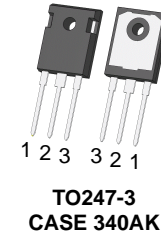


# Silicon Carbide (SiC) Diode – EliteSiC, TO247-3, 20 A, 650 V SiC Merged PiN-Schottky (MPS) Diode

## UJ3D06520KSD



### 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.

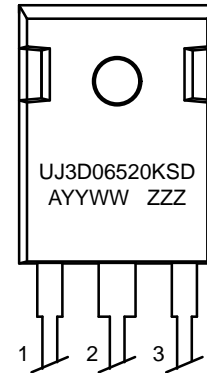
### Features

- 175 °C Maximum Operating Junction Temperature
- Easy Paralleling
- Extremely Fast Switching not Dependent on Temperature
- No Reverse or Forward Recovery
- Enhanced Surge Current Capability, MPS Structure
- Excellent Thermal Performance, Ag Sintered
- 100% UIS Tested
- This Device is Pb-Free, Halogen Free and is ROHS Compliant

### Typical Applications

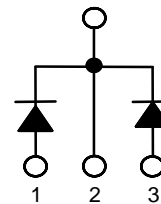
- Power Converters
- Industrial Motor Drives
- Switching-mode Power Supplies
- Power Factor Correction Modules

### MARKING DIAGRAM



UJ3D06520KSD = 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.

# UJ3D06520KSD

## MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Value (Leg/Device)	Unit
DC Blocking Voltage	$V_R$		650	V
Repetitive Peak Reverse Voltage, $T_J = 25\text{ }^\circ\text{C}$	$V_{RRM}$		650	V
Surge Peak Reverse Voltage	$V_{RSM}$		650	V
Maximum DC Forward Current	$I_F$	$T_C = 152\text{ }^\circ\text{C}$	10/20	A
Non-repetitive Forward Surge Current Sine Halfwave	$I_{FSM}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	70/140	A
		$T_C = 110\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	60/120	
Repetitive Forward Surge Current Sine Halfwave, $D = 0.1$	$I_{FRM}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	45.9/91.8	A
		$T_C = 110\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	28.7/57.4	
Non-repetitive Peak Forward Current	$I_{F, max}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$	455/910	A
		$T_C = 110\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$	455/910	
$i^2t$ Value	$\int i^2 dt$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	24.5/98	$\text{A}^2\text{s}$
		$T_C = 110\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	18/72	
Power Dissipation	$P_{tot}$	$T_C = 25\text{ }^\circ\text{C}$	136.4/272.8	W
		$T_C = 152\text{ }^\circ\text{C}$	20.9/41.8	
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, Wavesoldering only Allowed at Leads	$T_{sold}$	1.6 mm from case for 10 s	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.

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

Parameter	Symbol	Test Conditions	Value (Leg/Device)			Unit
			Min	Typ	Max	
Forward Voltage	$V_F$	$I_F = 10\text{ A}/20\text{ A}$ , $T_J = 25\text{ }^\circ\text{C}$	-	1.5	1.7	V
		$I_F = 10\text{ A}/20\text{ A}$ , $T_J = 150\text{ }^\circ\text{C}$	-	1.68	2	
		$I_F = 10\text{ A}/20\text{ A}$ , $T_J = 175\text{ }^\circ\text{C}$	-	1.75	2.1	
Reverse Current	$I_R$	$V_R = 650\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$	-	10/20	60/120	$\mu\text{A}$
		$V_R = 650\text{ V}$ , $T_J = 175\text{ }^\circ\text{C}$	-	150/300	-	
Total Capacitive Charge (Note 1)	$Q_C$	$V_R = 400\text{ V}$	-	23/46	-	nC
Total Capacitance	$C$	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$	-	327/654	-	pF
		$V_R = 300\text{ V}$ , $f = 1\text{ MHz}$	-	38/76	-	
		$V_R = 600\text{ V}$ , $f = 1\text{ MHz}$	-	34/68	-	
Capacitance Stored Energy	$E_C$	$V_R = 400\text{ V}$	-	3.4/6.8	-	$\mu\text{J}$

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](#)

## THERMAL CHARACTERISTICS

Parameter	Symbol	Test Conditions	Value (Leg/Device)			Unit
			Min	Typ	Max	
Thermal Resistance	$R_{\theta JC}$		-	0.82/0.41	1.1/0.55	$^\circ\text{C}/\text{W}$

