

# Silicon Carbide (SiC) Diodes

## - EliteSiC, TO247-3, 50 A, 1200 V SiC Merged PiN-Schottky (MPS) Diode

### UJ3D1250K

#### Description

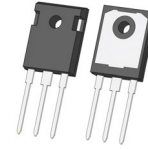
onsemi offers the 3<sup>rd</sup> generation of high performance SiC Merged-PiN-Schottky (MPS) diodes. With zero reverse recovery charge and 175 °C maximum junction temperature, these diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.

#### Features

- Maximum Operating Temperature of 175 °C
- Easy Paralleling
- Extremely Fast Switching Not Dependent on Temperature
- No Reverse or Forward Recovery
- Enhanced Surge Current Capability, MPS Structure
- 100% UIS Tested
- This Device is Halogen Free and RoHS Compliant with Exemption 7a, Pb-Free 2LI (on second level interconnection)

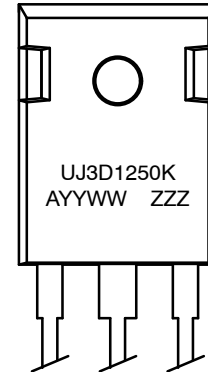
#### Typical Applications

- Power Converters
- Industrial Motor Drives
- Switch Mode Power Supplies
- Power Factor Correction Modules



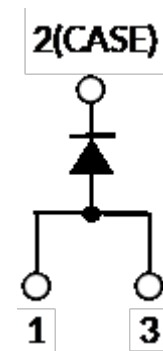
TO247-3 15.90x20.96x5.03, 5.44P  
CASE 340AK

#### MARKING DIAGRAM



UJ3D1250K	= Specific Device Code
A	= Assembly Location
YY	= Year
WW	= Work Week
ZZZ	= Lot ID

#### PIN CONNECTIONS



#### ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

# UJ3D1250K

## MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Value	Unit
DC Blocking Voltage	$V_R$		1200	V
Repetitive Peak Reverse Voltage, $T_J = 25\text{ }^{\circ}\text{C}$	$V_{RRM}$		1200	V
Surge Peak Reverse Voltage	$V_{RSM}$		1200	V
Maximum DC Forward Current	$I_F$	$T_C = 112\text{ }^{\circ}\text{C}$	50	A
Non-Repetitive Forward Surge Current Sine Half-wave	$I_{FSM}$	$T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$	275	A
Repetitive Forward Surge Current Sine Half-Wave, $D=0.1$	$I_{FRM}$	$T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$	163.5	A
		$T_C = 110\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$	99.6	
Non-Repetitive Peak Forward Current	$I_{F,max}$	$T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ }\mu\text{s}$	2400	A
		$T_C = 110\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ }\mu\text{s}$	2400	
$i^2t$ Value	$\int i^2 dt$	$T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$	378	$\text{A}^2\text{s}$
Power Dissipation	$P_{tot}$	$T_C = 25\text{ }^{\circ}\text{C}$	319	W
		$T_C = 112\text{ }^{\circ}\text{C}$	134	
Maximum Junction Temperature	$T_{J,max}$		175	$^{\circ}\text{C}$
Operating and Storage Temperature	$T_J$ , $T_{STG}$		-55 to 175	$^{\circ}\text{C}$
Soldering Temperatures, Wave Soldering Only Allowed at Leads	$T_{sold}$	1.6 mm From Case for 10s	260	$^{\circ}\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## THERMAL CHARACTERISTICS

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		-	0.36	0.47	$^{\circ}\text{C/W}$

## ELECTRICAL CHARACTERISTICS ( $T_J = +25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	$V_F$	$I_F = 50\text{ A}$ , $T_J = 25\text{ }^{\circ}\text{C}$	-	1.5	1.7	V
		$I_F = 50\text{ A}$ , $T_J = 150\text{ }^{\circ}\text{C}$	-	1.95	2.4	
		$I_F = 50\text{ A}$ , $T_J = 175\text{ }^{\circ}\text{C}$	-	2.2	2.7	
Reverse Current	$I_R$	$V_R = 1200\text{ V}$ , $T_J = 25\text{ }^{\circ}\text{C}$	-	52	400	$\mu\text{A}$
		$V_R = 1200\text{ V}$ , $T_J = 175\text{ }^{\circ}\text{C}$	-	900	-	
Total Gate Leakage Current (Note 1)	$Q_C$	$V_R = 800\text{ V}$	-	240	-	nC
Total Capacitance	$C$	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$	-	2340	-	pF
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$	-	224	-	
		$V_R = 800\text{ V}$ , $f = 1\text{ MHz}$	-	198	-	
Capacitance Stored Energy	$E_C$	$V_R = 800\text{ V}$	-	72	-	$\mu\text{J}$

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1.  $Q_C$  is independent on  $T_J$ ,  $di_F/dt$ , and  $I_F$  as shown in the application note AND90316/D.

