _{OH}	I/O Output high voltage	High driving strength Current load = 6mA Low driving strength Current load = 3mA	2.5		V
V _{OL}	I/O Output low voltage	High driving strength Current load = 6mA Low driving strength Current load = 3mA		0.5	V
R_{pup} R_{pdn}	Pull-up/Pull-down resistor		20	100	KOhm

Flash memory

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#fff;} .tg th{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#f0f0f0;} .tg .tg-s6z2{text-align:center} .tg .tg-huh2{font-size:14px;text-align:center}

Symbol	Parameter	Min	Unit
N_{END}	Sector Endurance	10,000	Cycles
T_{DR}	Data Retention	10	Years

Electrical Sensitivity Characteristics

Electrostatic discharge (ESD)

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-

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Symbol	Parameter	Test Method	Min	Max	Unit
$V_{ESD(HBM)}$	Electrostatic discharge (Human body model)	AEC-Q100-002	±2000	-	V
$V_{ESD(CDM)}$	Electrostatic discharge (Charge device model)	AEC-Q100-011	±500	-	V

Static latch-up

.tg {border-collapse:collapse;border-spacing:0;border-color:#ccc;} .tg td{font-family:Arial, sans-serif;font-size:14px;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#fff;} .tg th{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;border-color:#ccc;color:#333;background-color:#f0f0f0;} .tg .tg-s6z2{text-align:center} .tg .tg-huh2{font-size:14px;text-align:center}

Symbol	Parameter	Test Method	Min	Max	Unit
I_{LAT}	Latch up current at 125°C ambient temperature	AEC-Q100-004	±100	-	V

