FMSBSS138-Q1

List

FMSBSS138-Q1

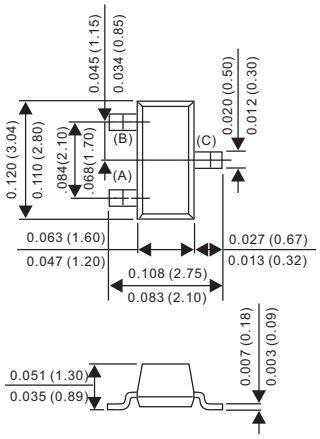
50V N-Channel Small Signal MOSFET

Features

- Low on-resistance : 3.5Ω max.
- Low input capacitance: 40pF typ.
- Low output capacitance : 12pF typ.
- Low threshole :1.5V max.
- Fast switching speed : 20ns max.
- Lead-free parts meet RoHS requirments.
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" for Halogen-free part, ex. FMSBSS138-Q1-H.

Package outline

SOT-23



Dimensions in inches and (millimeters)

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

Maximum ratings (AT T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Drain-source voltage		V_{DSS}			50	V
Gate-source voltage		V_{GS}			±20	V
Continuous drain current	T_A=25°C	I_D			200	mA
Pulsed drain current	t_P≦10μs	I_{DM}			800	mA
Maximum power dissipation	T_A=25°C	P_D			225	mW
Thermal resistance	Junction to ambient	$R_{\theta JA}$			556	°C/W
Operating junction and storage temperature range		T_J, T_{STG}	-55		+150	°C

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Electrical characteristics (AT T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
STATIC(1)						
Drain-source breakdown voltage	V_{GS} = 0V, I_D = 250μA	$V_{(BR)DSS}$	50			V
Gate-source threshold voltage	V_{DS} = V_{GS} , I_D = 1.0mA	$V_{GS(th)}$	0.5		1.5	V
Drain-source on-state resistance	V_{GS} = 2.75V, I_D < 200mA, T_A=-40 °C to + 85 °C	$R_{DS(on)}$		5.6	10	Ω
	V_{GS} = 5.0V, I_D = 200mA				3.5	
Zero gate voltage drai n current	V_{DS} = 25V, V_{GS} = 0V	I_{DSS}			0.1	μA
	V_{DS} = 50V, V_{GS} = 0V				0.5	
Gate-source leakage current	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}			±0.1	μA
Forward transconductance	V_{DS}=25V, I_D=200mA, f=1.0KHZ	g_{fs}	100			mmhos
DYNAMIC						
Input capacitance	V_{DS} = 25V, V_{GS} = 0V f = 1.0 MHz	C_{iss}		40	50	pF
Output capacitance		C_{oss}		12	25	
Reverse transfer capacitance		C_{rss}		3.5	5.0	
SWITCHING(2)						
Turn-on delay time	V_{DD} = 30V, I_D = 200mA	$t_{d(on)}$			20	ns
Turn-off delay time	V_{DD} = 30V, I_D = 200mA	$t_{d(off)}$			20	

Notes 1: Pulse Test : PW≦300μs,duty cycle≦2%
2: Switching time is essentially independent of operating temperature.

Rating and characteristic curves (FMSBSS138-Q1)

