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# **30V, N-Channel NexFET™ Power MOSFETs**

Check for Samples: CSD17327Q5A

### **FEATURES**

- Ultralow Q<sub>g</sub> and Q<sub>gd</sub>
- · Low Thermal Resistance
- Avalanche Rated
- Pb Free Terminal Plating
- RoHS Compliant
- Halogen Free
- SON 5-mm × 6-mm Plastic Package

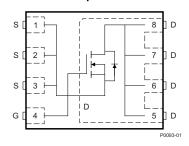
### **APPLICATIONS**

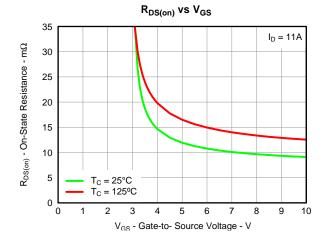
- Point-of-Load Synchronous Buck in Networking, Telecom and Computing Systems
- Optimized for Control FET Applications

### **DESCRIPTION**

The NexFET™ power MOSFET has been designed to minimize losses in power conversion applications.







### **PRODUCT SUMMARY**

V <sub>DS</sub>	Drain to Source Voltage 30			
$Q_g$	Gate Charge Total (4.5V)	/) 2.8		
$Q_{gd}$	Gate Charge Gate to Drain	0.8	nC	
В	Drain to Source On Resistance	$V_{GS} = 4.5V$	12.5	mΩ
R <sub>DS(on)</sub>	Diam to Source On Resistance	$V_{GS} = 8V$	9.9	mΩ
V <sub>GS(th)</sub>	Threshold Voltage	1.6	V	

### **ORDERING INFORMATION**

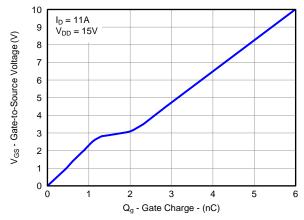
Device	Package	Media	Qty	Ship
CSD17327Q5A	SON 5-mm × 6-mm Plastic Package	13-Inch Reel	2500	Tape and Reel

### **ABSOLUTE MAXIMUM RATINGS**

T <sub>A</sub> = 2	5°C unless otherwise stated	VALUE	UNIT
$V_{DS}$	Drain to Source Voltage	30	V
$V_{GS}$	Gate to Source Voltage	+10 / -10	٧
	Continuous Drain Current, T <sub>C</sub> = 25°C	65	Α
I <sub>D</sub>	Continuous Drain Current <sup>(1)</sup>	13	Α
I <sub>DM</sub>	Pulsed Drain Current, T <sub>A</sub> = 25°C <sup>(2)</sup>	85	Α
$P_D$	Power Dissipation <sup>(1)</sup>	3	W
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 to 150	°C
E <sub>AS</sub>	Avalanche Energy, single pulse $I_D$ = 30A, L = 0.1mH, $R_G$ = 25 $\Omega$	45	mJ

- (1) Typical  $R_{\rm BJA}=44^{\circ}{\rm C/W}$  on 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu pad on a 0.06-inch (1.52-mm) thick FR4 PCB.
- (2) Pulse duration ≤300µs, duty cycle ≤2%

# **GATE CHARGE**



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Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### **ELECTRICAL CHARACTERISTICS**

