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Document ID: ESS-070-181120-1

EXC80W32

Projected Capacitive Touchscreen Controller Chip



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Introduction

EXC80W32 is a MCU based projected capacitive touch screen controller designed for commercial and industrial application.

EXC80W32 controller supports high voltage driving signal to achieve high SNR and better wideband interference susceptibility.

EXC80W32 needs an external DC/DC booster chip to generate high voltage.

EXC80W32 provides different working frequencies to avoid narrow band interference. With high voltage driving and different working frequencies, EXC80W32 provides an excellent interference susceptibility performance. With eGalaxTouch software package, EXC80W32 supports different touch sensor structures - OGS, SITO, DITO, G/F, G/F/F and G/G structure. With high SNR, EXC80W32 provides an excellent solution for not only finger operation but also with thin gloves, etc application.

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1 Features

Clocks	• External 12 MHz crystal • Internal PLL • Internal 32 bits RTC • Clock generator for digital modules • Clock generator for analog modules
Power Management	• Power supply : 3.0~3.6 VDC • Internal regulator for analog block • Internal regulator for digital core • Idle mode • Sleep mode
Memory	• 256KB embedded flash • 64KB SRAM + 1KB USB FIFO
ESD	• 2000V(HBM)
Analog Modules	• Up to 40 RX channels • Up to 26 TX channels • TX + RX must $\leq$ 58 channels • Signal generator
Communication Interface	• USB 2.0 compliant full speed with LPM L1 supported. • Configurable Serial Interface - UART : baud rate 115200(programmable), none parity, 8 data bits and 1 stops bit - Support HW flow control - I2C : up to 400 KHz, Voltage Level:3.3V
Digital Modules	• Timers, watch dog Timer • Multi-touch algorithm engine • Hardware algorithm accelerator • Hardware scan engine
Active Pen	• Support Microsoft pen protocol (MPP) version 1.51 • Support eGalax pen protocol
Temperature Range	• -40 to 85°C operation • -40 to 125°C storage
Package	• BGA 9mm x 9mm x 1.0mm • Ball Pitch : 0.65mm • Ball Count : 169

