

MMBT5550L, MMBT5551L, SMMBT5551L



High Voltage Transistors

NPN Silicon

Features

- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage MMBT5550 MMBT5551, SMMBT5551	V_{CEO}	140 160	Vdc
Collector - Base Voltage MMBT5550 MMBT5551, SMMBT5551	V_{CBO}	160 180	Vdc
Emitter - Base Voltage	V_{EBO}	6.0	Vdc
Collector Current - Continuous	I_C	600	mAdc
Electrostatic Discharge Human Body Model Machine Model	ESD	> 8000 > 400	V

THERMAL CHARACTERISTICS

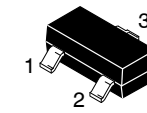
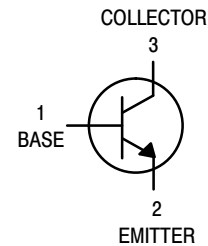
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1) @ $T_A = 25^\circ\text{C}$ Derate Above 25°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate (Note 2) @ $T_A = 25^\circ\text{C}$ Derate Above 25°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-5 = $1.0 \times 0.75 \times 0.062$ in.
2. Alumina = $0.4 \times 0.3 \times 0.024$ in. 99.5% alumina.

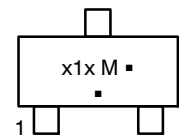
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SOT-23 (TO-236)
CASE 318
STYLE 6

MARKING DIAGRAM



x1x = Device Code
M1F = MMBT5550LT
G1 = MMBT5551LT
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)
*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
MMBT5550LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBT5551LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
SMMBT5551LT1G	SOT-23 (Pb-Free)	10,000/Tape & Reel
MMBT5551LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
SMMBT5551LT3G	SOT-23 (Pb-Free)	10,000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector – Emitter Breakdown Voltage (Note 3) (I _C = 1.0 mA _{dc} , I _B = 0)	MMBT5550 MMBT5551, SMMBT551	V _{(BR)CEO}	140 160	– – V _{dc}
Collector – Base Breakdown Voltage (I _C = 100 μA _{dc} , I _E = 0)	MMBT5550 MMBT5551, SMMBT551	V _{(BR)CBO}	160 180	– – V _{dc}
Emitter – Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)		V _{(BR)EBO}	6.0	– V _{dc}
Collector Cutoff Current (V _{CB} = 100 V _{dc} , I _E = 0) (V _{CB} = 120 V _{dc} , I _E = 0) (V _{CB} = 100 V _{dc} , I _E = 0, T _A = 100°C) (V _{CB} = 120 V _{dc} , I _E = 0, T _A = 100°C)	MMBT5550 MMBT5551, SMMBT551 MMBT5550 MMBT5551, SMMBT551	I _{CBO}	– – – –	100 50 100 50 nA _{dc} μA _{dc}
Emitter Cutoff Current (V _{EB} = 4.0 V _{dc} , I _C = 0)		I _{EBO}	–	50 nA _{dc}
ON CHARACTERISTICS				
DC Current Gain (I _C = 1.0 mA _{dc} , V _{CE} = 5.0 V _{dc}) (I _C = 10 mA _{dc} , V _{CE} = 5.0 V _{dc}) (I _C = 50 mA _{dc} , V _{CE} = 5.0 V _{dc})	MMBT5550 MMBT5551, SMMBT551 MMBT5550 MMBT5551, SMMBT551 MMBT5550 MMBT5551, SMMBT551	h _{FE}	60 80 60 80 20 30	– – 250 250 – –
Collector – Emitter Saturation Voltage (I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc}) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})	Both Types MMBT5550 MMBT5551, SMMBT551	V _{CE(sat)}	– – –	0.15 0.25 0.20 V _{dc}
Base – Emitter Saturation Voltage (I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc}) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})	Both Types MMBT5550 MMBT5551, SMMBT551	V _{BE(sat)}	– – –	1.0 1.2 1.0 V _{dc}
Collector Emitter Cut-off (V _{CB} = 10 V) (V _{CB} = 75 V)	Both Types	I _{CES}	– –	50 100 nA

3. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

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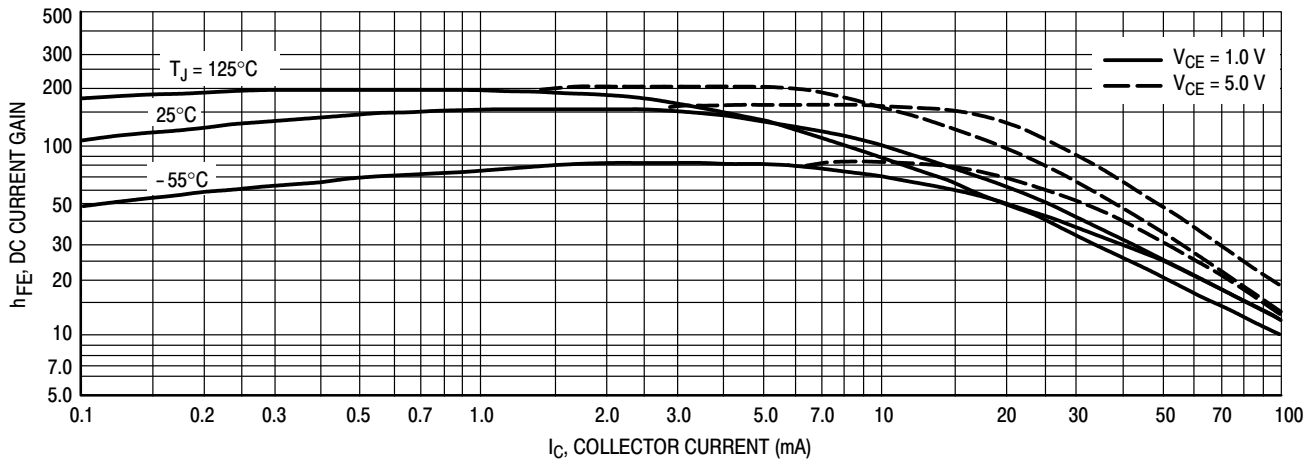


