

FMBSS84-Q1

List

List.....	1
Package outline.....	2
Features.....	2
Mechanical data.....	2
Maximum ratings	2
Electrical characteristics.....	3
Rating and characteristic curves.....	4~5
Pinning information.....	6
Marking.....	6
Suggested solder pad layout.....	6
Packing information.....	7
Reel packing.....	8
Suggested thermal profiles for soldering processes.....	8
High reliability test capabilities.....	9

FMBSS84-Q1

50V P-Channel Enhancement Mode MOSFET

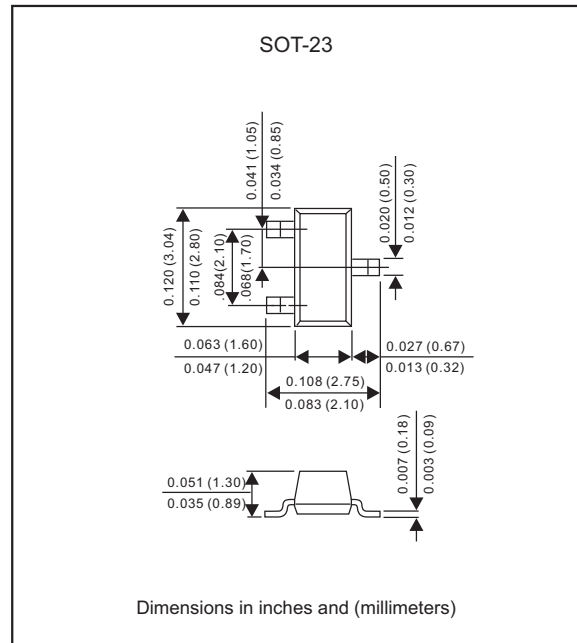
Features

- Energy efficient
- Low threshold voltage
- High-speed switching
- Miniature surface mount package saves board space
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free part, ex. FMBSS84-Q1-H

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

Package outline



Maximum ratings (AT $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain source voltage	V_{DS}	-50	V
Gate to source voltage-continuous	V_{GS}	± 20	V
Continuous drain current $T_A=25^\circ\text{C}$	I_D	-130	mA
Pulsed drain current ($t_p \leq 10\mu\text{s}$)	I_{DM}	-520	mA

Thermal characteristics

Parameter	Symbol	Limit	Unit
Total device dissipation FR-5 board (Note 1) @ $T_A=25^\circ\text{C}$ Derate above 25°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
Thermal resistance junction to ambient (Note 1)	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Operation junction temperature range	T_J	-55 to +150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$

1. FR-5 = $1.0 \times 0.75 \times 0.062$ in.

FMBSS84-Q1**Electrical characteristics** (At $T_A=25^{\circ}\text{C}$ unless otherwise noted)**OFF CHARACTERISTICS**

Parameter	Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Drain-source breakdown voltage	$V_{GS}=0V, I_D=-250\mu A$	B_{VDS}	-50			V
Zero gate voltage drain current	$V_{GS}=0V, V_{DS}=-25V$ $V_{GS}=0V, V_{DS}=-50V$ $V_{GS}=0V, V_{DS}=-50V, T_J=125^{\circ}\text{C}$	I_{DSS}			-0.1 -15 -60	μA
Gate-body leakage current	$V_{GS}=\pm 20V, V_{DS}=0V$	I_{GSS}			± 10	μA

ON CHARACTERISTICS (Note 2)

Gate threshold voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	$V_{GS(th)}$	-0.8		-2.0	V
Static drain source on state resistance	$V_{GS}=-5.0V, I_D=-100mA$ $V_{GS}=-10V, I_D=-100mA$	$R_{DS(on)}$		2.0 1.8	6.0 5.0	Ω
Transfer admittance	$V_{DS}=-25V, I_D=-100mA, f=1KHz$	$ y_{fs} $	50			mS

DYNAMIC CHARACTERISTICS

Input capacitance	$V_{DS}=-15V, V_{GS}=0V$ $f=1.0MHz$	C_{iss}		38		pF
Output capacitance		C_{oss}		4.8		
Reverse transfer capacitance		C_{rss}		2.7		

SWITCHING CHARACTERISTICS

Turn on delay time	$V_{DS}=-15V, V_{GS}=-10V,$ $R_L=50\Omega, R_G=25\Omega$	$t_{d(on)}$		16.7		ns
Rise time		t_r		8.6		
Turn off delay time		$t_{d(off)}$		17.9		
Fall time		t_f		5.3		