Table 1-1 Features

2 Block Diagram

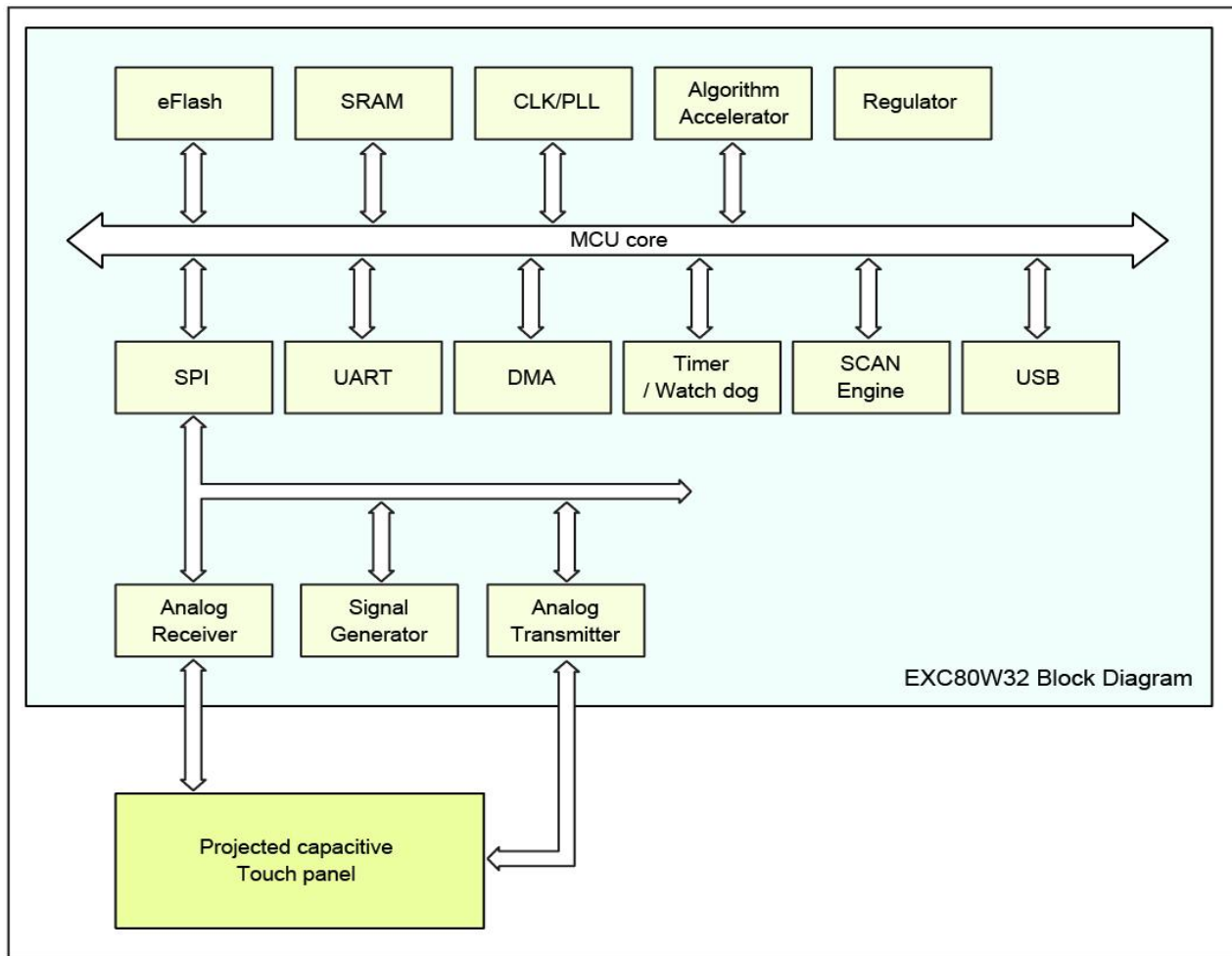


Figure 2-1 Block Diagram

3 Pinout Configuration



Figure 3-1 Top View EXC80W32

	1	2	3	4	5	6	7	8	9	10	11	12	13	
A	RX34	RX32	RX28	RX24	RX20	RX16	RX12	RX8	RX4	RX0	AGND	V150	GPIO1/TP_EN	A
B	RX35	RX33	RX29	RX25	RX21	RX17	RX13	RX9	RX5	RX1	AVDD	/LDO15_EN	HV_EN	B
C	RX37	RX36	RX30	RX26	RX22	RX18	RX14	RX10	RX6	RX2	AGND	GPIO5/M_I2C_INT1	DVDD	C
D	RX39	RX38	RX31	RX27	RX23	RX19	RX15	RX11	RX7	RX3	DGND	DVDD	DGND	D
E	NC	NC	NC	AVDD	AGND	AGND	AGND	AGND	AGND	AGND	PENINT_B	PENINT_A	DVDD	E
F	NC	NC	NC	AGND	SERIN	AOUT	PWMA	D	DGND	DVDD15	SDA3_B	I2C_SCL	I2C_SDA	F
G	DVDD15	DGND	AGND	AGND	ATEST	AGND	AGND	AGND	SDA1_B	SDA1_A	SDA3_A	SDA0_A	I2C_INT	G
H	VSSH	VSSH	VDDH	VDDH	VSSH	RSTN_A	RXCLK	XI	GPIO6	SCL_A	SCL_B	SDA0_B	RSTN	H
J	TX0	TX1	TX2	TX3	VSSH	RSTN_B	NSS_B	NSS_A	GPIO2/M_I2C_INT0	RDY_B	RDY_A	SDA2_A	GPIO3/M_I2C_SDA	J
K	TX4	TX5	TX6	TX7	TX20	VSSH	DBUS	NTEST	P013_D	GPIO7/UART_CTS	GPIO8/UART_RTS	SDA2_B	XOUT	K
L	TX8	TX9	TX14	TX17	TX21	TX24	NC	VSSH	P014_D	GPIO10/UART_RX	GPIO9/UART_TX	GPIO4/M_I2C_SCL	XIN	L
M	TX10	TX11	TX15	TX18	TX22	TX25	NC	VSSH	DVDD	P015_D	P15	P14_D	DGND	M
N	TX12	TX13	TX16	TX19	TX23	NC	NC	VSSH	DGND	USB_DM	USB_DP	P13_D	DVDD	N

