

FMSBSS138

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FMSBSS138

50V N-Channel Small Signal MOSFET

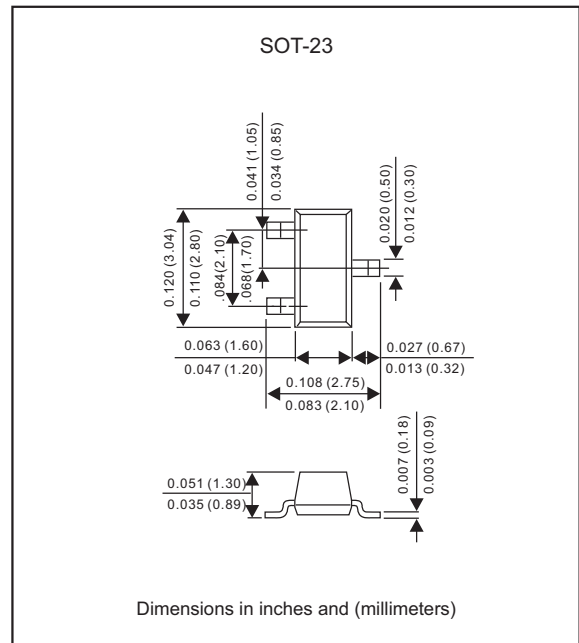
Features

- 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 $T_A=25^\circ\text{C}$ 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	$T_A=25^\circ\text{C}$	I_D			200	mA
Pulsed drain current	$t_P \leq 10\mu\text{s}$	I_{DM}			800	mA
Maximum power dissipation	$T_A=25^\circ\text{C}$	P_D			225	mW
Thermal resistance	Junction to ambient	$R_{\theta JA}$			556	$^\circ\text{C/W}$
Operating junction and storage temperature range		T_J, T_{STG}	-55		+150	$^\circ\text{C}$

FMSBSS138**Electrical characteristics** (AT $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Conditions	SYMBOL	MIN.	TYP.	MAX.	Unit
STATIC(Note 1)						
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	Ω
	$V_{GS} = 5.0V, I_D = 200mA$				3.5	
Zero gate voltage drain current	$V_{DS} = 25V, V_{GS} = 0V$	I_{DSS}			0.1	μA
	$V_{DS} = 50V, V_{GS} = 0V$				0.5	
Gate-source leakage current	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}			± 0.1	μA
Forward transconductance	$V_{DS} = 25V, I_D = 200mA, f = 1.0KHz$	g_{fs}	100			mmhos

DYNAMIC

Input capacitance	$V_{DS} = 25V, V_{GS} = 0V$ $f = 1.0\text{ MHz}$	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)