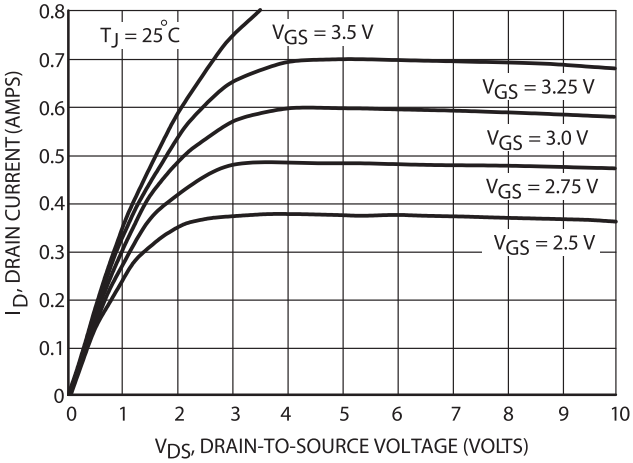

Figure 1. On-Region Characteristics

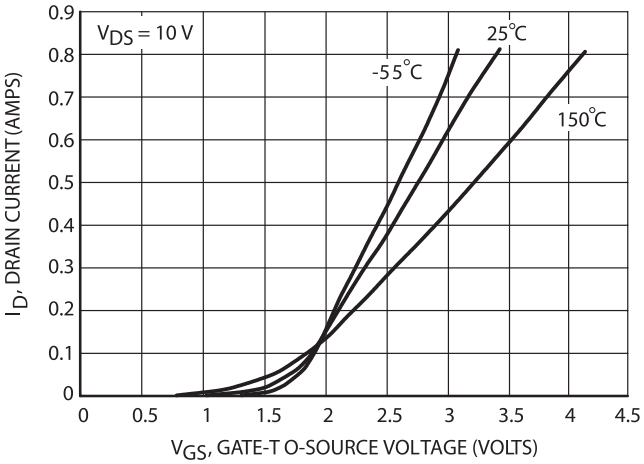

Figure 2. Transfer Characteristics

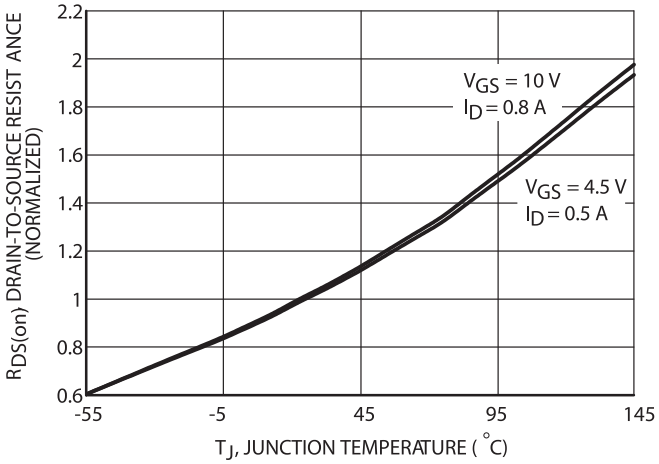

Figure 3. On-Resistance Variation with Temperature

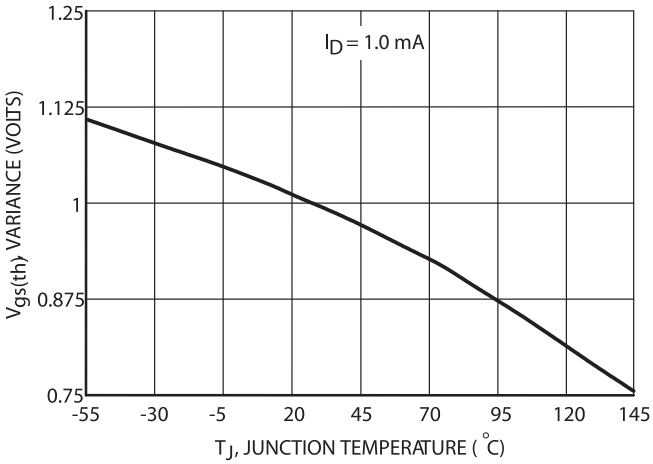

Figure 4. Threshold Voltage Variation with Temperature

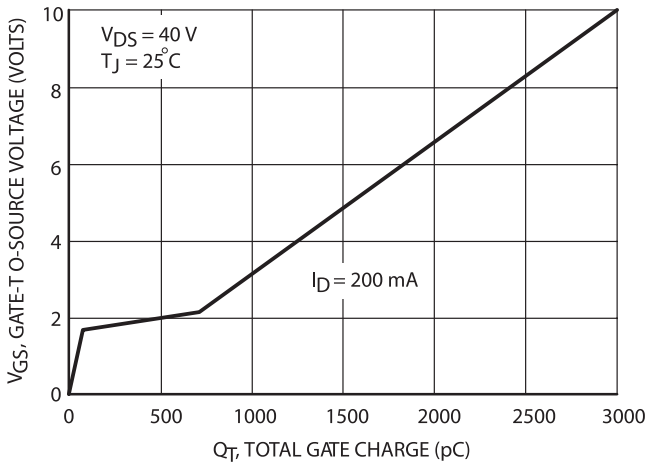

Figure 5. Gate Charge

Rating and characteristic curves (FMSBSS138-Q1)