TYPICAL PERFORMANCE DIAGRAMS

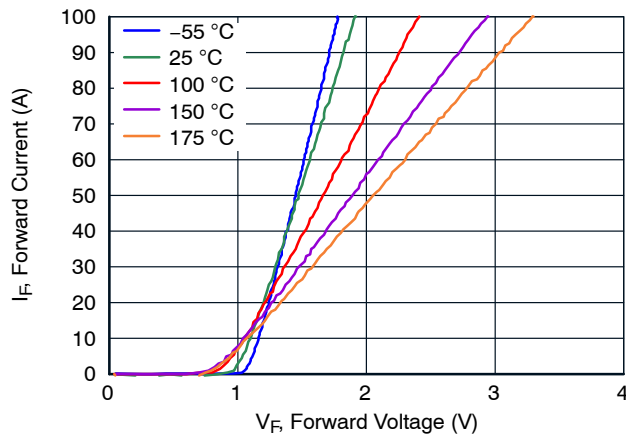


Figure 1. Typical Forward Characteristics

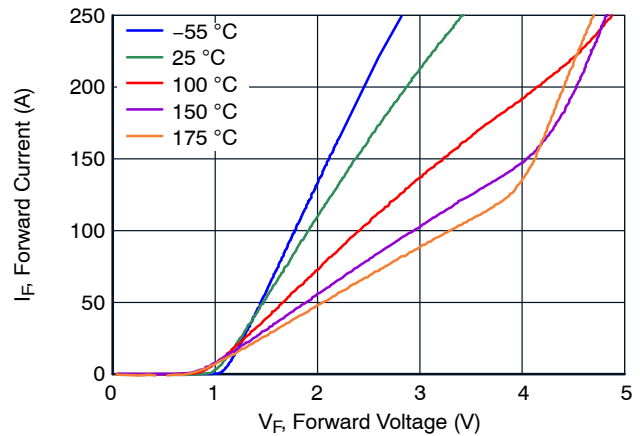


Figure 2. Typical Forward Characteristics in Surge Current

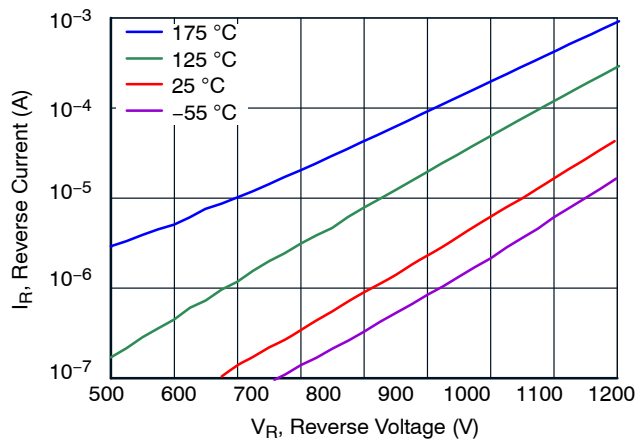


Figure 3. Typical Reverse Characteristics

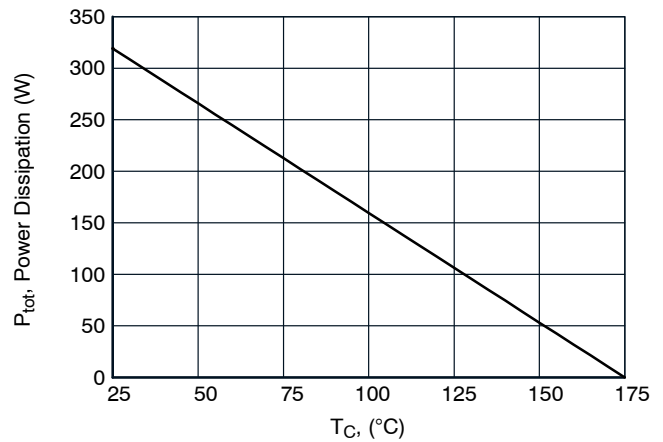


Figure 4. Power Dissipation