Figure 3-2 TOP View EXC80W32 BGA Ball Pins

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Ball Map	Pin Name	Type	Description
A1	RX34	Analog	Sense Signal
A2	RX32	Analog	Sense Signal
A3	RX28	Analog	Sense Signal
A4	RX24	Analog	Sense Signal
A5	RX20	Analog	Sense Signal
A6	RX16	Analog	Sense Signal
A7	RX12	Analog	Sense Signal
A8	RX8	Analog	Sense Signal
A9	RX4	Analog	Sense Signal
A10	RX0	Analog	Sense Signal
A11	AGND	Ground	Analog Ground
A12	V150	Power	1.5V LDO Output
A13	GPIO1/TP_EN	I/O	GPIO or Enable Touch Function
B1	RX35	Analog	Sense Signal
B2	RX33	Analog	Sense Signal
B3	RX29	Analog	Sense Signal
B4	RX25	Analog	Sense Signal
B5	RX21	Analog	Sense Signal
B6	RX17	Analog	Sense Signal
B7	RX13	Analog	Sense Signal
B8	RX9	Analog	Sense Signal
B9	RX5	Analog	Sense Signal
B10	RX1	Analog	Sense Signal
B11	AVDD	Power	Analog Power
B12	/LDO15_EN	I/O	Enable 1.5V LDO Output
B13	HV_EN	I/O	High Voltage Enable
C1	RX37	Analog	Sense Signal
C2	RX36	Analog	Sense Signal
C3	RX30	Analog	Sense Signal
C4	RX26	Analog	Sense Signal
C5	RX22	Analog	Sense Signal
C6	RX18	Analog	Sense Signal
C7	RX14	Analog	Sense Signal
C8	RX10	Analog	Sense Signal
C9	RX6	Analog	Sense Signal
C10	RX2	Analog	Sense Signal
C11	AGND	Ground	Analog Ground
C12	GPIO5/M_I2C_INT1	I/O	GPIO or Master I2C INT1
C13	DVDD	Power	3.3V Digital Power

Ball Map	Pin Name	Type	Description
D1	RX39	Analog	Sense Signal
D2	RX38	Analog	Sense Signal
D3	RX31	Analog	Sense Signal
D4	RX27	Analog	Sense Signal
D5	RX23	Analog	Sense Signal
D6	RX19	Analog	Sense Signal
D7	RX15	Analog	Sense Signal
D8	RX11	Analog	Sense Signal
D9	RX7	Analog	Sense Signal
D10	RX3	Analog	Sense Signal
D11	DGND	Ground	Digital Ground
D12	DVDD	Power	3.3V Digital Power
D13	DGND	Ground	Digital Ground
E1	NC		No Connect
E2	NC		No Connect
E3	NC		No Connect
E4	AVDD	Power	Analog Power
E5	AGND	Ground	Analog Ground
E6	AGND	Ground	Analog Ground
E7	AGND	Ground	Analog Ground
E8	AGND	Ground	Analog Ground
E9	AGND	Ground	Analog Ground
E10	AGND	Ground	Analog Ground
E11	PENINT_B	I/O	GPIO
E12	PENINT_A	I/O	GPIO
E13	DVDD	Power	3.3V Digital Power
F1	NC		No Connect
F2	NC		No Connect
F3	NC		No Connect
F4	AGND	Ground	Analog Ground
F5	SERIN	I/O	Reference Signal
F6	AOUT	Analog	Analog Reference Signal
F7	PWMA	Analog	Analog Reference Signal
F8	D	Analog	Analog Reference Signal
F9	DGND	Ground	Digital Ground
F10	DVDD15	Power	1.5V Digital Power
F11	SDA3_B	I/O	I2C Data Line
F12	I2C_SCL	I/O	To Host I2C Clock
F13	I2C_SDA	I/O	To Host I2C Data