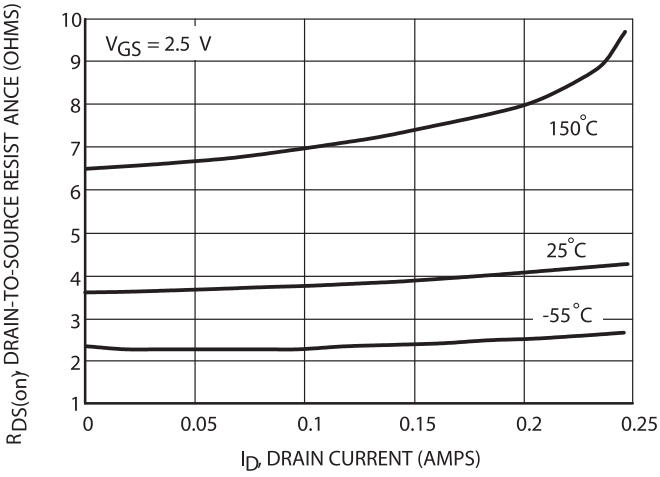

Figure 6. On-Resistance versus Drain Current

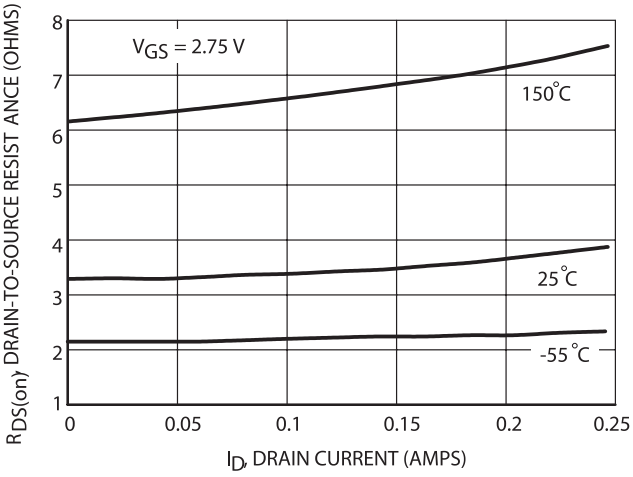

Figure 7. On-Resistance versus Drain Current

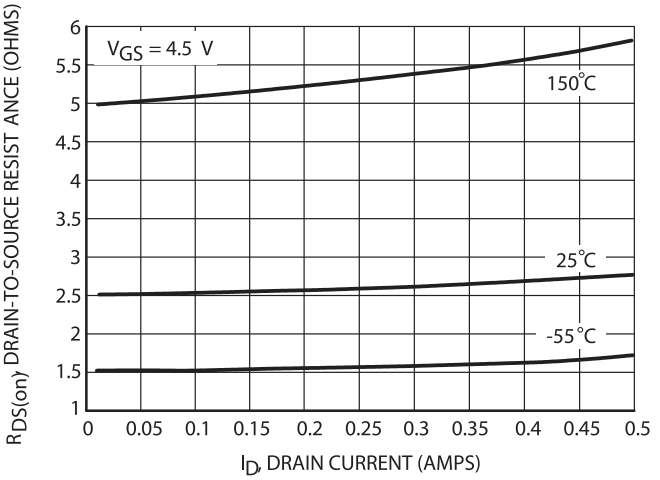

Figure 8. On-Resistance versus Drain Current

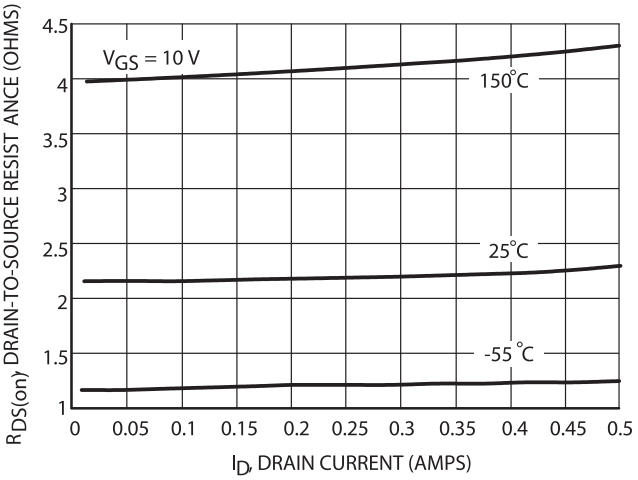

Figure 9. On-Resistance versus Drain Current

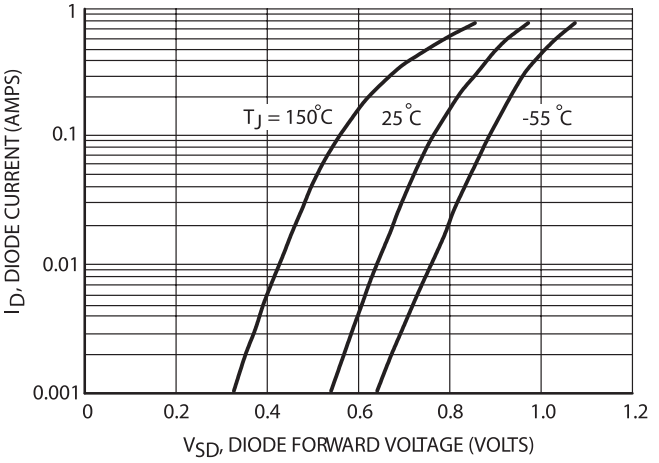

Figure 10. Body Diode Forward Voltage

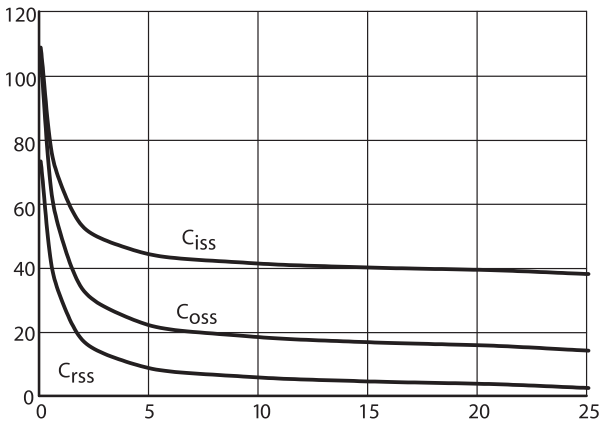

Figure 11. Capacitance