TYPICAL PERFORMANCE

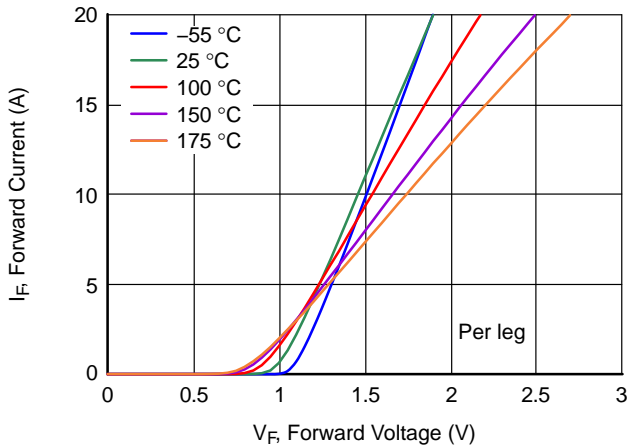


Figure 1. Typical Forward Characteristics per Leg

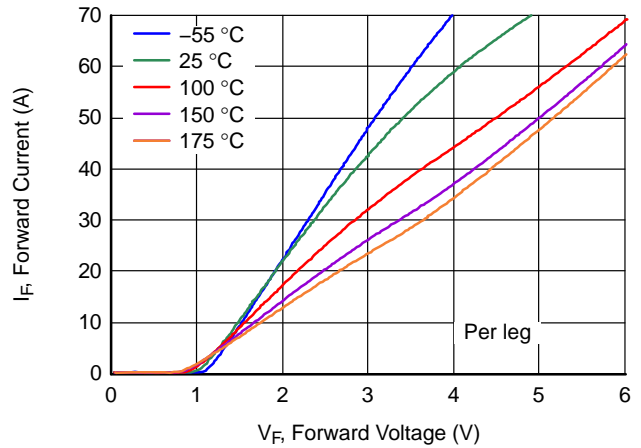


Figure 2. Typical Forward Characteristics in Surge Current per Leg

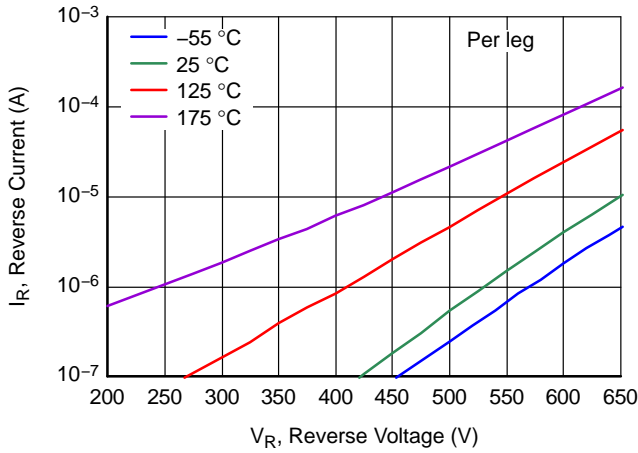


Figure 3. Typical Reverse Characteristics per Leg

