

## FMSBSS138

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## FMSBSS138

### 50V N-Channel Small Signal MOSFET

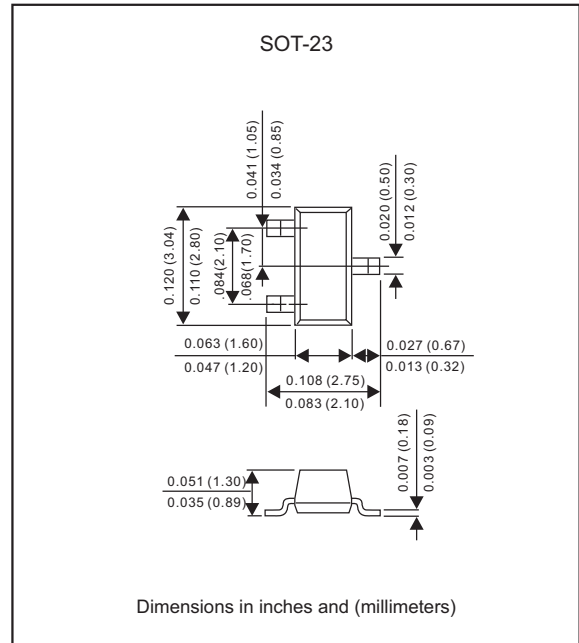
#### Features

- Low on-resistance : 3.5Ω max
- Low input capacitance: 40pF typ
- Low output capacitance : 12pF typ
- Low threshold : 1.5V max
- Fast switching speed : 20ns max
- Lead-free parts meet RoHS requirements
- Suffix "-H" for Halogen-free part, ex. FMSBSS138-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<sub>A</sub>=25°C unless otherwise noted)

Parameter	Conditions	SYMBOL	MIN.	TYP.	MAX.	Unit
Drain-source voltage		V <sub>DSS</sub>			50	V
Gate-source voltage		V <sub>GS</sub>			±20	V
Continuous drain current	T <sub>A</sub> =25°C	I <sub>D</sub>			200	mA
Pulsed drain current	t <sub>P</sub> ≤ 10μs	I <sub>DM</sub>			800	mA
Maximum power dissipation	T <sub>A</sub> =25°C	P <sub>D</sub>			225	mW
Thermal resistance	Junction to ambient	R <sub>θJA</sub>			556	°C/W
Operating junction and storage temperature range		T <sub>J</sub> , T <sub>STG</sub>	-55		+150	°C

## FMSBSS138

**Electrical characteristics** (AT  $T_A = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Conditions	SYMBOL	MIN.	TYP.	MAX.	Unit
<b>STATIC(Note 1)</b>						
Drain-source breakdown voltage	$V_{GS} = 0V, I_D = 250\mu A$	$V_{(BR)DSS}$	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	$V_{GS} = 2.75V, I_D < 200mA, T_A = -40^\circ\text{C to } +85^\circ\text{C}$	$R_{DS(on)}$		5.6	10	$\Omega$
	$V_{GS} = 5.0V, I_D = 200mA$				3.5	
Zero gate voltage drain current	$V_{DS} = 25V, V_{GS} = 0V$	$I_{DSS}$			0.1	$\mu A$
	$V_{DS} = 50V, V_{GS} = 0V$				0.5	
Gate-source leakage current	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$			$\pm 0.1$	$\mu A$
Forward transconductance	$V_{DS} = 25V, I_D = 200mA, f = 1.0KHz$	$g_{fs}$	100			mmhos

**DYNAMIC**

Input capacitance	$V_{DS} = 25V, V_{GS} = 0V$ $f = 1.0\text{ MHz}$	$C_{iss}$		40	50	$pF$
Output capacitance		$C_{oss}$		12	25	
Reverse transfer capacitance		$C_{rss}$		3.5	5.0	

**SWITCHING(Note 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 :  $PW \leq 300\mu s$ , duty cycle  $\leq 2\%$ 

2: Switching time is essentially independent of operating temperature.