Ball Map	Pin Name	Type	Description
G1	DVDD15	Power	1.5V Digital Power
G2	DGND	Ground	Digital Ground
G3	AGND	Ground	Analog Ground
G4	AGND	Ground	Analog Ground
G5	ATEST	I/O	For Test Only
G6	AGND	Ground	Analog Ground
G7	AGND	Ground	Analog Ground
G8	AGND	Ground	Analog Ground
G9	SDA1_B	I/O	I2C Data Line
G10	SDA1_A	I/O	I2C Data Line
G11	SDA3_A	I/O	I2C Data Line
G12	SDA0_A	I/O	I2C Data Line
G13	I2C_INT	I/O	To Host I2C INT
H1	VSSH	Ground	Digital Ground
H2	VSSH	Ground	Digital Ground
H3	VDDH	Power	High Voltage Power
H4	VDDH	Power	High Voltage Power
H5	VSSH	Ground	Digital Ground
H6	RSTN_A	I/O	Reset
H7	RXCLK	I/O	Reference Clock
H8	XI	I/O	Reference Clock
H9	GPIO6	I/O	GPIO
H10	SCL_A	I/O	I2C Clock
H11	SCL_B	I/O	I2C Clock
H12	SDA0_B	I/O	I2C Data Line
H13	RSTN	I/O	Reset
J1	TX0	Analog	Drive Signal
J2	TX1	Analog	Drive Signal
J3	TX2	Analog	Drive Signal
J4	TX3	Analog	Drive Signal
J5	VSSH	Ground	Digital Ground
J6	RSTN_B	I/O	Reset
J7	NSS_B	I/O	NSS
J8	NSS_A	I/O	NSS
J9	GPIO2/M_I2C_INT0	I/O	GPIO or Master I2C INT0
J10	RDY_B	I/O	GPIO
J11	RDY_A	I/O	GPIO
J12	SDA2_A	I/O	I2C Data Line
J13	GPIO3/M_I2C_SDA	I/O	GPIO or Master I2C Data line

Ball Map	Pin Name	Type	Description
K1	TX4	Analog	Drive Signal
K2	TX5	Analog	Drive Signal
K3	TX6	Analog	Drive Signal
K4	TX7	Analog	Drive Signal
K5	TX20	Analog	Drive Signal
K6	VSSH	Ground	Digital Ground
K7	DBUS	Analog	Analog Reference Signal
K8	NTEST	I/O	For Test Only
K9	P013_D	I/O	Debug Port
K10	GPIO7/UART_CTS	I/O	GPIO or UART CTS
K11	GPIO8/UART_RTS	I/O	GPIO or UART RTS
K12	SDA2_B	I/O	I2C Data Line
K13	XOUT	Digital	Crystal Output
L1	TX8	Analog	Drive Signal
L2	TX9	Analog	Drive Signal
L3	TX14	Analog	Drive Signal
L4	TX17	Analog	Drive Signal
L5	TX21	Analog	Drive Signal
L6	TX24	Analog	Drive Signal
L7	NC		No Connect
L8	VSSH	Ground	Digital Ground
L9	P014_D	I/O	Debug Port
L10	GPIO10/UART_RX	I/O	GPIO or UART RX
L11	GPIO9/UART_TX	I/O	GPIO or UART TX
L12	GPIO4/M_I2C_SCL	I/O	GPIO or Master I2C Clock line
L13	XIN	Digital	Crystal Input Clock 12MHz
M1	TX10	Analog	Drive Signal
M2	TX11	Analog	Drive Signal
M3	TX15	Analog	Drive Signal
M4	TX18	Analog	Drive Signal
M5	TX22	Analog	Drive Signal
M6	TX25	Analog	Drive Signal
M7	NC		No Connect
M8	VSSH	Ground	Digital Ground
M9	DVDD	Power	3.3V Digital Power
M10	P015_D	I/O	Debug Port
M11	P15	I/O	GPIO
M12	P14_D	I/O	Debug Port
M13	DGND	Ground	Digital Ground

Ball Map	Pin Name	Type	Description
N1	TX12	Analog	Drive Signal
N2	TX13	Analog	Drive Signal
N3	TX16	Analog	Drive Signal
N4	TX19	Analog	Drive Signal
N5	TX23	Analog	Drive Signal
N6	NC		No Connect
N7	NC		No Connect
N8	VSSH	Ground	Digital Ground
N9	DGND	Ground	Digital Ground
N10	USB_DM	I/O	USB D-
N11	USB_DP	I/O	USB D+
N12	P13_D	I/O	Debug Port
N13	DVDD	Power	3.3V Digital Power

Table 3-1 Pin Map

4 Electrical Characteristics

VDD = 3.3V, TA = 25°C, all voltage are with respect to ground, unless otherwise noted.