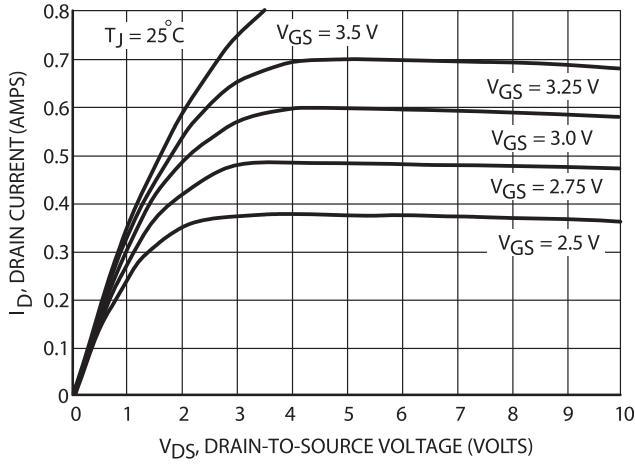


Figure 1. On-Region Characteristics

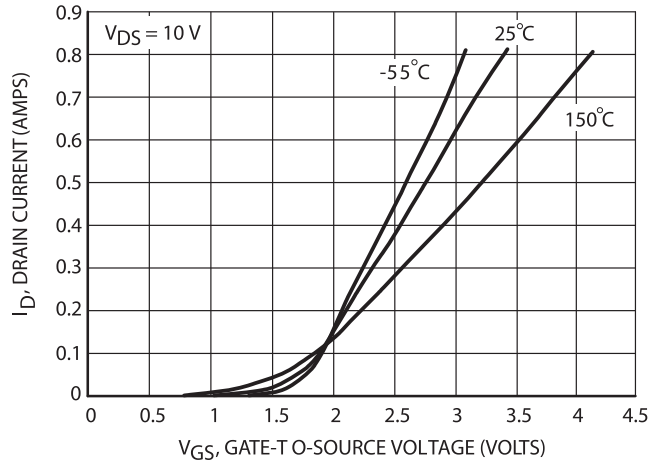


Figure 2. Transfer Characteristics

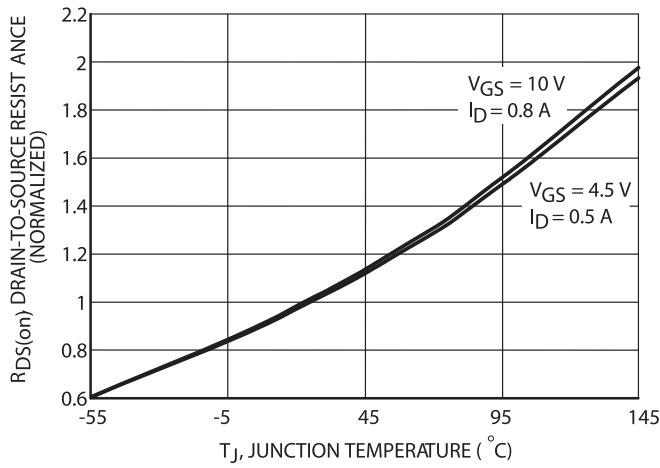


Figure 3. On-Resistance Variation with Temperature

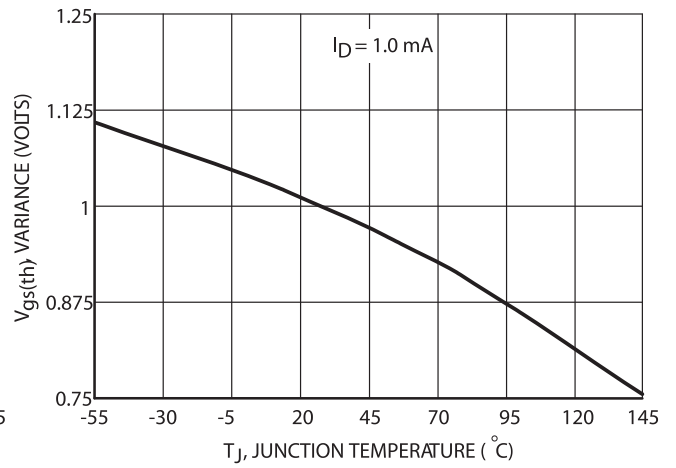


Figure 4. Threshold Voltage Variation with Temperature

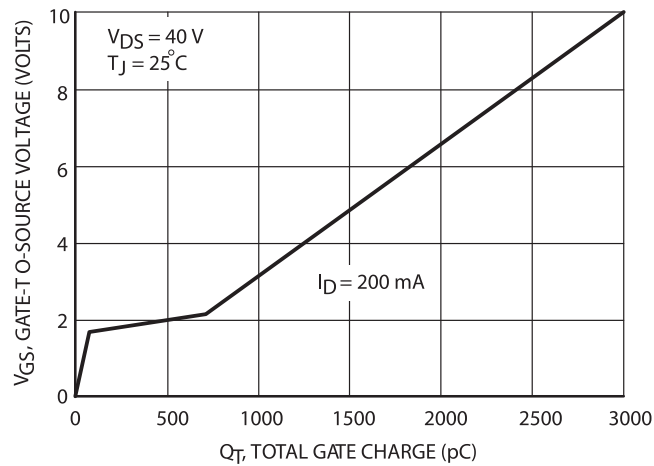


Figure 5. Gate Charge

Rating and characteristic curves (FMSBSS138)