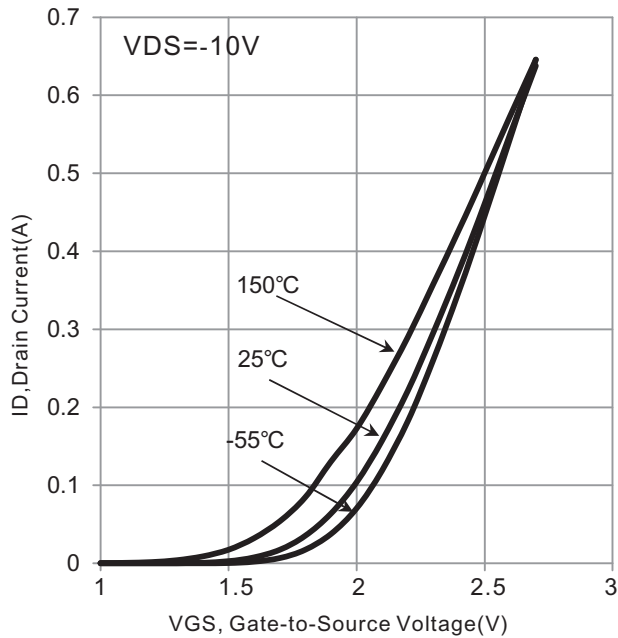
SOURCE DRAIN DIODE CHARACTERISTICS

Continuous current		I_S			-0.13	A
Pulsed current		I_{SM}			-0.52	A
Forward voltage		V_{SD}		-2.5		V

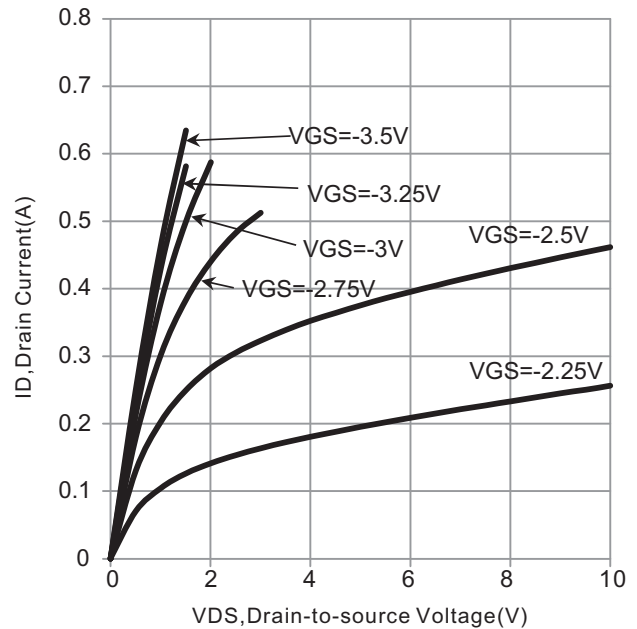
2. Pulse test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2.0\%$

Rating and characteristic curves (FMBSS84-Q1)