Symbol	Parameter	Condition	Min	TYP	Max	Unit
DVDD	Digital Power	-	3.0	3.3	3.6	V
AVDD	Analog Power	-	3.0	3.3	3.6	V
Crystal Clock	Crystal Clock	-	-	12	-	MHz
VIH	Input high level voltage	-	0.8VDD	-	-	V
VIL	Input Low level	-	-	-	0.4	V
VOH	Output high voltage	I = 2mA	VDD-0.4	-	-	V
VOL	Output low voltage	I = 2mA	-	-	0.4	V
VDDH	High Voltage Power	-	-	-	26	V
DVDD15	1.5V Power	-	1.4	1.5	1.7	V

Table 4-1 Electrical Characteristics

Symbol	Parameter	Min	Max	Unit
VDD-GND	Maximum Power Supply Voltage	-0.3	3.6	V
Vin	Input I/O Pin Voltage	GND-0.3	4	V
IVDD	Total current at power	-	200	mA
IGND	Total current at Gnd	-	200	mA
Vesd	Electrostatics Discharge Voltage(HBM) ⁽¹⁾	2000	-	V
DVDD15	Maximum 1.5V Power	-	1.8	V

Table 4-2 Maximum Rating

(1) This test conforms to the MIL-STD-883J/Method 3015.9.

Each I/O has two protection diodes as shown in Figure 4-1. These diode used for ESD protection and to clamp input voltage to a save level to prevent internal logic circuit damage.