 $(T_A = 25^{\circ}C \text{ unless otherwise stated})$ 

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
haracteristics	·				
Drain to Source Voltage	$V_{GS} = 0V, I_{DS} = 250\mu A$	30			V
Drain to Source Leakage Current	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 24V			1	μA
Gate to Source Leakage Current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = +10/-10V			100	nA
Gate to Source Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = 250 \mu A$	1.1	1.6	2.0	V
Dunin to Course On Boninton	V <sub>GS</sub> = 4.5V, I <sub>DS</sub> = 11A		12.5	15.5	mΩ
Drain to Source On Resistance	V <sub>GS</sub> = 8V, I <sub>DS</sub> = 11A		9.9	12.2	mΩ
Transconductance	V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A		44		S
Characteristics					
Input Capacitance			422	506	pF
Output Capacitance			286	343	pF
Reverse Transfer Capacitance	1 - 10112		26	33	pF
Series Gate Resistance			4.7		Ω
Gate Charge Total (4.5V)			2.8	3.4	nC
Gate Charge Gate to Drain	V 45V L 44A		0.8		nC
Gate Charge Gate to Source	V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A		1.2		nC
Gate Charge at Vth			0.6		nC
Output Charge	$V_{DS} = 13V, V_{GS} = 0V$		6.8		nC
Turn On Delay Time			5.6		ns
Rise Time	$V_{DS} = 15V, V_{GS} = 4.5V,$		8.2		ns
Turn Off Delay Time	$I_{DS} = 11A, R_G = 2\Omega$		9.8		ns
Fall Time			3.2		ns
haracteristics		•			
Diode Forward Voltage	I <sub>SD</sub> = 11A, V <sub>GS</sub> = 0V		0.85	1	V
Reverse Recovery Charge	V 40V L 44A 4:/4k 2004/		10.5		nC
Reverse Recovery Time	$v_{DS} = 13V$ , $I_F = 11A$ , $\alpha I/\alpha t = 300A/\mu s$		14.6		ns
	Drain to Source Voltage Drain to Source Leakage Current Gate to Source Leakage Current Gate to Source Threshold Voltage  Drain to Source On Resistance  Transconductance Characteristics Input Capacitance Output Capacitance Reverse Transfer Capacitance Series Gate Resistance Gate Charge Total (4.5V) Gate Charge Gate to Drain Gate Charge Gate to Source Gate Charge at Vth Output Charge Turn On Delay Time Rise Time Turn Off Delay Time Fall Time Diode Forward Voltage Reverse Recovery Charge	naracteristics       Drain to Source Voltage $V_{GS} = 0V$ , $I_{DS} = 250\mu A$ Drain to Source Leakage Current $V_{GS} = 0V$ , $V_{DS} = 24V$ Gate to Source Leakage Current $V_{DS} = 0V$ , $V_{GS} = +10/-10V$ Gate to Source Threshold Voltage $V_{DS} = 0V$ , $V_{GS} = 250\mu A$ Drain to Source On Resistance $V_{DS} = V_{DS}$ , $I_{DS} = 250\mu A$ Drain to Source On Resistance $V_{CS} = 8V$ , $V_{DS} = 11A$ Transconductance $V_{DS} = 15V$ , $V_{DS} = 11A$ Characteristics       Input Capacitance         Output Capacitance $V_{CS} = 0V$ , $V_{DS} = 15V$ , $V_{CS} = $	naracteristics           Drain to Source Voltage         V <sub>GS</sub> = 0V, I <sub>DS</sub> = 250µA         30           Drain to Source Leakage Current         V <sub>GS</sub> = 0V, V <sub>DS</sub> = 24V           Gate to Source Threshold Voltage         V <sub>DS</sub> = 0V, V <sub>GS</sub> = +10/-10V           Gate to Source Threshold Voltage         V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250µA         1.1           Drain to Source On Resistance         V <sub>GS</sub> = 4.5V, I <sub>DS</sub> = 11A         1.1           Transconductance         V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A         1.1           **Characteristics         Input Capacitance         V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, I <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A           **Characteristics         **IMHz         **IMHz           **Characteristics         **IMHz         **IMHz           **Characteristics         **Input Capacitance         V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A           **Characteristics         **V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, I <sub>DS</sub> = 15V, I <sub>DS</sub> = 15V, I <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A           **Gate Charge Gate to Drain         V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A           **Gate Charge Gate to Source         V <sub>DS</sub> = 13V, V <sub>GS</sub> = 0V           **Gate Charge at Vth         V <sub>DS</sub> = 13V, V <sub>GS</sub> = 0V           **Output Charge         V <sub>DS</sub> = 15V, V <sub>GS</sub> = 4.5V, I <sub>DS</sub> = 11A           **Turn On Delay Time         V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V           **Fall Time         V <sub>DS</sub> = 11A, V <sub>GS</sub> = 0V	Drain to Source Voltage         V <sub>GS</sub> = 0V, I <sub>DS</sub> = 250μA         30           Drain to Source Leakage Current         V <sub>GS</sub> = 0V, V <sub>DS</sub> = 24V           Gate to Source Leakage Current         V <sub>DS</sub> = 0V, V <sub>GS</sub> = +10/-10V           Gate to Source Threshold Voltage         V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250μA         1.1         1.6           Drain to Source On Resistance         V <sub>GS</sub> = 4.5V, I <sub>DS</sub> = 11A         12.5           Drain to Source On Resistance         V <sub>GS</sub> = 8V, I <sub>DS</sub> = 11A         9.9           Transconductance         V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A         44           Characteristics         422         422           Input Capacitance         422         422           Output Capacitance         422         286           Reverse Transfer Capacitance         4.7         286           Series Gate Resistance         4.7         2.8           Gate Charge Total (4.5V)         2.8         0.8           Gate Charge Gate to Drain         0.8         0.8           Gate Charge at Vth         0.6         0.6           Output Charge         V <sub>DS</sub> = 13V, V <sub>GS</sub> = 0V         6.8           Turn On Delay Time         5.6           Rise Time         V <sub>DS</sub> = 15V, V <sub>GS</sub> = 4.5V, I <sub>DS</sub> = 11A, R <sub>G</sub> = 2Ω         9.8           Fall Time         <	Drain to Source Voltage         V <sub>GS</sub> = 0V, I <sub>DS</sub> = 250μA         30           Drain to Source Leakage Current         V <sub>GS</sub> = 0V, V <sub>DS</sub> = 24V         1           Gate to Source Leakage Current         V <sub>DS</sub> = 0V, V <sub>DS</sub> = 24V         100           Gate to Source Threshold Voltage         V <sub>DS</sub> = 0V, V <sub>DS</sub> = +10/-10V         100           Drain to Source On Resistance         V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250μA         1.1         1.6         2.0           Drain to Source On Resistance         V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A         12.5         15.5         15.5           Transconductance         V <sub>DS</sub> = 15V, I <sub>DS</sub> = 11A         44         12.2         15.5           Characteristics         Input Capacitance         422         506           Output Capacitance         V <sub>DS</sub> = 15V, I <sub>DS</sub> = 15V, V <sub>DS</sub> = 15V, from 14V = 15V         286         343           Reverse Transfer Capacitance         4.7         286         343           Reverse Gate Resistance         4.7         286         343           Gate Charge Gate to Drain         0.8         0.8           Gate Charge Gate to Source         0.8         0.8           Gate Charge at Vth         0.6         0.6           Output Charge         V <sub>DS</sub> = 13V, V <sub>GS</sub> = 0V         6.8           Turn Off Delay Time