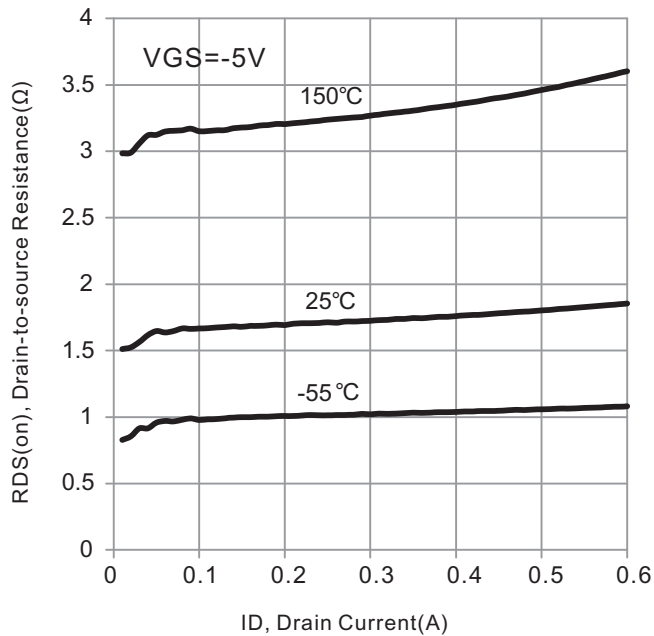
Transfer Characteristics



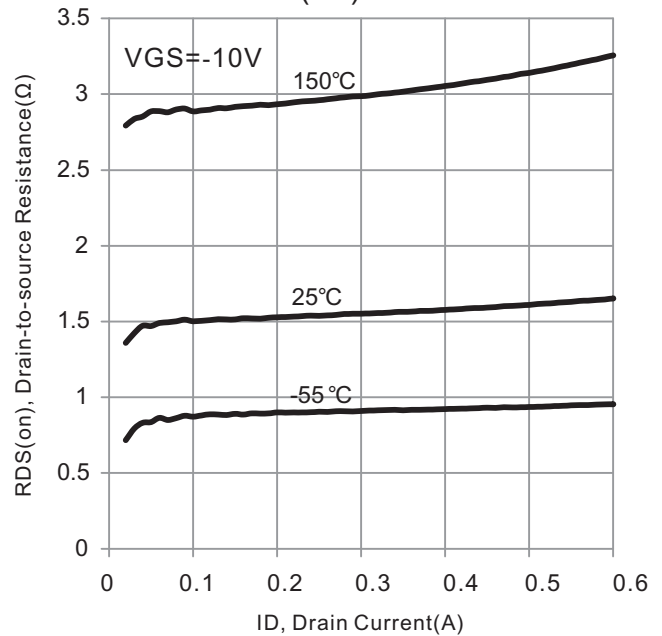
On-Region Characteristics



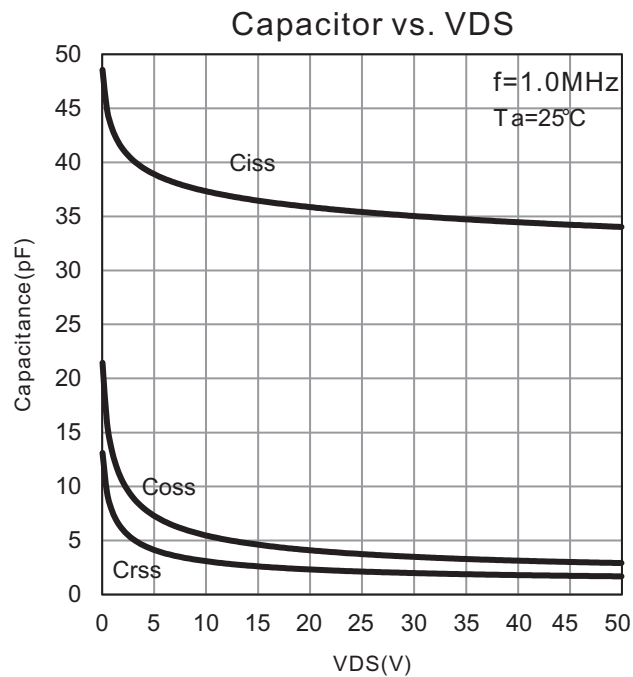
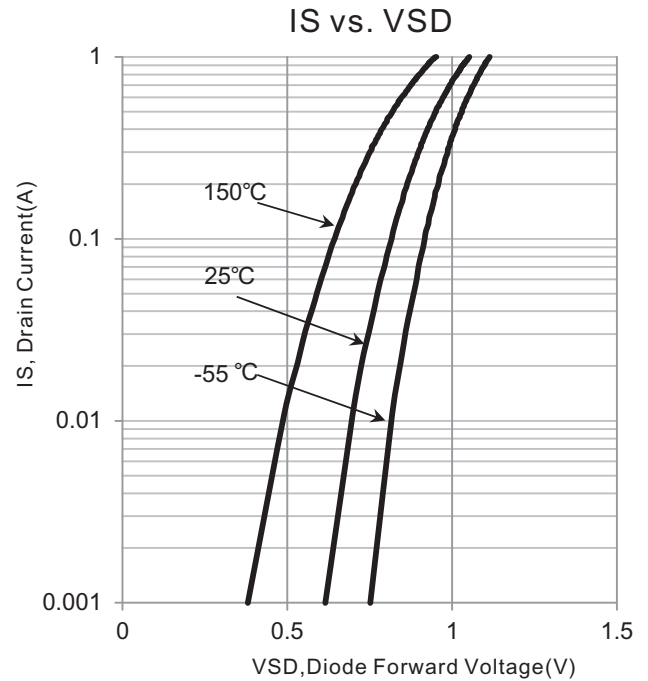
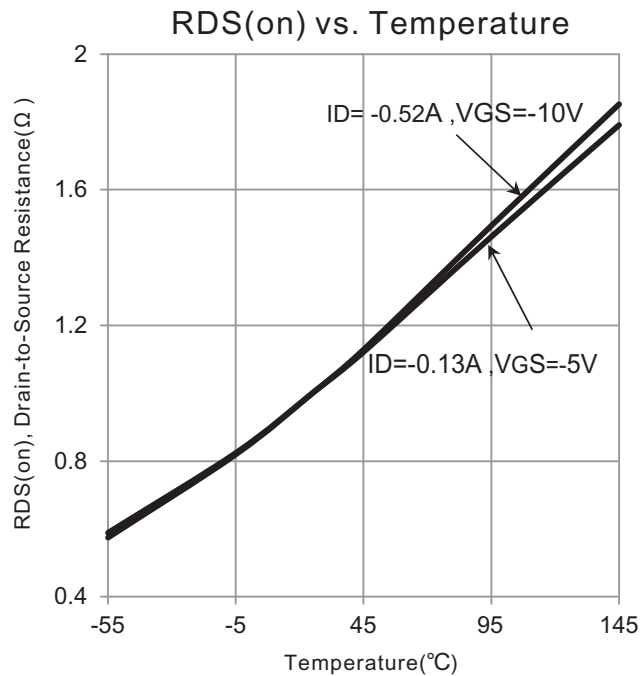
RDS(on) vs. ID