## Rating and characteristic curves (FMSBSS138)

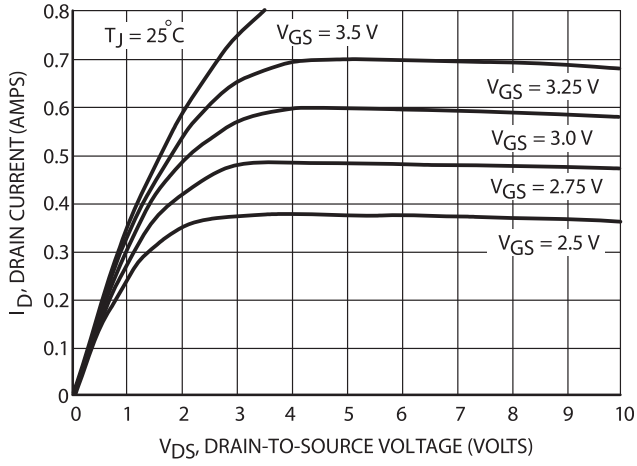


Figure 1. On-Region Characteristics

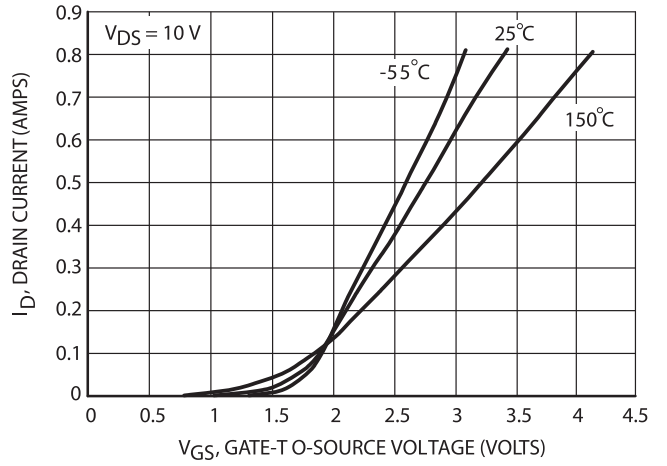


Figure 2. Transfer Characteristics

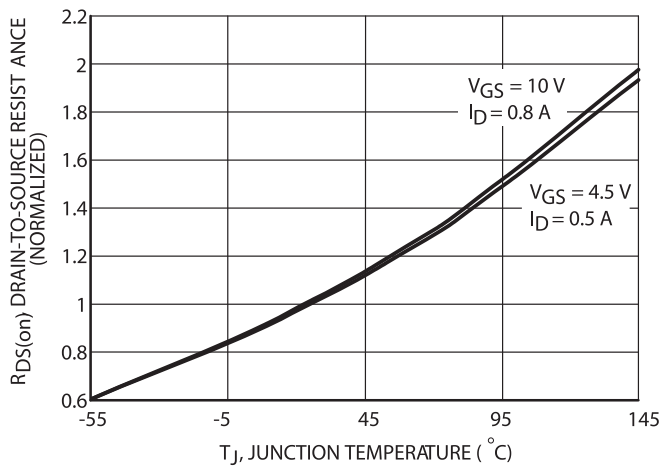


Figure 3. On-Resistance Variation with Temperature

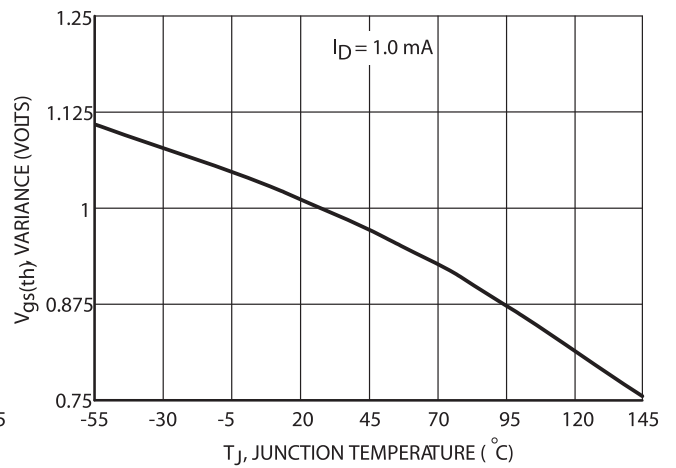


Figure 4. Threshold Voltage Variation with Temperature

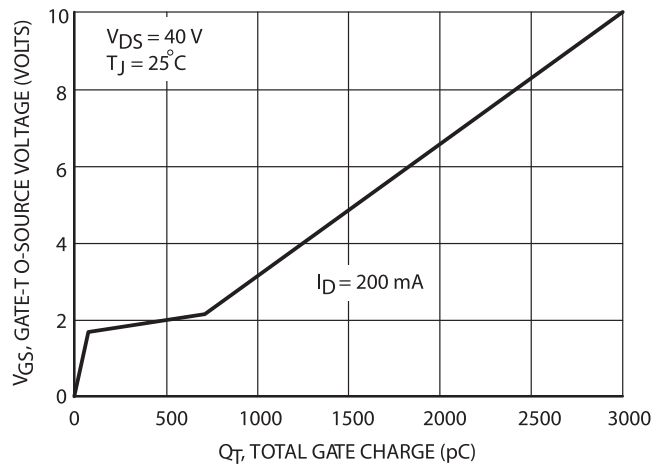