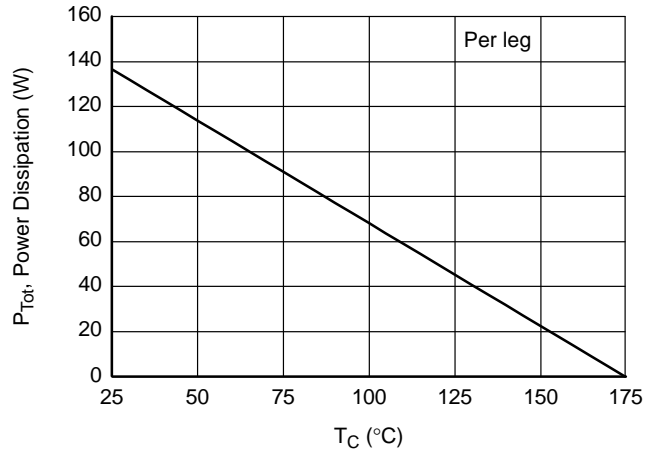


Figure 4. Power Dissipation per Leg

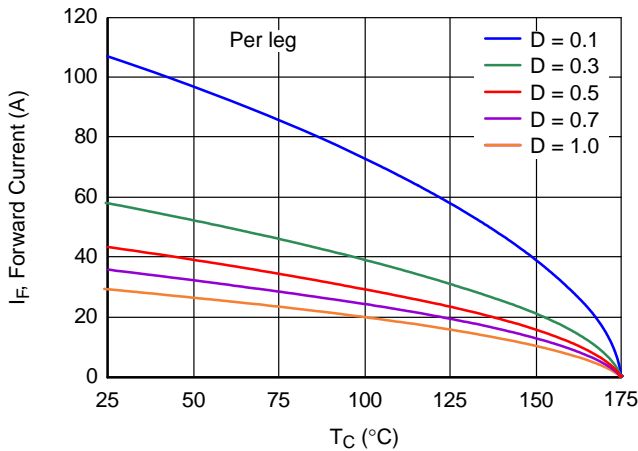


Figure 5. Diode Forward Current per Leg

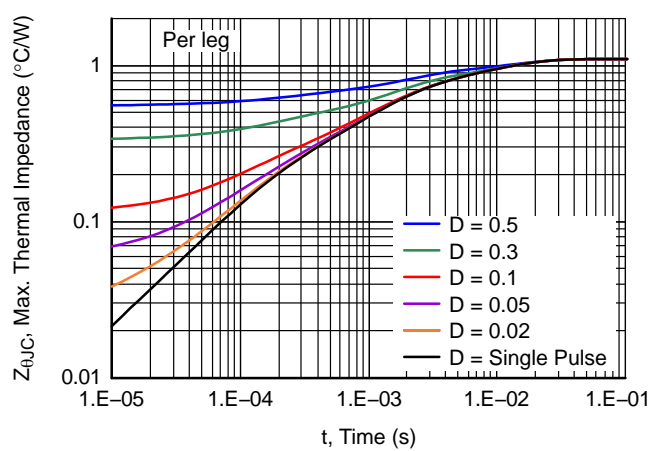
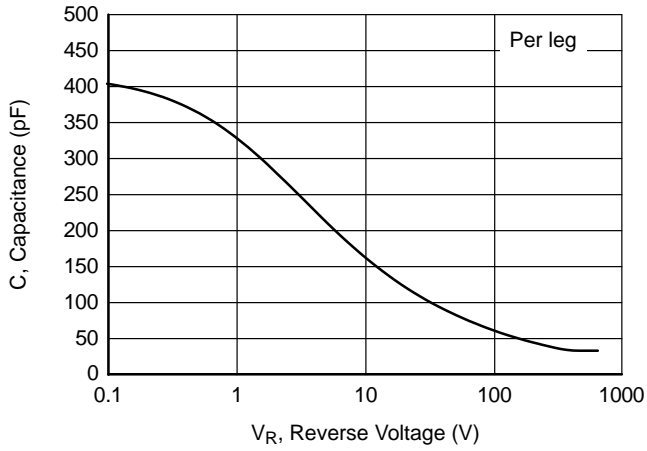


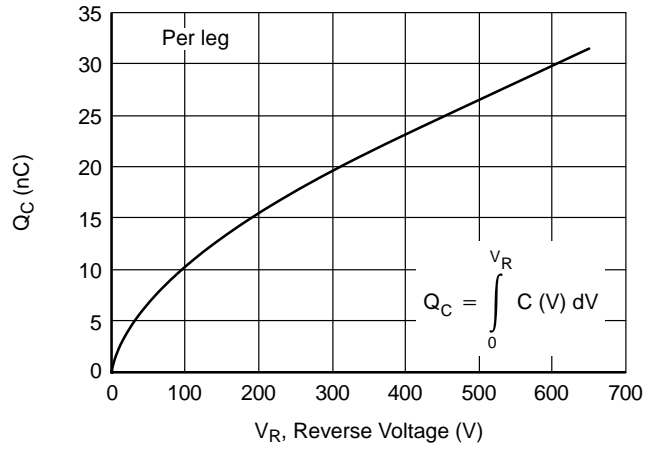
Figure 6. Maximum Transient Thermal Impedance per Leg