Figure 1. DC Current Gain

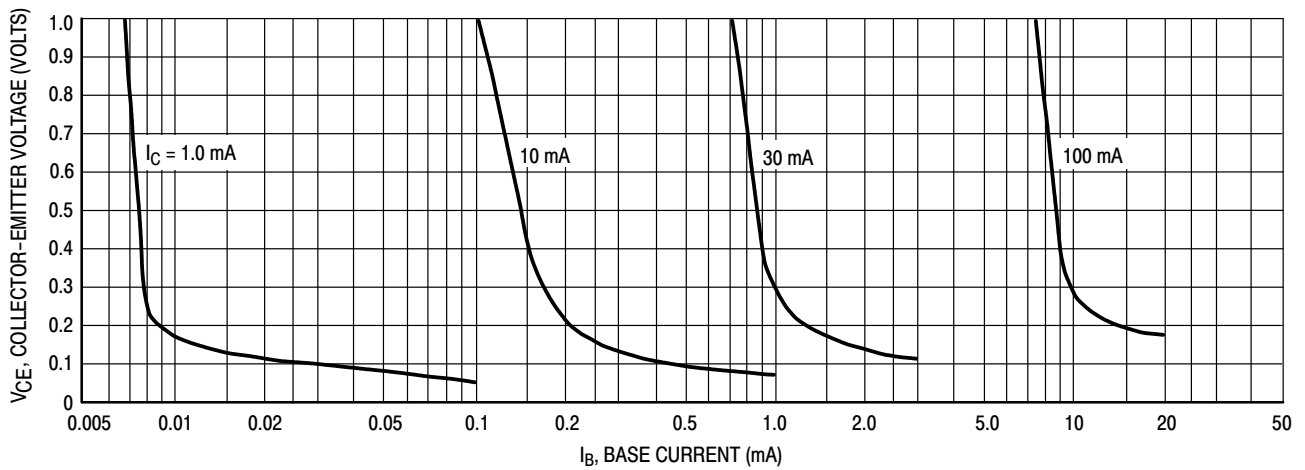


Figure 2. Collector Saturation Region

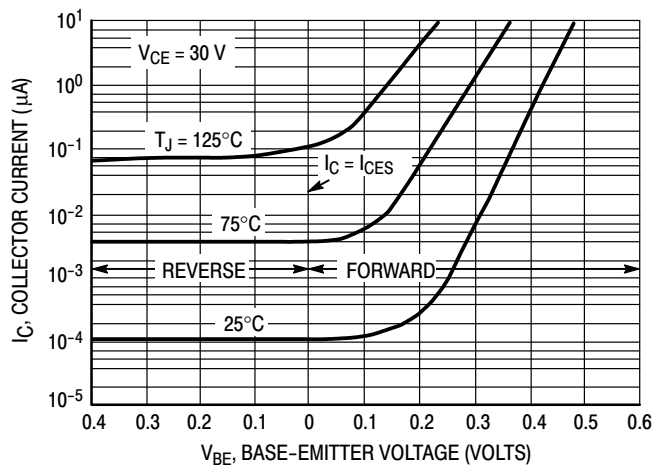


Figure 3. Collector Cut-Off Region

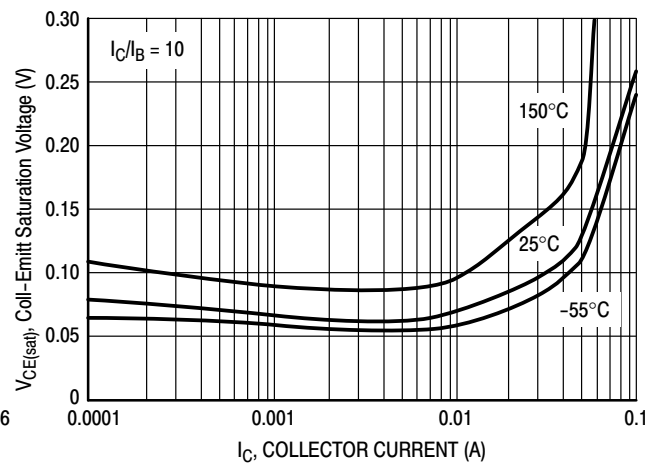


Figure 4. $V_{CE(sat)}$

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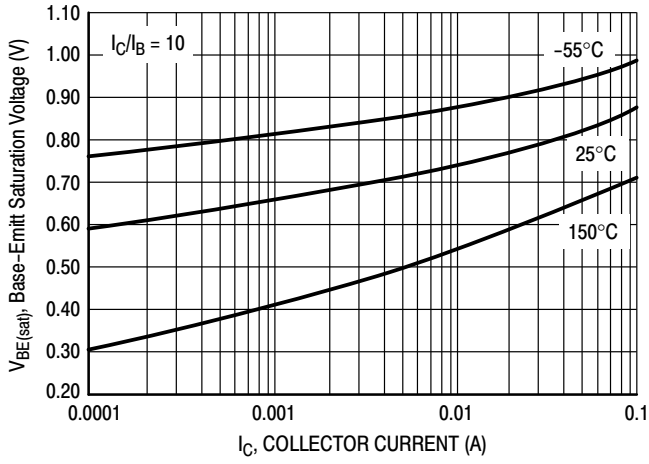