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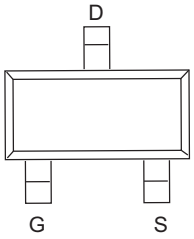
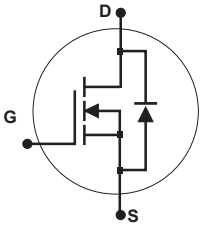
Pinning information

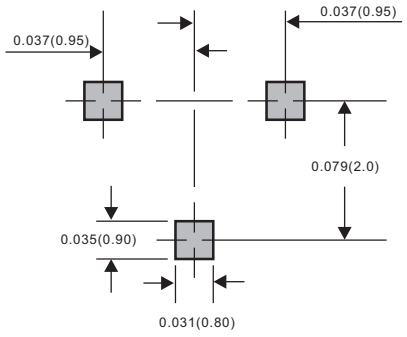
Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

Marking

Type number	Marking code
FMSBSS138-Q1	J1,SS

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)

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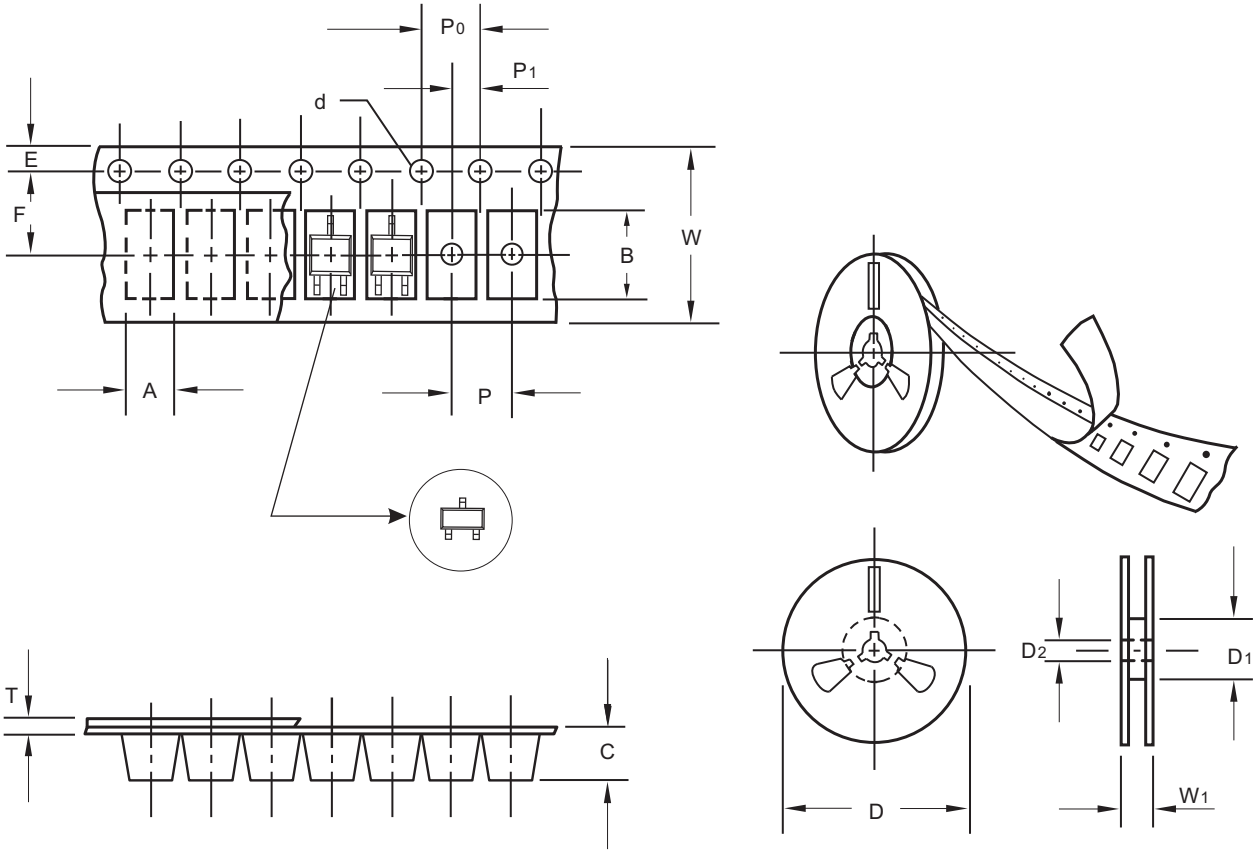
Packing information