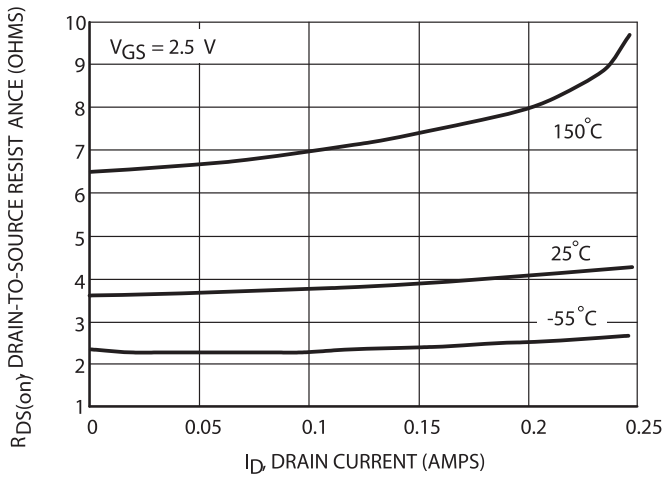


Figure 6. On-Resistance versus Drain Current

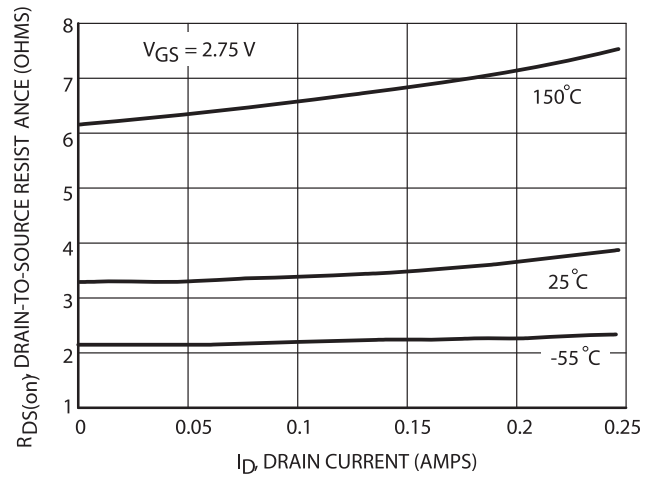


Figure 7. On-Resistance versus Drain Current

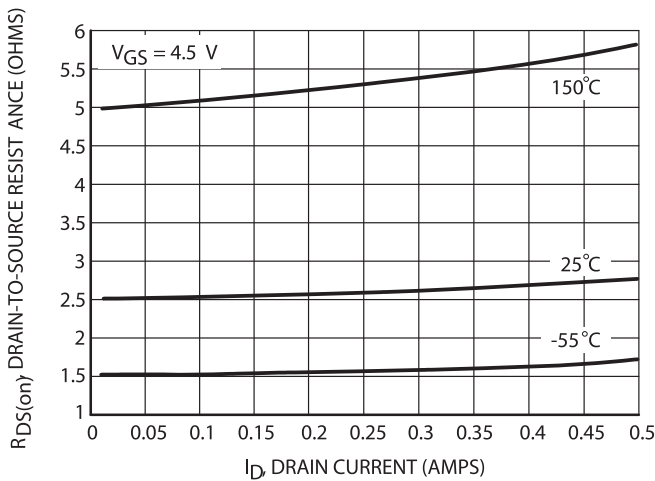


Figure 8. On-Resistance versus Drain Current

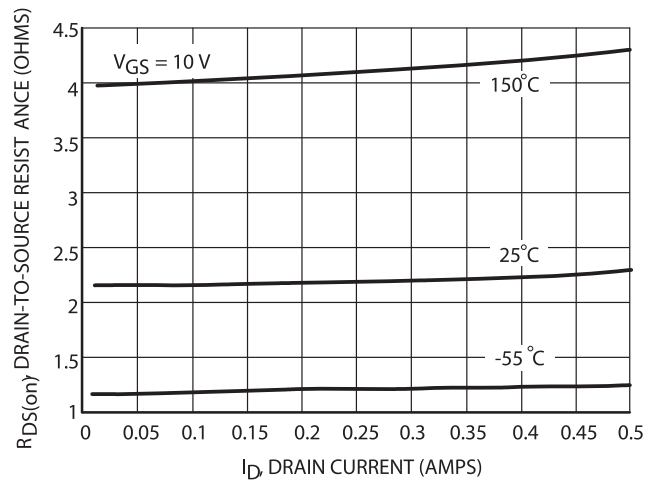


Figure 9. On-Resistance versus Drain Current

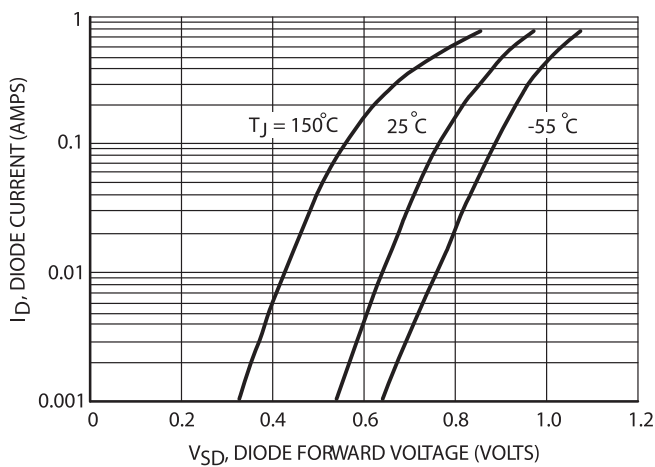