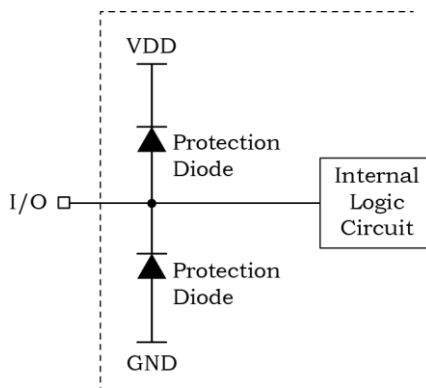


Figure 4-1 Protection Diode Scheme

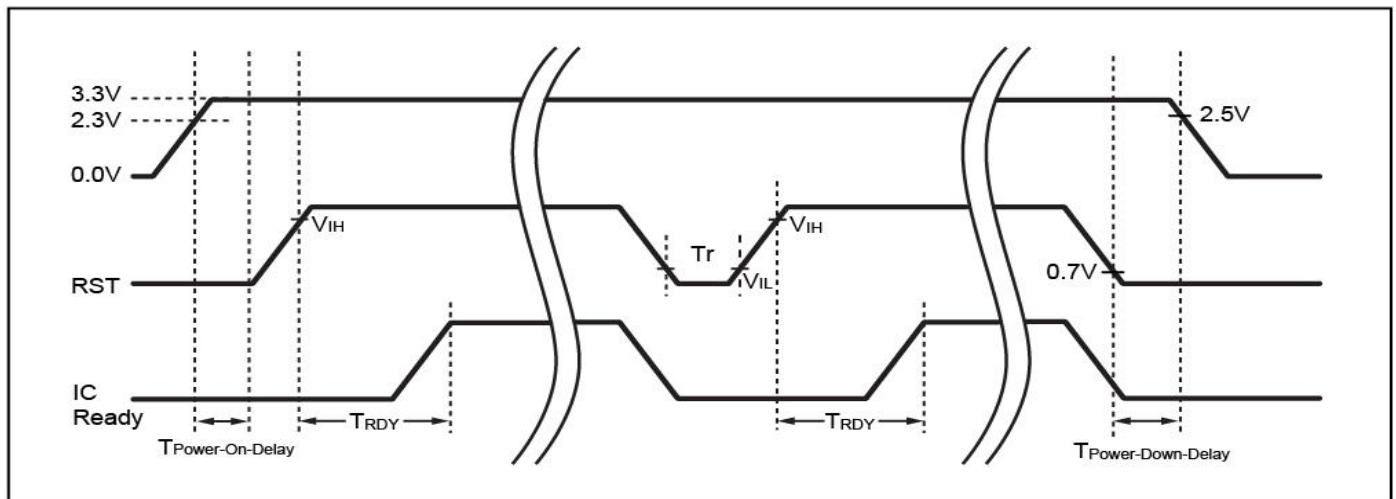


Figure 4-2 Power On Sequence Diagram

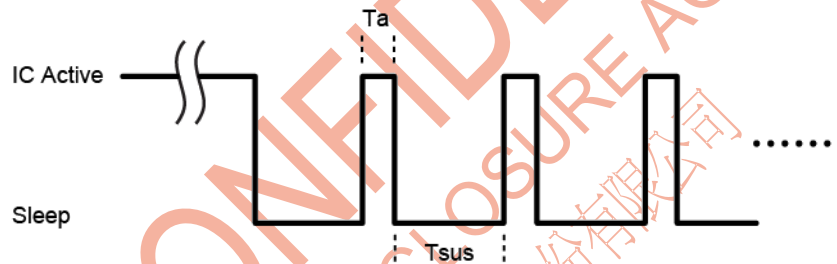


Figure 4-3 Idle Sequence Diagram

Symbol	Parameter	Condition	Min	TYP	Max	Unit
Tr	Host pull low period	-	1	-	-	ms
TRDY	IC ready to communication	-	-	65	-	ms
Ta	IC active period	-	-	5	-	ms
Tsus	IC suspend period	-	-	10	-	ms
T _{Power-On-Delay}	Power-on delay	-	100	-	-	us
T _{Power-Down-Delay}	Power-down delay	-	0	-	-	ms
V _{IL}	RST input low Voltage	-	-	-	0.4	V
V _{IH}	RST input high Voltage	-	0.8VDD	-	-	V

Table 4-3 Description

NOTE :

If host needs to control RST pin or connect any GPIO pins, please make sure Host's GPIO is configured to open-drain mode and pull-up(3.3V) resistor should be at touch IC side.

NOTE :

If host needs to reset EXC80W32, drive low voltage, after 'Tr' time, please pull high again.

NOTE :

Incorrect power sequence may cause IC damage.