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	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	55.00
Feed hole diameter	D_2	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	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	12.0

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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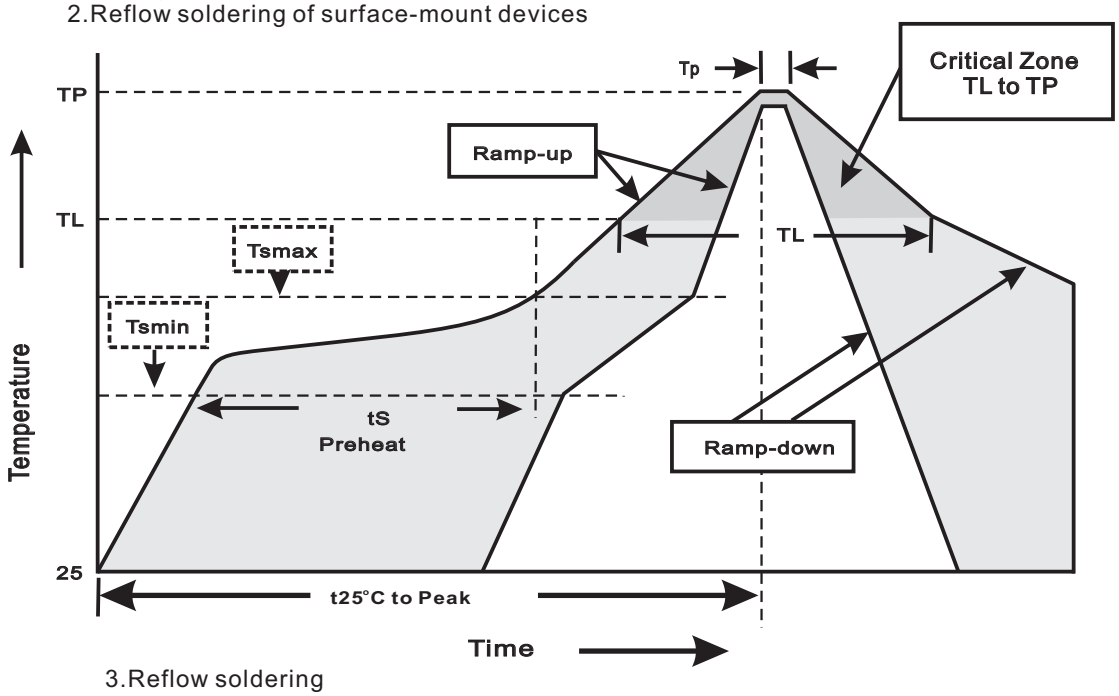
Reel packing

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(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax 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

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High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125℃+168hrs@85℃ /85%RH+3xIR@260℃+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Intermittent Operating Life	Ta=25℃, ΔTj≥100℃ On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Gate Bias	V_{GS}=100% rated V_{GS} (Tj=150℃)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125℃ Test Duration:1000hrs	JESD22 A-103
5. Temperature Cycle	-55℃（15min）to 150℃（15min）Test Cycles:1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121℃ RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5℃ for 5sec	J-STD-002
8. Moisture Resistance	Ta=85℃/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5℃ for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85℃, 85%RH, V_{DS}=80% ratedV_{DS} Test Duration:1000hrs	JESD22-A101