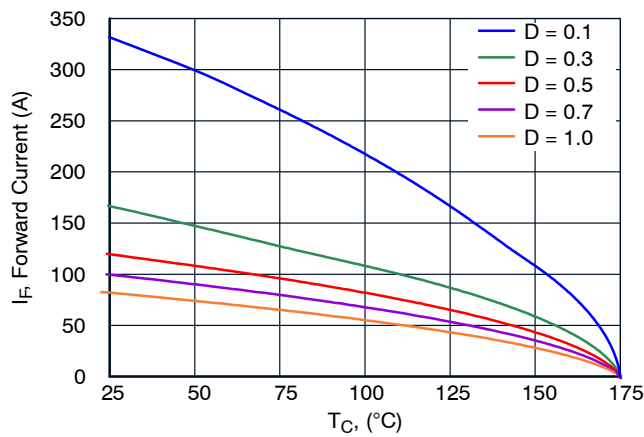


Figure 5. Diode Forward Current

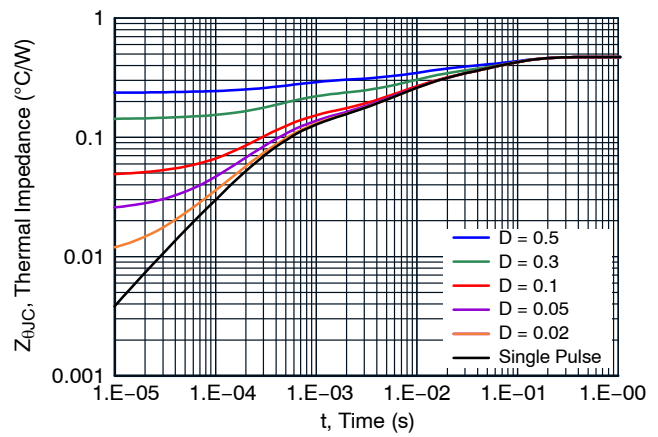
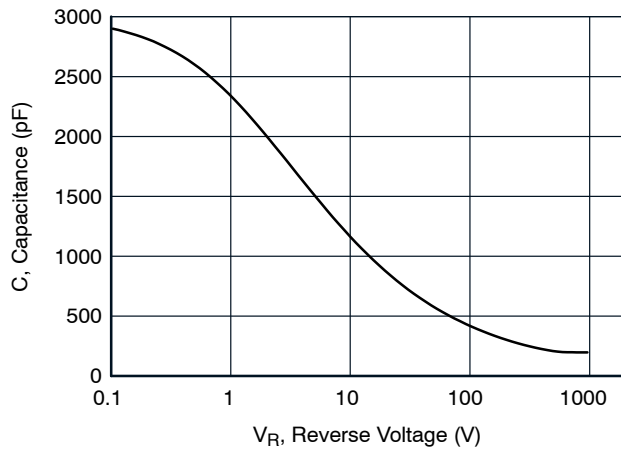


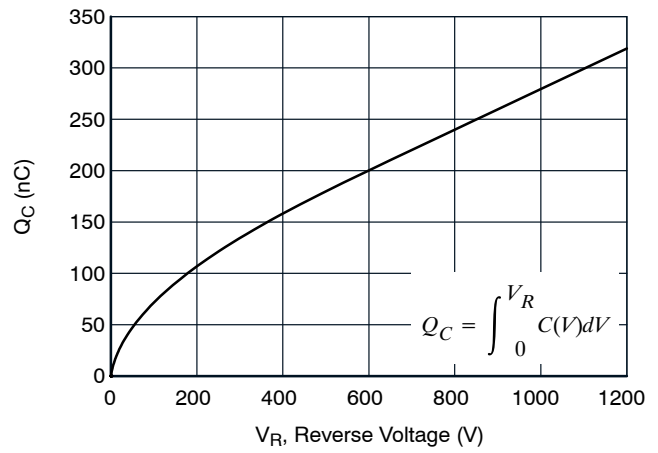
Figure 6. Maximum Transient Thermal Impedance

# UJ3D1250K

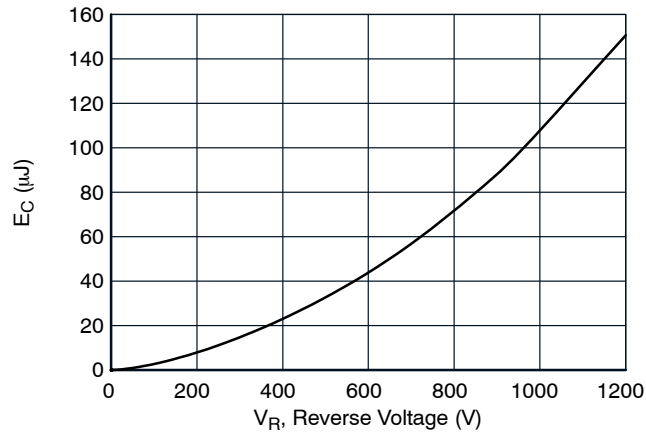
## TYPICAL PERFORMANCE DIAGRAMS (continued)