### THERMAL CHARACTERISTICS

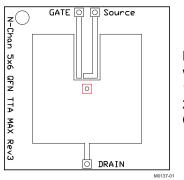
(T<sub>A</sub> = 25°C unless otherwise stated)

	PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Thermal Resistance Junction to Case <sup>(1)</sup>			1.9	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient <sup>(1)(2)</sup>			51	°C/W

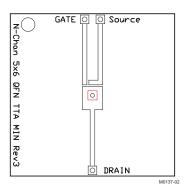
 $R_{\theta JC}$  is determined with the device mounted on a 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz. (0.071-mm thick) Cu pad on a 1.5-inch × 1.5-inch (3.81-cm × 3.81-cm), 0.06-inch (1.52-mm) thick FR4 PCB.  $R_{\theta JC}$  is specified by design, whereas  $R_{\theta JA}$  is determined by the user's board design. Device mounted on FR4 material with 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz. (0.071-mm thick) Cu.



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Max  $R_{\theta JA} = 51^{\circ} C/W$  when mounted on 1 inch² (6.45 cm²) of 2-oz. (0.071-mm thick) Cu.



Max  $R_{\theta JA} = 131^{\circ} C/W$  when mounted on a minimum pad area of 2-oz. (0.071-mm thick) Cu.