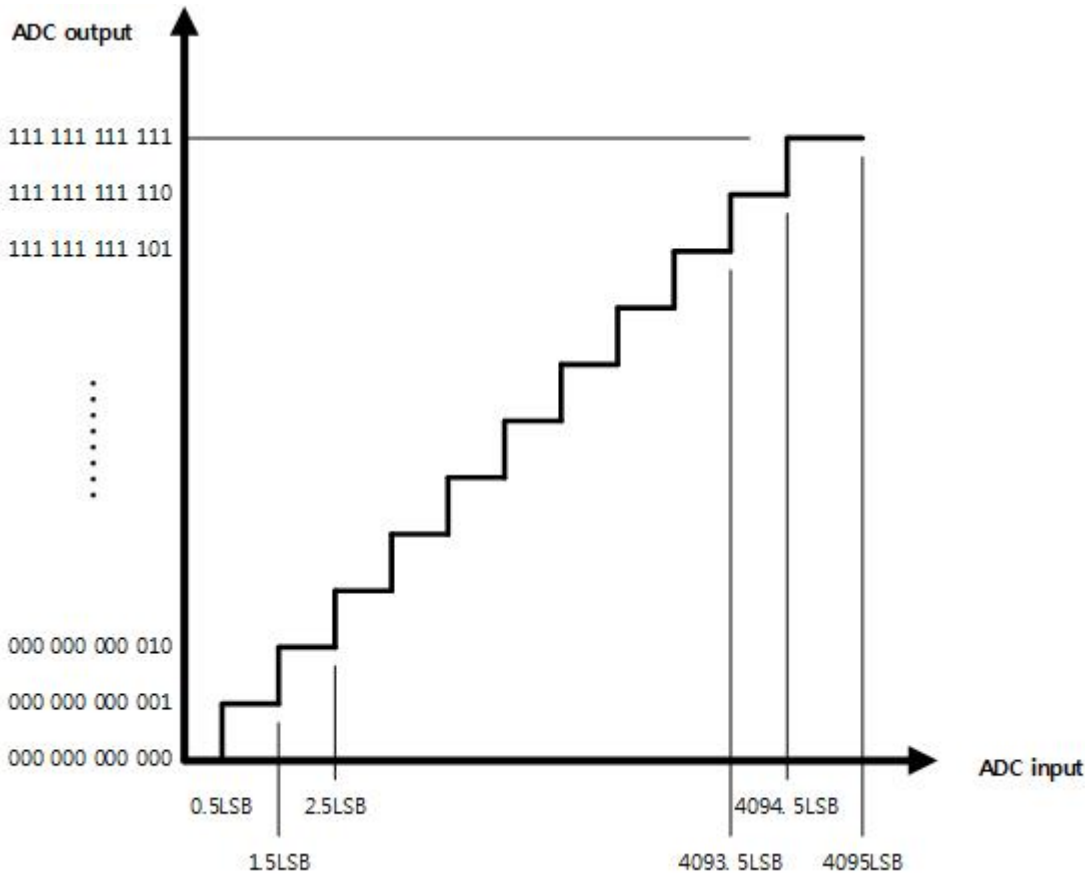
ADC Characteristics

ADC Electrical characteristics

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Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IN[15:0]	Analog input channel		V_{SS}	-	V_{REFP}	V
V_{REFP}	Reference voltage of REFP			V_{DD}		V
RES	Resolution			12		Bits
Offset error			-3.0		3.0	LSB
INL	Integral non-linearity error		-2.0	1.0	2.0	LSB
DNL	Differential non-linearity error		-1.0	0.8	1.5	LSB
Fclk	Clock frequency				16	MHz
SPS	Sampling rate		30	500	1000	K
TS	Sampling time		$4/F_{CLK}$			
TC	Conversion time			12		$1/F_{CLK}$
SNDR	Signal-noise plus distortion ratio	At 10KHz		64		dB
THD	Total harmonic distortion	At 10KHz		-65		dB
SFDR	Spurious-free dynamic range	At 10KHz		64		dB

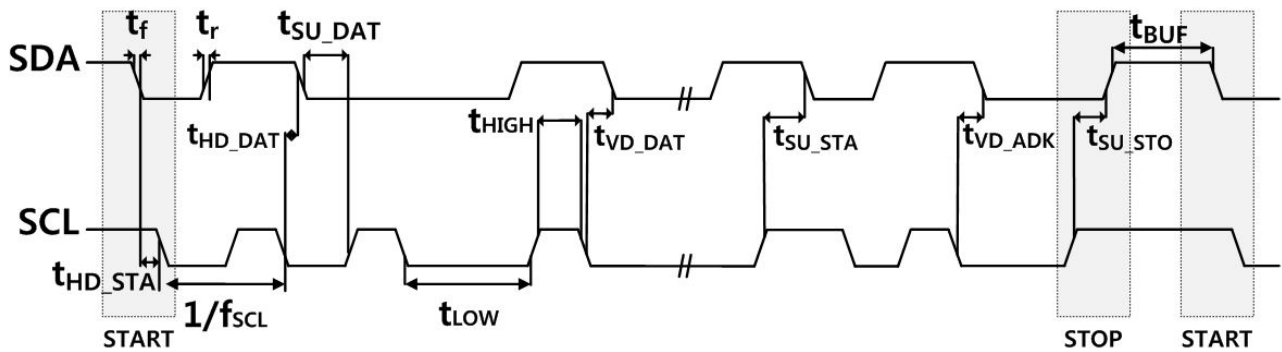
ADC Transform function description



I2C interface Characteristics

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Symbol	Parameter	Standard		Fast		Unit
		Min	Max	Min	Max	
f_{SCL}	CLK clock frequency	0	100	0	400	KHz
t_{LOW}	Low period of the SCL clock	4.5		1.0		us
t_{HIGH}	High period of SCL clock	3.8		0.5		us
t_r	Rise time of SCL and SDA		1000	300		ns
t_f	Fall time SCL and SDA		300	300		ns
t_{HD_DAT}	Data hold time	0		0		us
t_{VD_DAT}	Data valid time		3.5	1.0		us
t_{SU_DAT}	Data setup time	200		90		ns
t_{VD_ACK}	Data valid acknowledge time		3.5	1.0		us
t_{HD_STA}	Hold time START condition	3.8		0.5		us
t_{SU_STA}	Set-up time for a repeat START condition	4.5		0.5		us
t_{SU_STO}	Set-up time for STOP condition	3.8		0.5		us