RDS(on) vs. ID

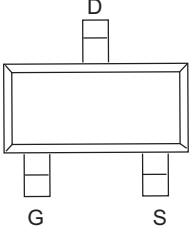
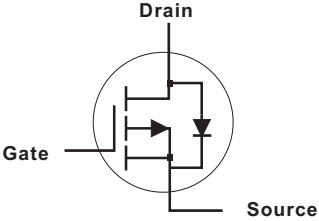


Rating and characteristic curves (FMBSS84-Q1)



FMBSS84-Q1

Pinning information

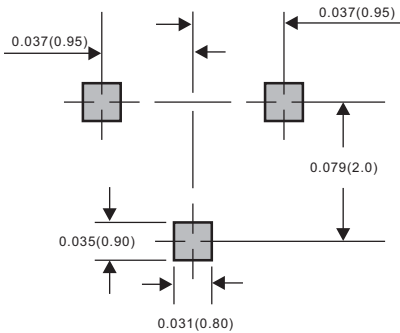
Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

Marking

Type number	Marking code
FMBSS84-Q1	B84

Suggested solder pad layout

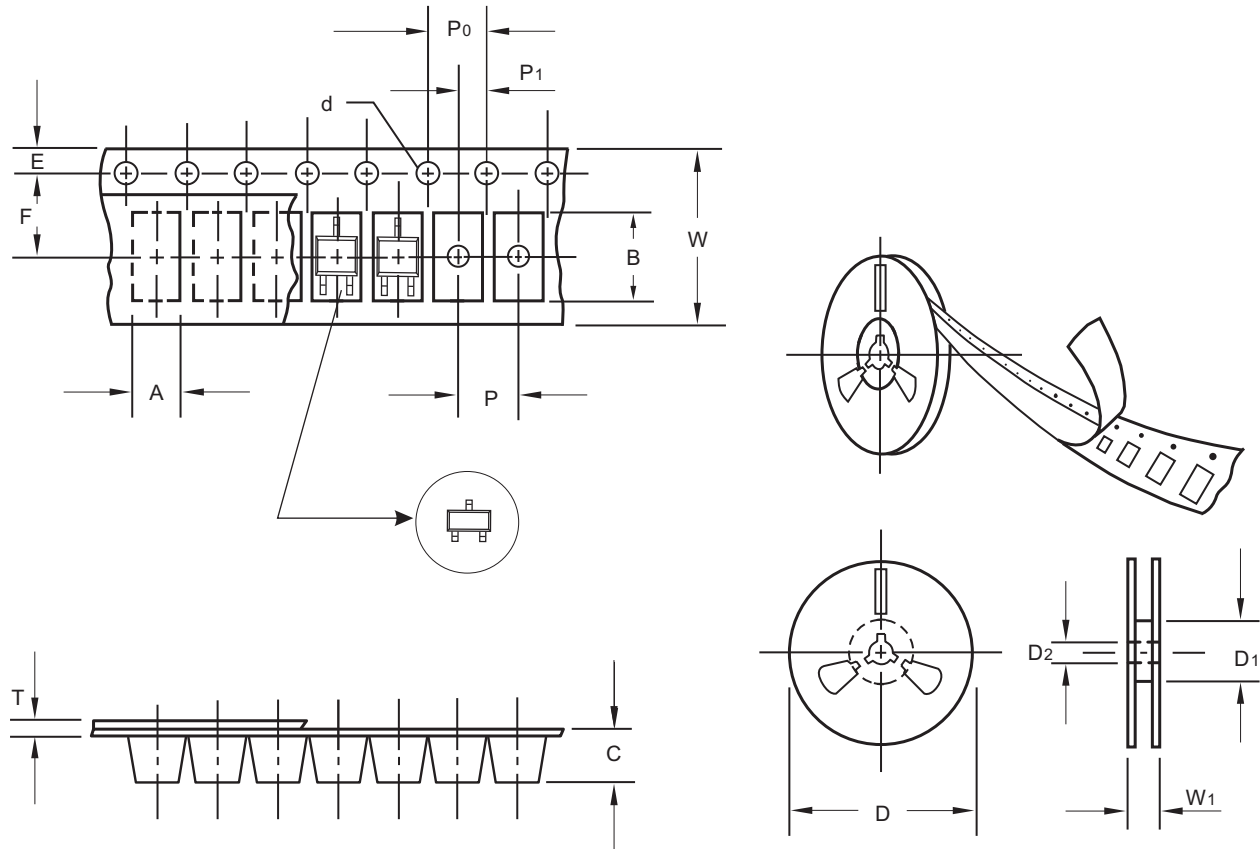
SOT-23



Dimensions in inches and (millimeters)

FMBSS84-Q1

Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	55.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	12.0

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

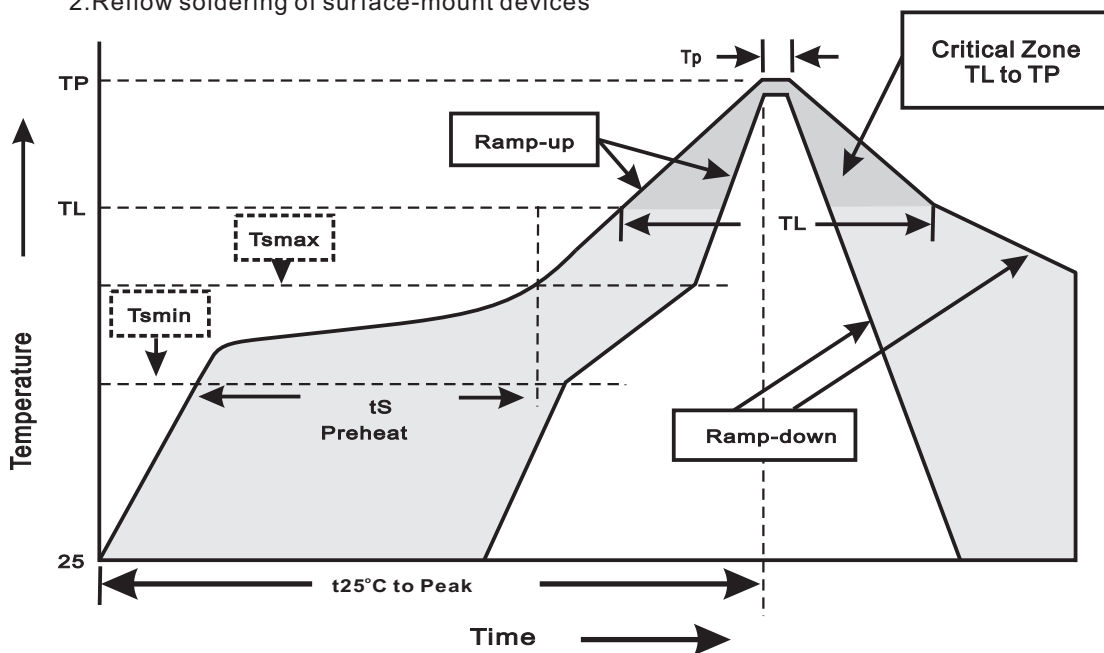
FMBSS84-Q1

Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

FMBSS84-Q1

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. High Temperature Reverse Bias	$V_{DS}=V_{DS}^*80\%$ (T_j max=150°C) Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	$T_a=125^\circ\text{C}$ Test Duration:1000hrs	JESD22 A-103
4. Temperature Cycle	-55°C(15min) to 150°C(15min) Test Cycles:1000cycles	JESD22 A-104
5. Autoclave	$P=2\text{atm}$ $T_a=121^\circ\text{C}$ RH=100% Test Duration:96hrs	JESD22 A-102
6. Solderability	245±5°C for 5sec	J-STD-002
7. Moisture Resistance	$T_a=85^\circ\text{C}$ /85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	$T_a=85^\circ\text{C}$, 85%RH, $V_{DS}=80\%$ rated V_{DS} Test Duration:1000hrs	JESD22-A101