## TYPICAL MOSFET CHARACTERISTICS

 $(T_A = 25^{\circ}C \text{ unless otherwise stated})$ 

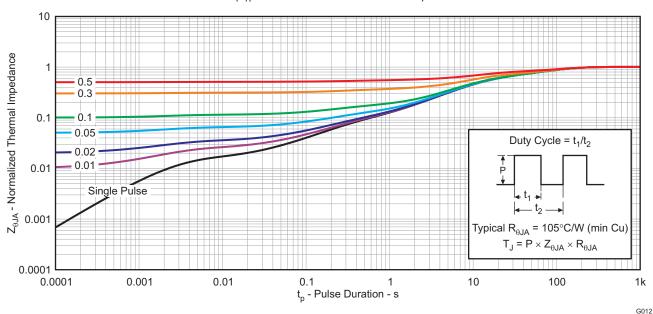


Figure 1. Transient Thermal Impedance

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# TEXAS INSTRUMENTS

## TYPICAL MOSFET CHARACTERISTICS (continued)

 $(T_A = 25^{\circ}C \text{ unless otherwise stated})$ 

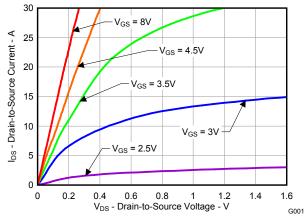


Figure 2. Saturation Characteristics

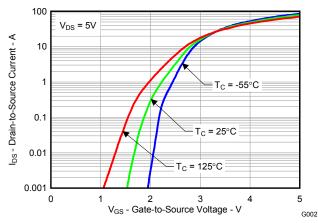


Figure 3. Transfer Characteristics

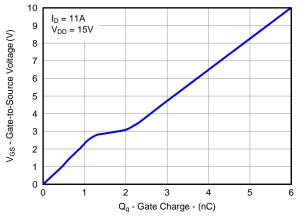


Figure 4. Gate Charge

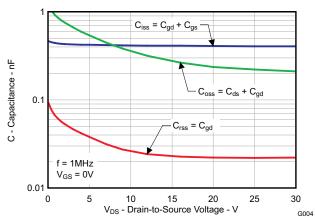


Figure 5. Capacitance

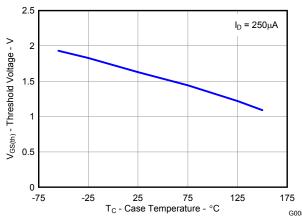


Figure 6. Threshold Voltage vs. Temperature

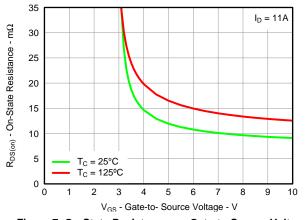


Figure 7. On-State Resistance vs. Gate-to-Source Voltage



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## **TYPICAL MOSFET CHARACTERISTICS (continued)**

(T<sub>A</sub> = 25°C unless otherwise stated)

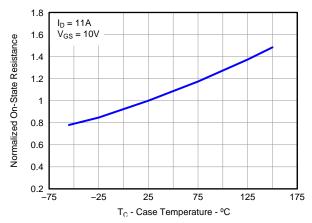


Figure 8. Normalized On-State Resistance vs. Temperature

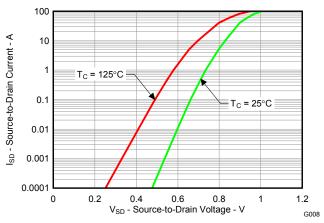


Figure 9. Typical Diode Forward Voltage

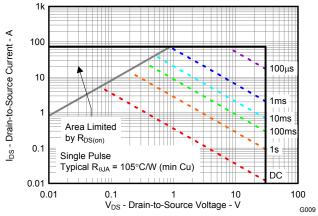


Figure 10. Maximum Safe Operating Area

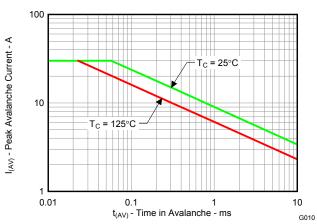
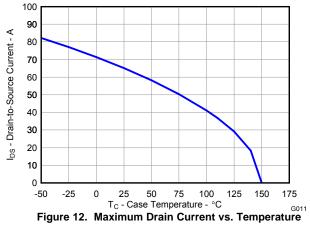


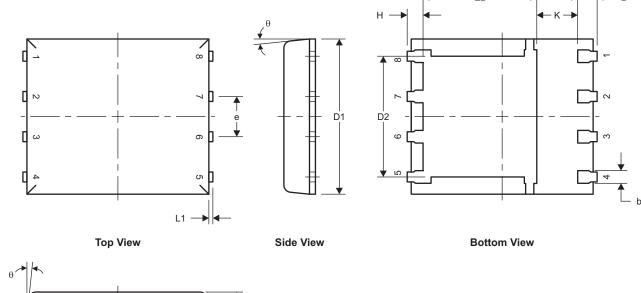
Figure 11. Single Pulse Unclamped Inductive Switching