Figure 5. $V_{BE(sat)}$

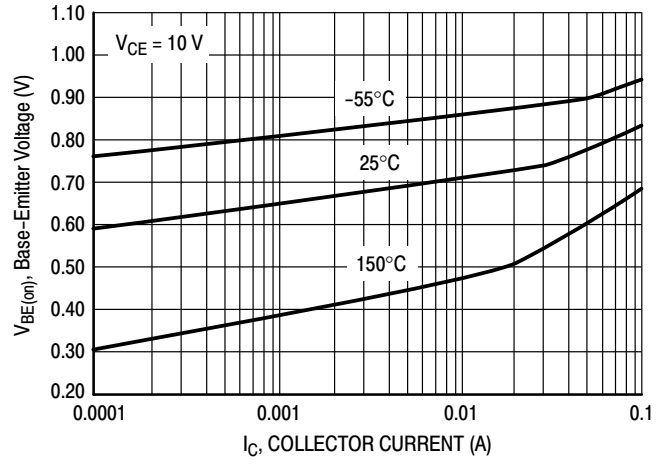


Figure 6. $V_{BE(on)}$

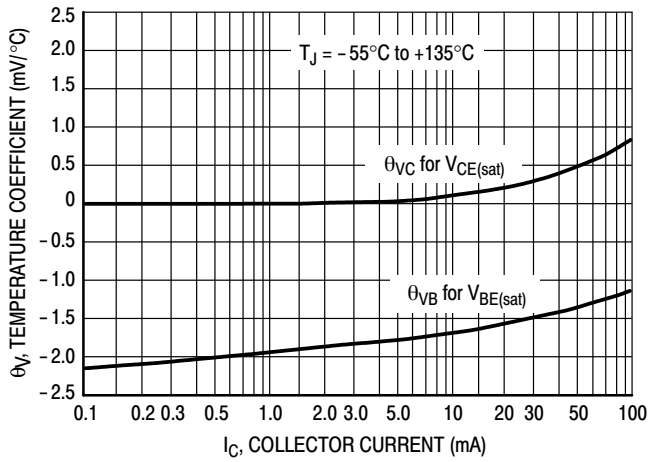


Figure 7. Temperature Coefficients

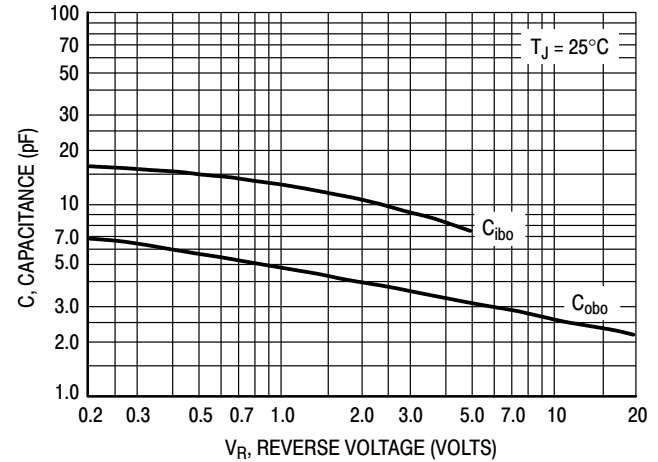
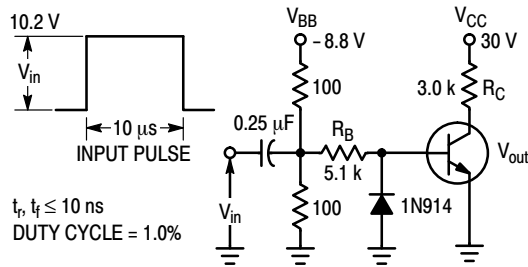