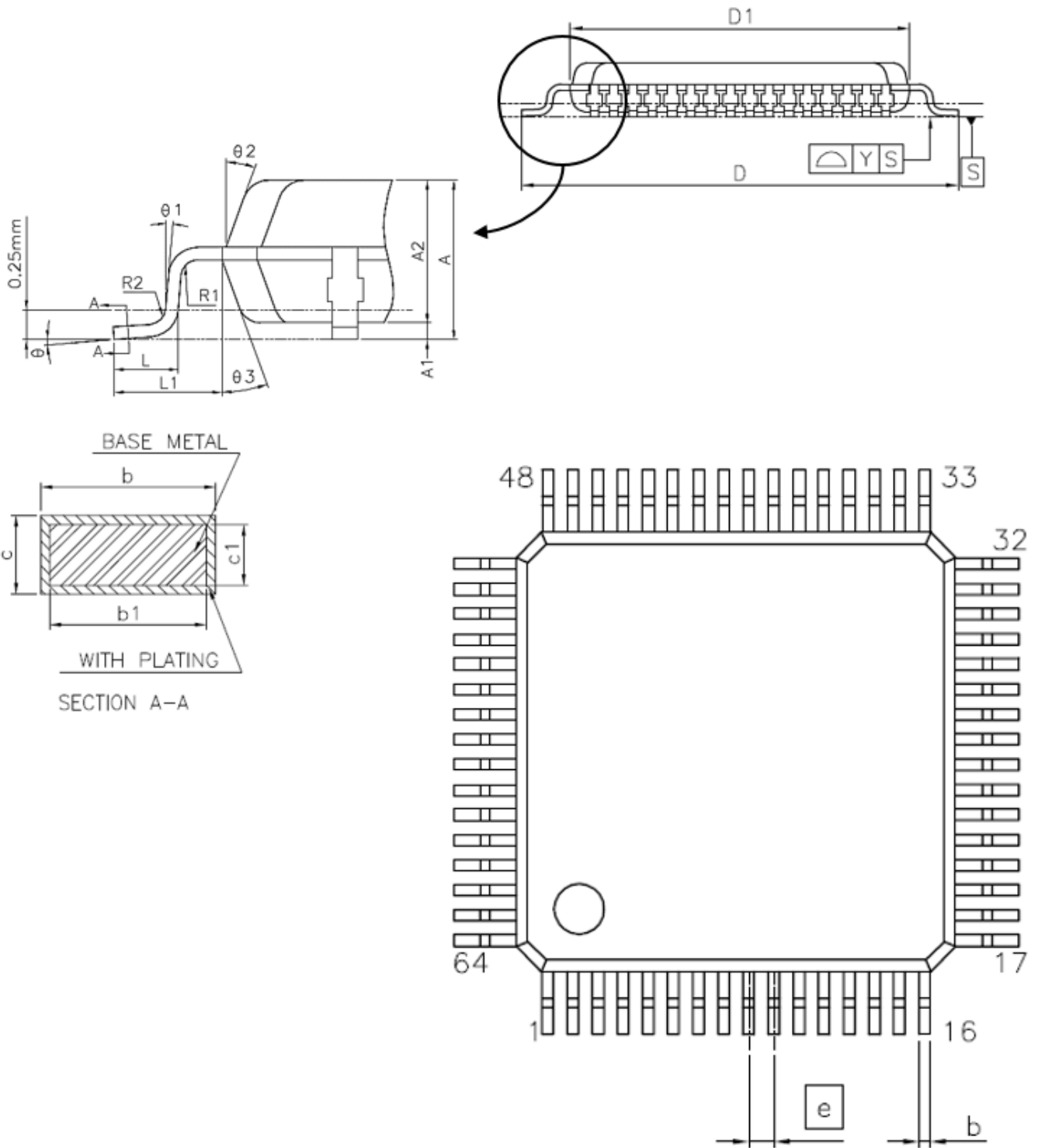
SSP Interface Characteristics

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Symbol	Parameter	Conditions	Min	Max	Unit
f_{SCL}	SSP clock frequency	Master mode		20	MHz
		Slave mode		20	MHz
t_{r_SCK}	SSP clock rising and fall time	Capacitive load : C = 25pF	8		ns
t_{SU_M}	Data input setup time	Master mode	5		ns
t_{SU_S}		Slave mode	6		ns
t_{H_M}	Data input hold time	Master mode	5		ns
t_{H_S}		Slave mode	6		ns
t_{V_M}	Data output valid time	Master mode		20	ns
t_{V_S}		Slave mode		5	ns
t_{H_M}	Data output hold time	Master mode	13		
t_{H_S}		Slave mode	3		
DuCy	SSP slave input clock duty cycle	Slavemode	45	55	%