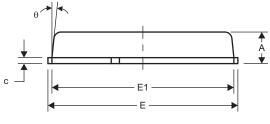




# **MECHANICAL DATA**

# **Q5A Package Dimensions**





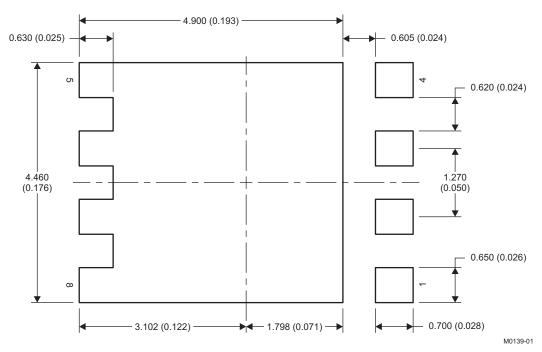
Front View

M0135-01

DIM	MILLIMETERS					
DIN	MIN	NOM	MAX			
Α	0.90	1.00	1.10			
b	0.33	0.41	0.51			
С	0.20	0.25	0.34			
D1	4.80	4.90	5.00			
D2	3.61	3.81	4.02			
Е	5.90	6.00	6.10			
E1	5.70	5.75	5.80			
E2	3.38	3.58	3.78			
е	1.17	1.27	1.37			
Н	0.41	0.56	0.71			
K	1.10					
L	0.51	0.61	0.71			
L1	0.06	0.13	0.20			
θ	0°		12°			

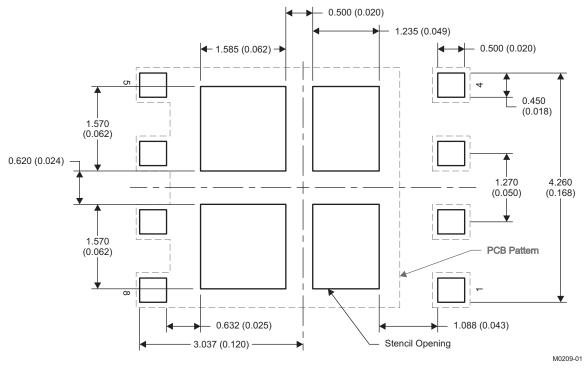
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### **Recommended PCB Pattern**



NOTE: Dimensions are in mm (inches).

## **Stencil Recommendation**



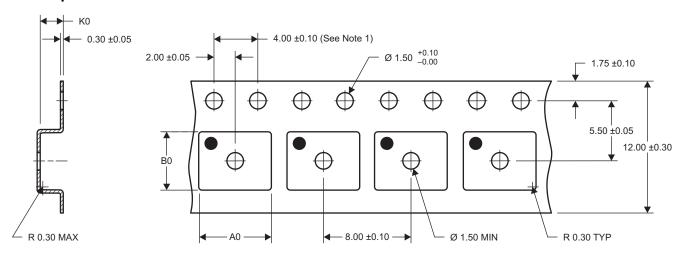
NOTE: Dimensions are in mm (inches).

For recommended circuit layout for PCB designs, see application note SLPA005 – Reducing Ringing Through PCB Layout Techniques.

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## **Q5A Tape and Reel Information**



 $A0 = 6.50 \pm 0.10$   $B0 = 5.30 \pm 0.10$  $K0 = 1.40 \pm 0.10$ 

M0138-01

- NOTES: 1. 10-sprocket hole-pitch cumulative tolerance ±0.2
  - 2. Camber not to exceed 1mm in 100mm, noncumulative over 250mm
  - 3. Material: black static-dissipative polystyrene
  - 4. All dimensions are in mm (unless otherwise specified)
  - 5. A0 and B0 measured on a plane 0.3mm above the bottom of the pocket

11-Nov-2025

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### PACKAGING INFORMATION

Orderable part number	Status	Material type	Package   Pins	Package qty   Carrier	<b>RoHS</b> (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
CSD17327Q5A	Active	Production	VSONP (DQJ)   8	2500   LARGE T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD17327
CSD17327Q5A.B	Active	Production	VSONP (DQJ)   8	2500   LARGE T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD17327

<sup>(1)</sup> Status: For more details on status, see our product life cycle.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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<sup>(3)</sup> RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

<sup>(4)</sup> Lead finish/Ball material: Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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