Figure 10. Body Diode Forward Voltage

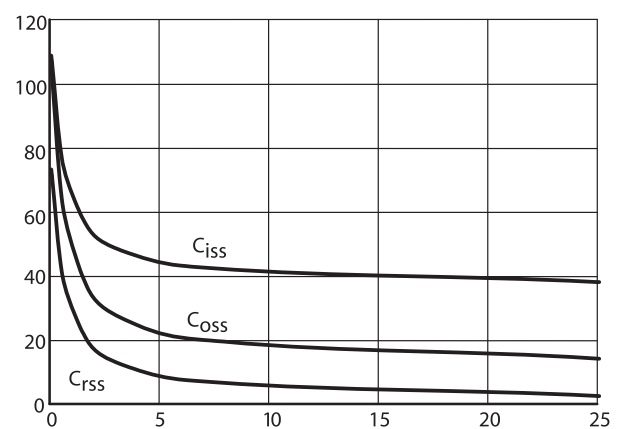
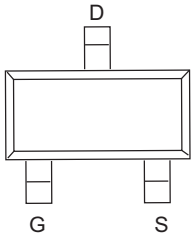
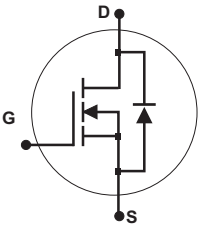


Figure 11. Capacitance

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Pinning information

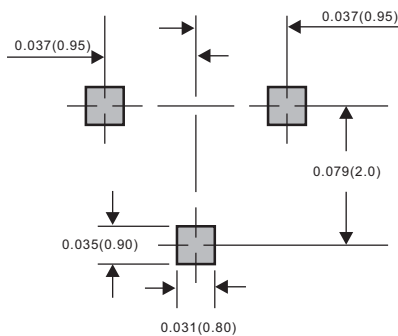
Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