5 Package Information

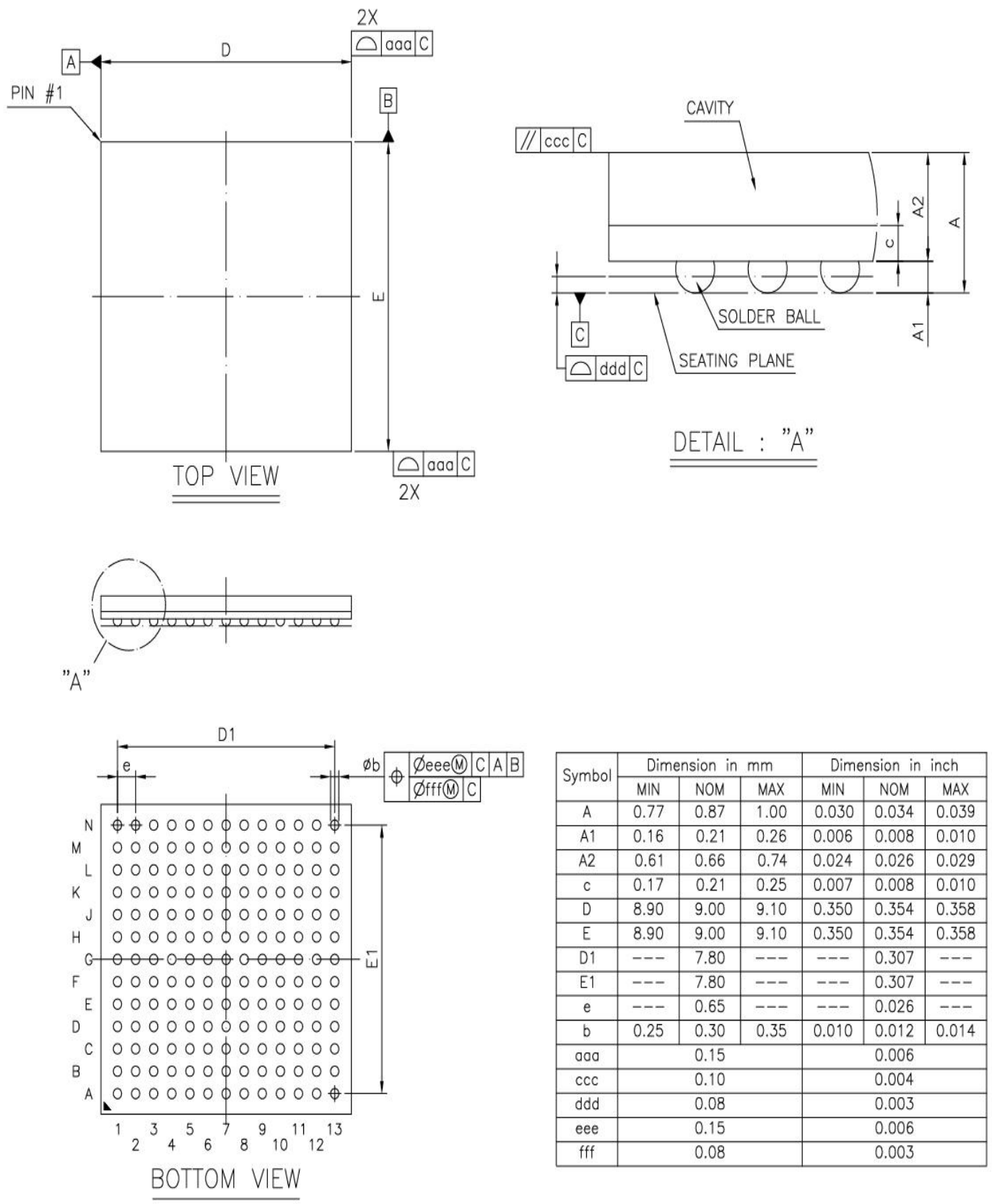


Figure 5-1 EXC80W32 BGA

6 General Reflow Profiles(For Reference)

A PCBA reflow profile depends on the thermal mass of the entire populated board.

The actual temperature used in the reflow oven is a function of:

- Solder paste types
- Board density
- Component location
- Component mass
- Board finish

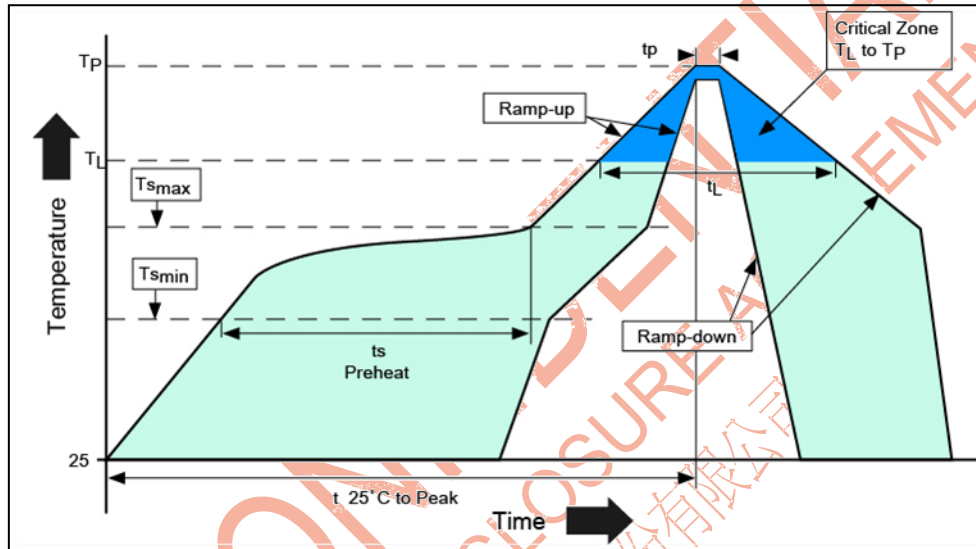


Figure 6-1 Diagram

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T _{smax} to T _p)	1.5°C/second max
Preheat -Temperature Min (T _{smin}) -Temperature Max (T _{smax}) -Time (min to max) (t _s)	150°C 200°C 60~180 seconds
Time maintained above: -Temperature (T _L) -Time (t _L)	217°C 60-150 seconds
Peak Temperature (T _p)	245±5°C
Time within 5°C of actual Peak Temperature (t _p)	30 seconds max
Ramp-down Rate	3°C/second max
Time 25°C to Peak Temperature	8 minutes max

Table 6-1 Description

Note:

1. All temperatures refer to topside of the package, measured on the package body surface.
2. Actual board assembly depends on other parts on board density and follow solder paste manufacturer's guideline.

7 Order Information

ETP-CP-EXC80W32	-	F	G	3	1
CP = Chip EX = Slave ASIC EXC = MCU	-	Tracking Code 1	Green Part	0 = LQFP 1 = QFN 2 = TSSOP 3 = BGA 4 = TQFP	Tracking Code 2

Table 7-1 Description

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