Figure 8. Capacitances



Values Shown are for $I_C @ 10 \text{ mA}$

Figure 9. Switching Time Test Circuit

MMBT5550L, MMBT5551L, SMMBT5551L

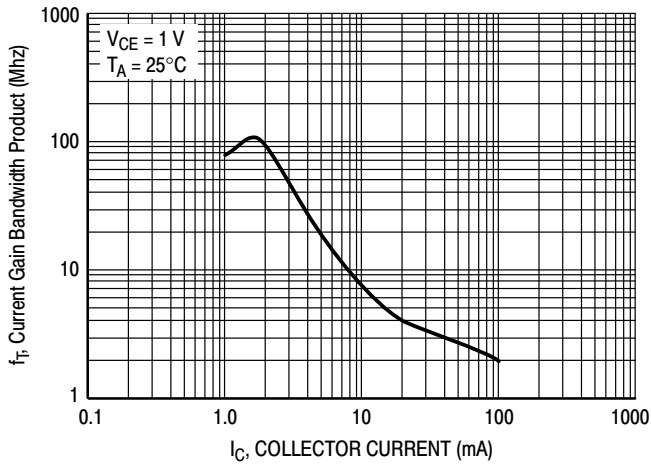


Figure 10. Current Gain Bandwidth Product

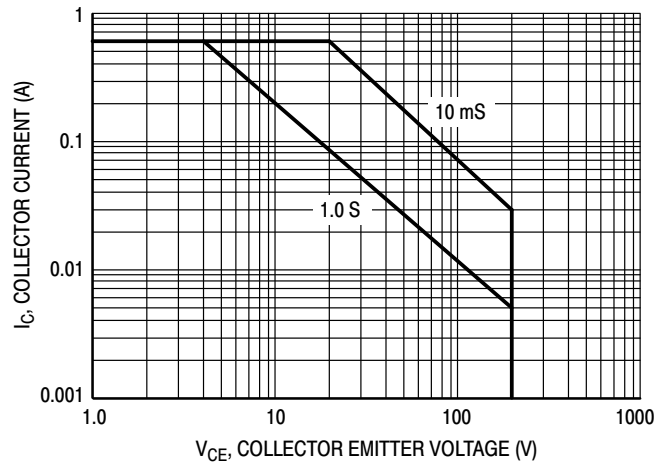


Figure 11. Safe Operating Area

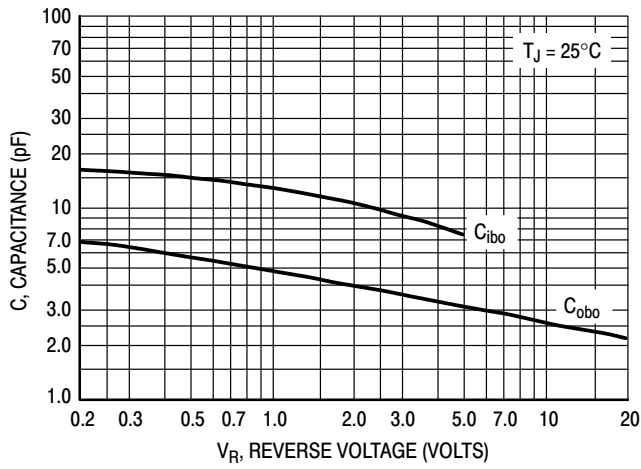


Figure 12. Capacitances

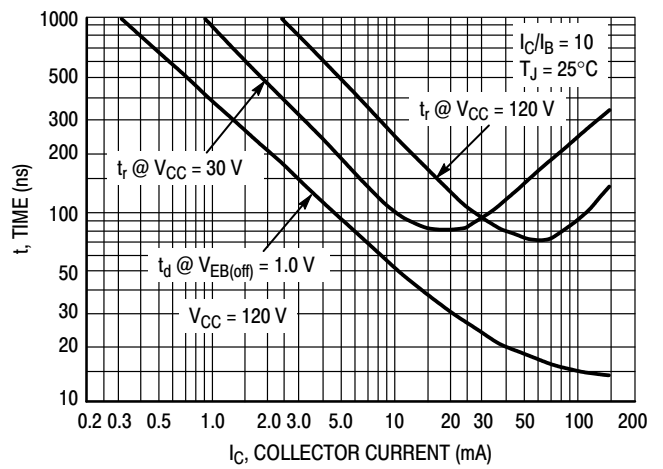
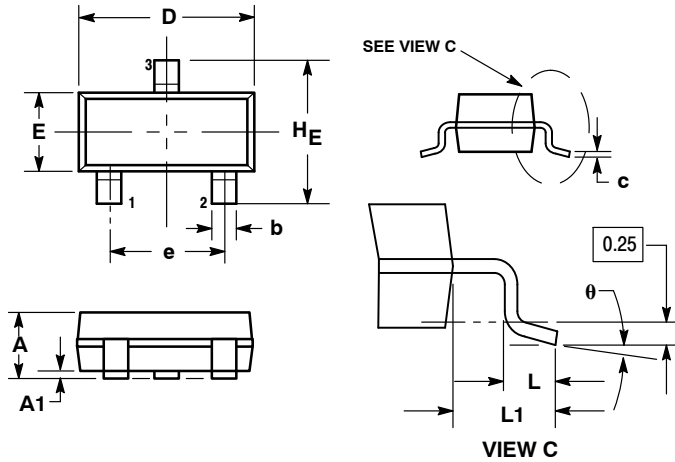


Figure 13. Turn-On Time

MMBT5550L, MMBT5551L, SMMBT5551L

PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-08
ISSUE AP



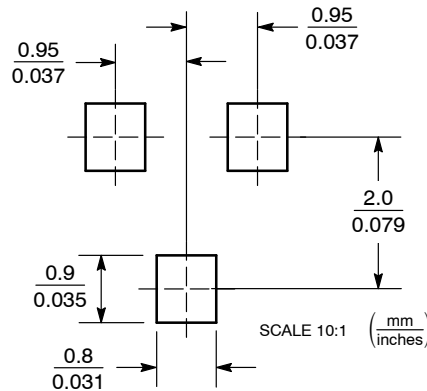
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	---	10°	0°	---	10°

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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