Marking

Type number	Marking code
FMSBSS138	J1,SS

Suggested solder pad layout

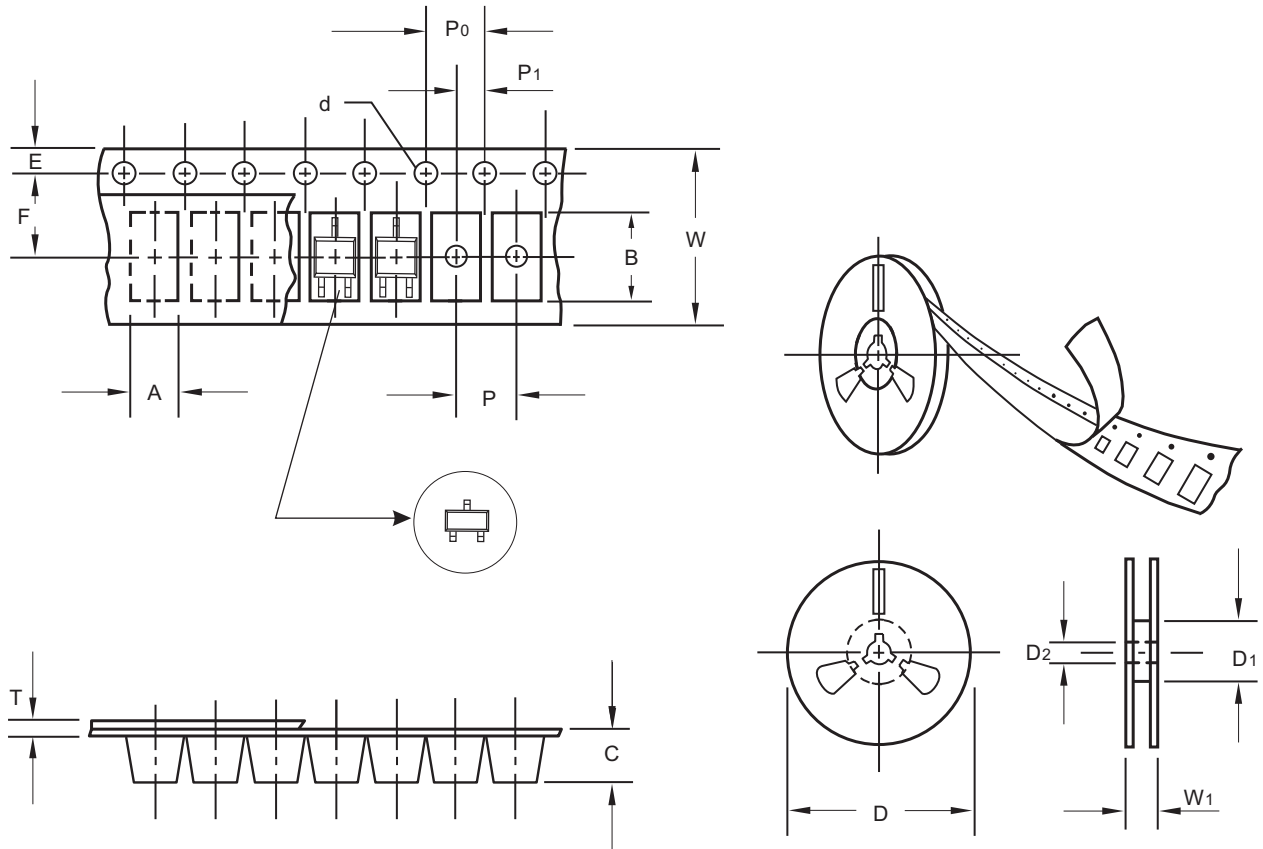
SOT-23



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.

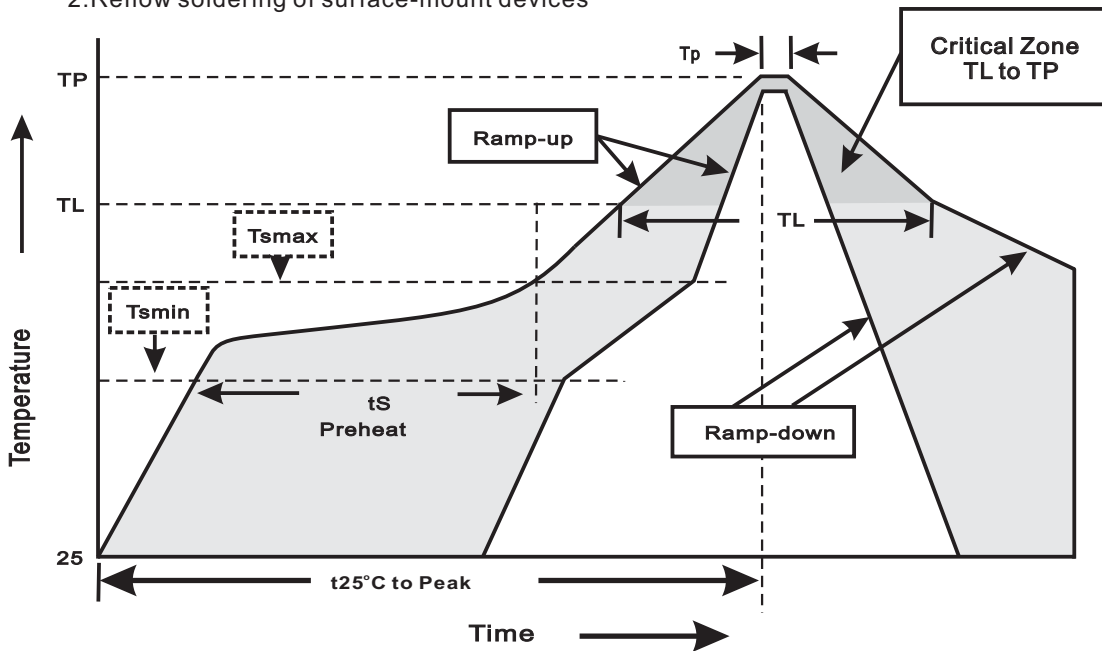
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Reel packing

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(T _{smín}) -Temperature Max(T _{smáx}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smáx} 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