Figure 5. Gate Charge

## Rating and characteristic curves (FMSBSS138)

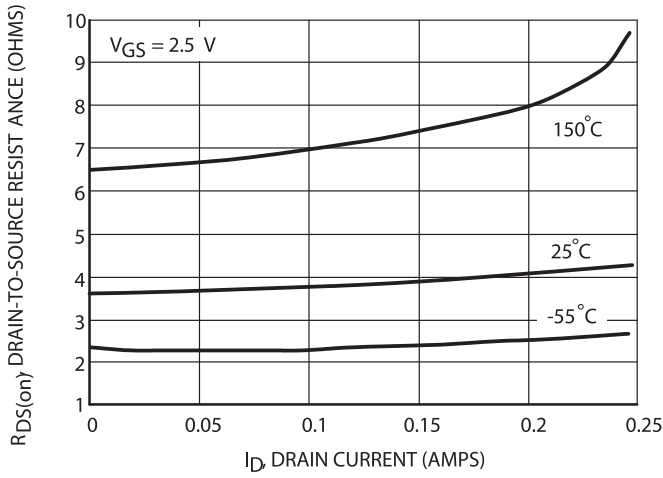


Figure 6. On-Resistance versus Drain Current

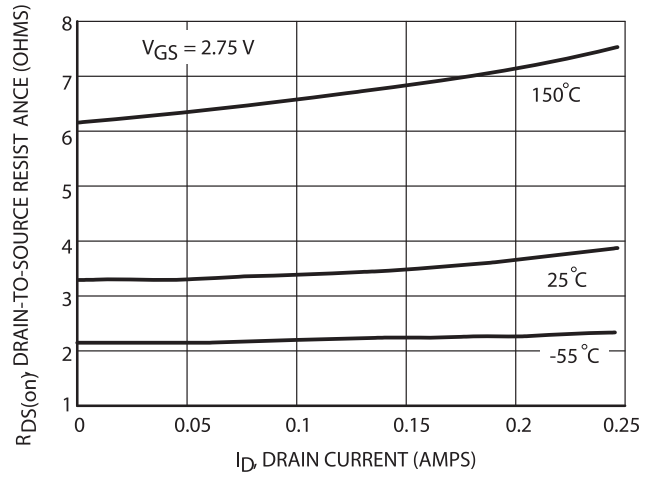


Figure 7. On-Resistance versus Drain Current

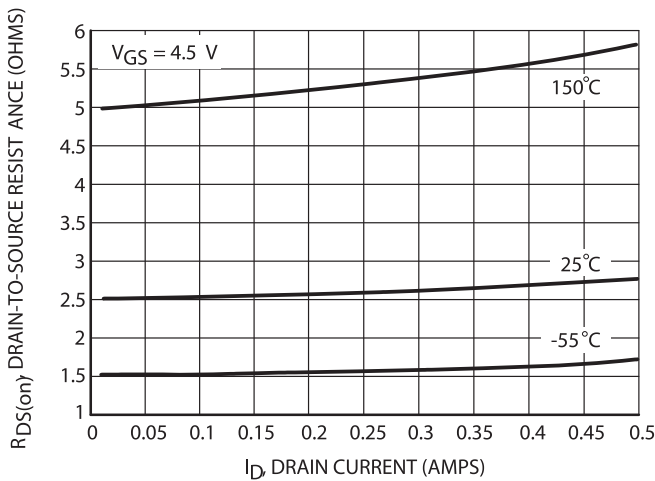


Figure 8. On-Resistance versus Drain Current

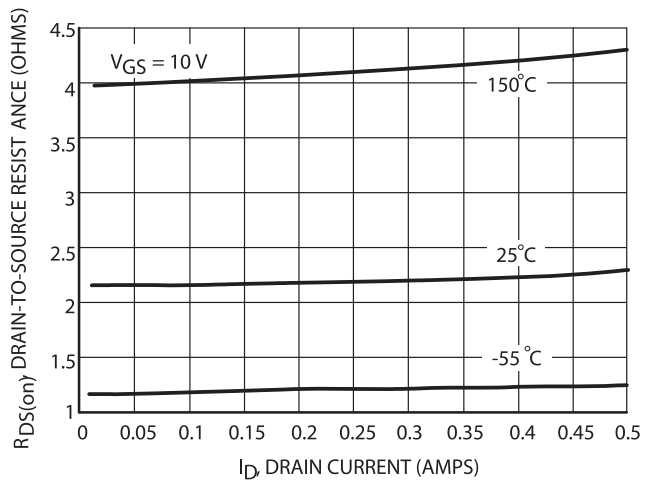


Figure 9. On-Resistance versus Drain Current