# UJ3D06520KSD

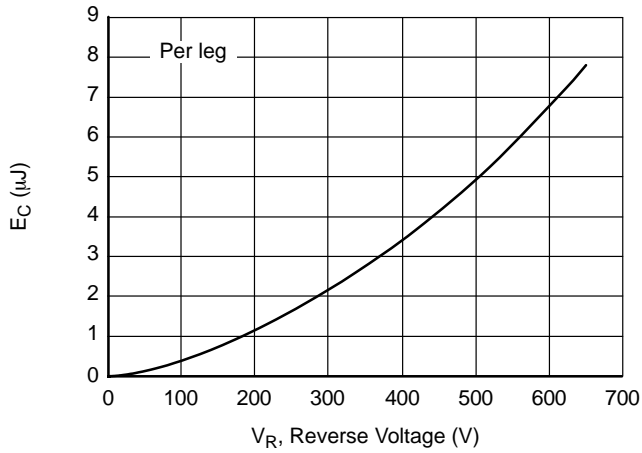
## TYPICAL PERFORMANCE (CONTINUED)



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



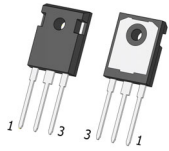
**Figure 8. Typical Capacitive Charge per Leg vs. Reverse Voltage**



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

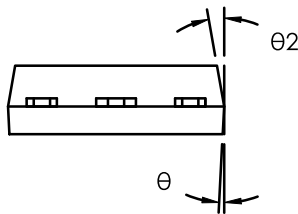
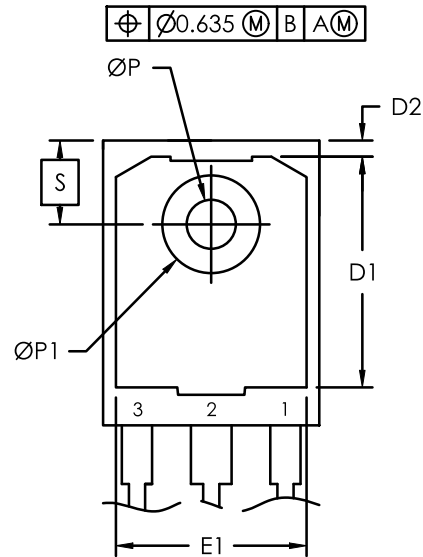
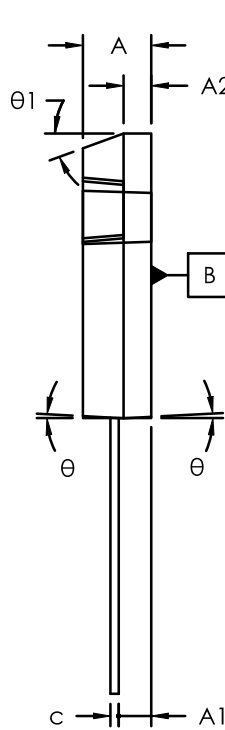
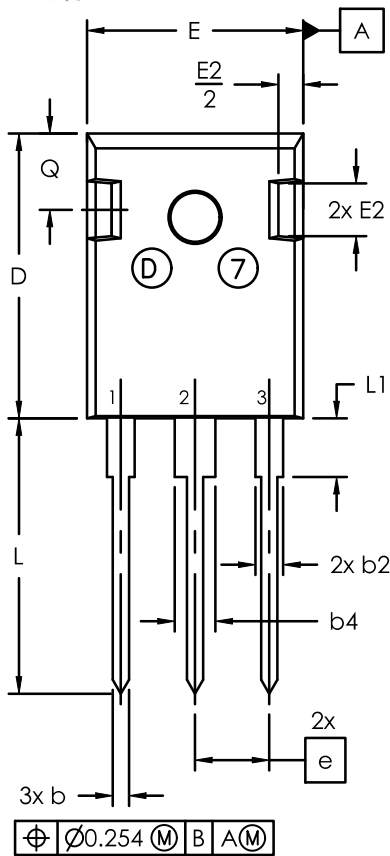
### ORDERING INFORMATION

Part Number	Marking	Package	Shipping
UJ3D06520KSD	UJ3D06520KSD	TO247-3 (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. ØP 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
ØP	3.40	3.60	3.80
ØP1	7.06	7.19	7.39
Q	5.38	5.62	6.20
S	6.15 BSC		
Ø	3°		
Ø1	20°		
Ø2	10°		

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DESCRIPTION:	TO247-3 15.90x20.96x5.03, 5.44P	PAGE 1 OF 1

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