**Figure 7. Capacitance vs. Reverse Voltage at 1 MHz**



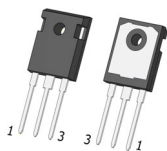
**Figure 8. Typical Capacitive Charge vs. Reverse Voltage**



**Figure 9. Typical Capacitance Stored Energy vs. Reverse Voltage**

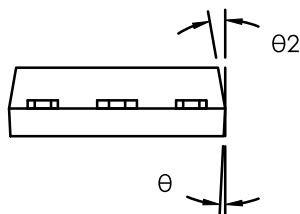
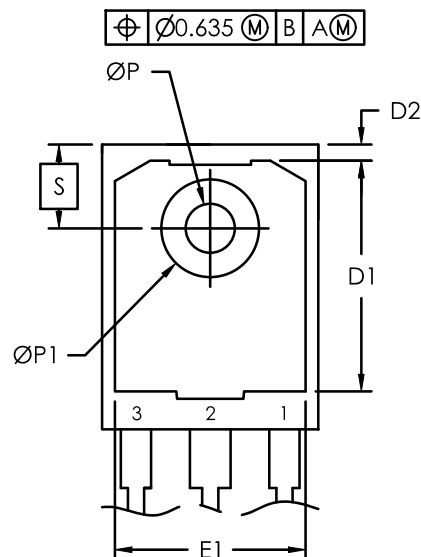
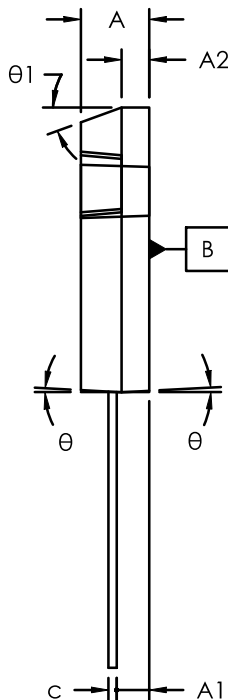
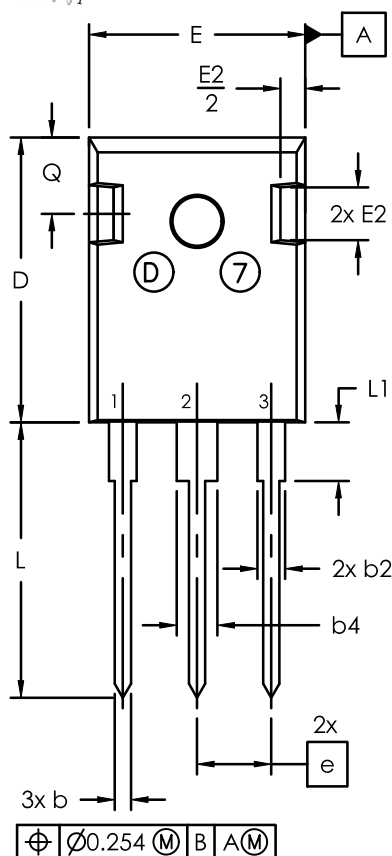
## ORDERING INFORMATION

Part Number	Marking	Package	Shipping
UJ3D1250K	UJ3D1250K	TO247-3 15.90x20.96x5.03, 5.44P (Pb-Free, Halogen Free)	600 / Tube



**TO247-3 15.90x20.96x5.03, 5.44P**  
CASE 340AK  
ISSUE B

DATE 14 APR 2025



**NOTE:**

1. Dimensioning and tolerancing as per ASME Y14.5 - 2018
2. Controlling dimension : millimeters
3. Package Outline in compliance with JEDEC standard var. AD.
4. Dimensions D & E does not include mold flash.
5.  $\varnothing P$  to have max draft angle of 1.7° to the top with max. hole diameter of 3.91mm.

SYM	millimeters		
	MIN	NOM	MAX
A	4.70	5.03	5.31
A1	2.21	2.40	2.59
A2	1.50	2.03	2.49
b	0.99	1.20	1.40
b2	1.65	2.03	2.39
b4	2.59	3.00	3.43
c	0.38	0.60	0.89
D	20.70	20.96	21.46
D1	13.08	—	—
D2	0.51	1.19	1.35
E	15.49	15.90	16.26
e	5.44 BSC		
E1	13.00	13.30	13.60
E2	3.43	3.89	5.20
L	19.62	20.27	20.32
L1	—	—	4.50
$\varnothing P$	3.40	3.60	3.80
$\varnothing P1$	7.06	7.19	7.39
Q	5.38	5.62	6.20
S	6.15 BSC		
$\theta$	3°		
$\theta 1$	20°		
$\theta 2$	10°		

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**DESCRIPTION:** TO247-3 15.90x20.96x5.03, 5.44P

**PAGE 1 OF 1**

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