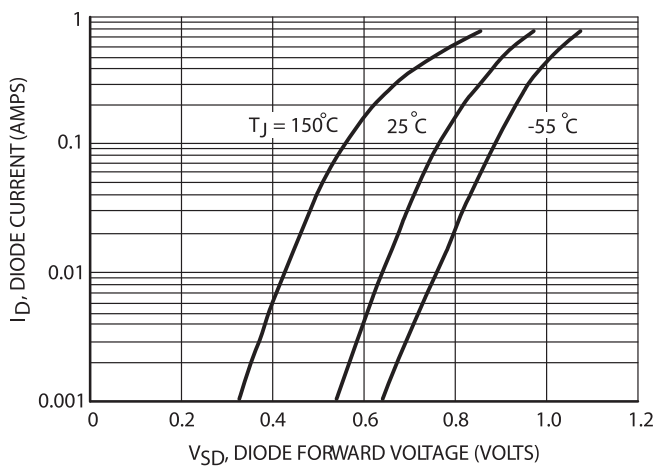


Figure 10. Body Diode Forward Voltage

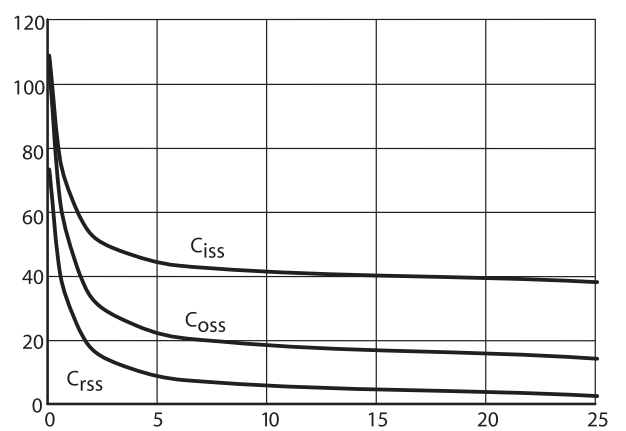
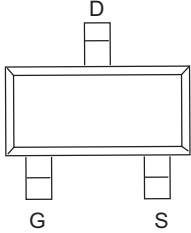
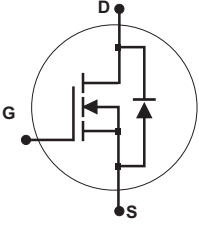


Figure 11. Capacitance

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### Pinning information

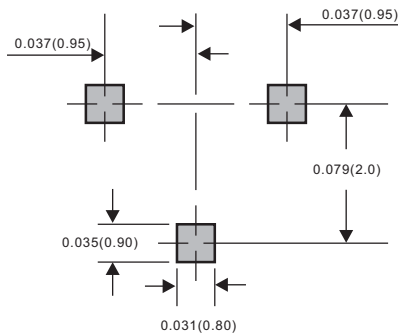
Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