Package Characteristics

Package dimension information

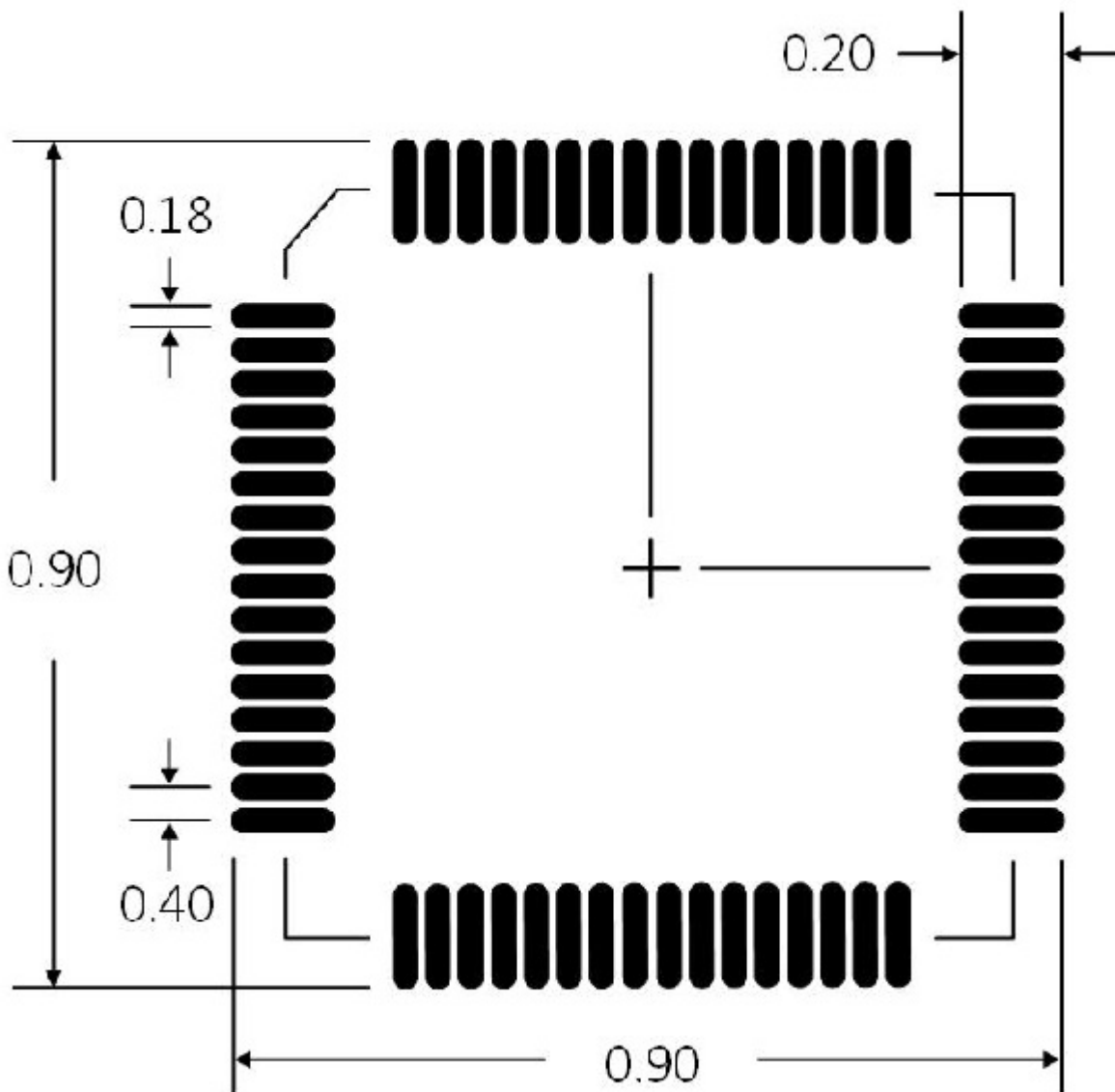


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Symbol	Dimention (MM)			Dimention (MIL)		
	Min	Nom	Max	Min	Nom	Max
A			1.60			63.0
A1	0.05	0.10	0.15	2.0	3.9	5.9
A2	1.35	1.40	1.45	53.1	55.1	57.1

b	0.13	0.18	0.23	5.1	7.1	9.1
b1	0.13	0.16	0.19	5.1	6.3	7.5
c	0.09		0.20	3.5		7.9
c1	0.09		0.16	3.5		6.3
D	8.85	9.00	9.15	348.4	354.3	360.2
D1	6.90	7.00	7.10	271.7	275.6	279.5
e	0.35	0.40	0.45	13.8	15.7	17.7
L	0.45	0.60	0.75	17.7	23.6	29.5
L1	0.85	1.00	1.15	33.5	39.4	45.3
R1	0.08			3.1		
R2	0.08		0.20	3.1		7.9
Y			0.08			3.1
θ	0°	3.5°	7°	0°	3.5°	7°
θ_1	0°			0°		
θ_2	11°	12°	13°	11°	12°	13°
θ_3	11°	12°	13°	11°	12°	13°

Package footprint information



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