### Marking

Type number	Marking code
FMSBSS138	J1,SS

### Suggested solder pad layout

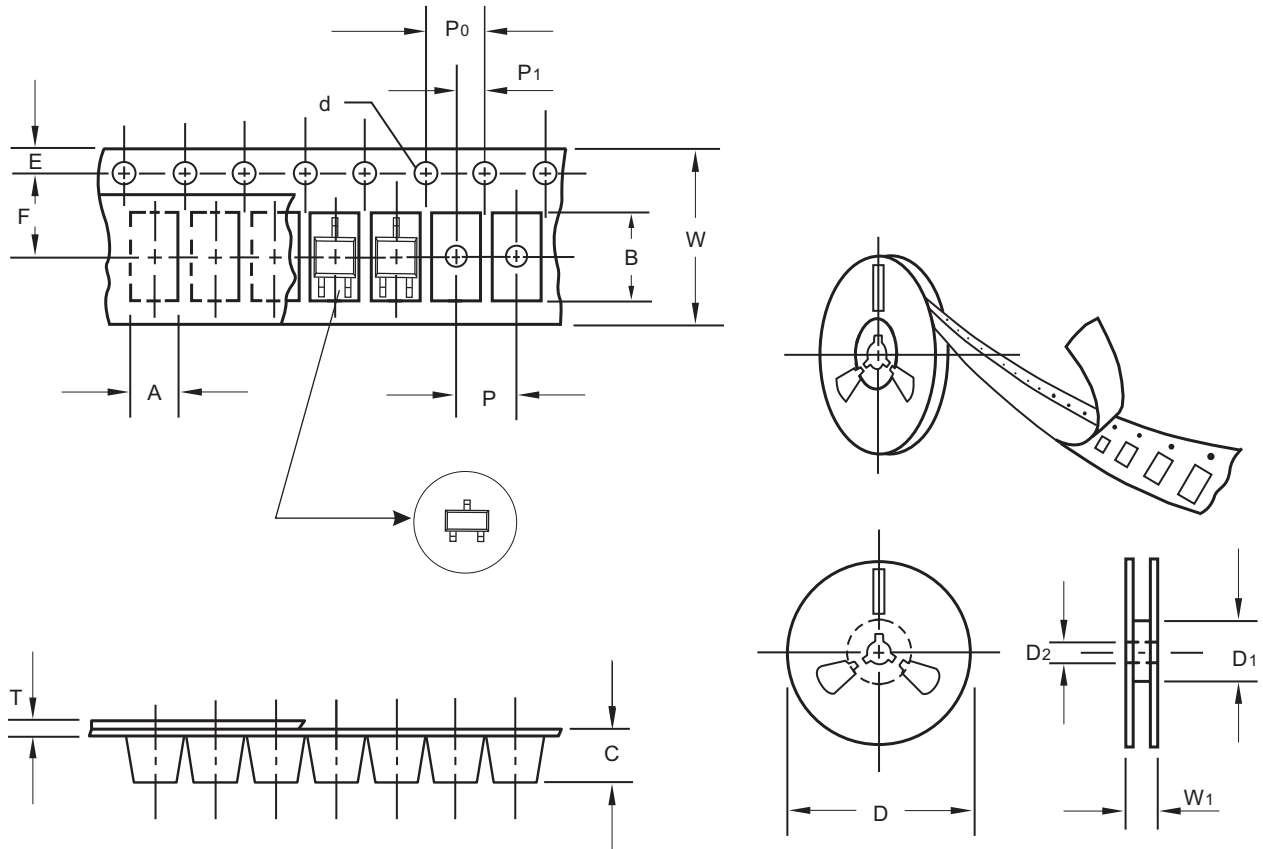
#### SOT-23



Dimensions in inches and (millimeters)

## FMSBSS138

### 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.

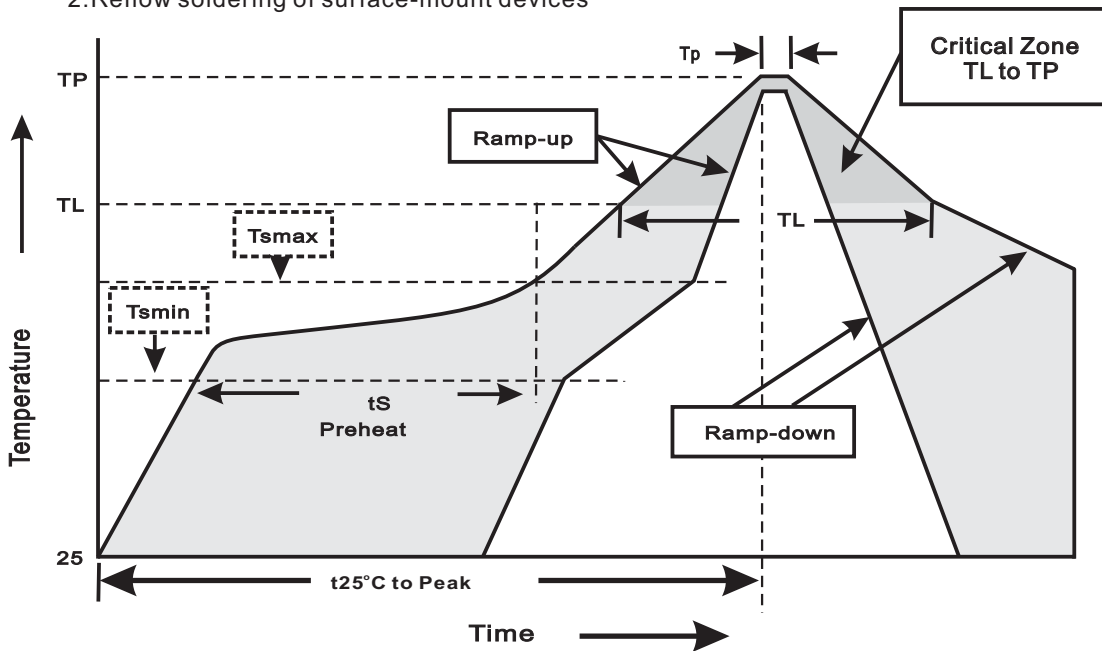
## FMSBSS138

### 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(TL to TP)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(ts)	150°C 200°C 60~120sec
Tsmax to TL -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(TL) -Time(tL)	217°C 60~260sec
Peak Temperature(TP)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(tp)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes