

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
60V	50mΩ @ V _{GS} = 10V	24A
	65mΩ @ V _{GS} = 4.5V	21A

Features and Benefits

- Rated to +175°C—Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching—Ensures More Reliable and Robust End Application
- Low R_{DS(ON)}—Minimizes Power Losses
- Low Q_G—Minimizes Switching Losses
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

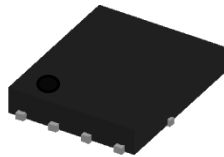
Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

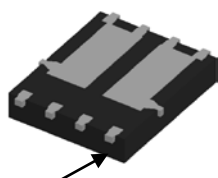
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

Mechanical Data

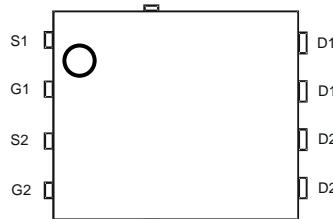
- Case: PowerDI[®]5060-8 (Type C)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.097 grams (Approximate)



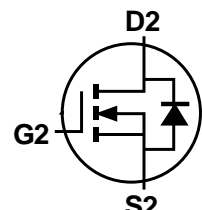
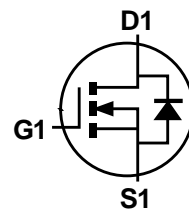
Top View



Bottom View



Pin Out
Top View



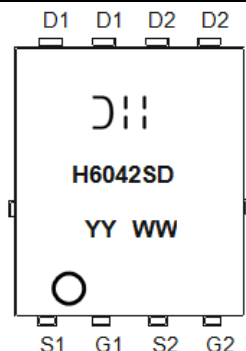
Equivalent Circuit

Ordering Information (Note 5)

Part Number	Case	Packaging
DMNH6042SPDQ-13	PowerDI5060-8 (Type C)	2500/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



= Manufacturer's Marking
 H6042SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 18 = 2018)
 WW = Week (01 to 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current (Note 7) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	5.7	A
		$T_A = +70^\circ\text{C}$		4.6	
Continuous Drain Current (Note 8) $V_{GS} = 10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$	I_D	24	A
		$T_C = +100^\circ\text{C}$		17	
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	32	A
Maximum Continuous Body Diode Forward Current (Note 8)			I_S	24	A
Avalanche Current (Note 9) $L = 10\text{mH}$			I_{AS}	3.5	A
Avalanche Energy (Note 9) $L = 10\text{mH}$			E_{AS}	65	mJ

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 6)			P_D	1.2	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$		105	$^\circ\text{C/W}$
	$t < 10\text{s}$			54	
Total Power Dissipation (Note 7)			P_D	2.5	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$		51	$^\circ\text{C/W}$
	$t < 10\text{s}$			26	
Thermal Resistance, Junction to Case (Note 8)			$R_{\theta JC}$	3.5	$^\circ\text{C/W}$
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

- Notes:
6. Device mounted on FR-4 PCB, with minimum recommended pad layout, single sided.
 7. Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 8. Thermal resistance from junction to soldering point (on the exposed drain pad).
 9. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 10)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	V _{GS(TH)}	1.0	—	3.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	34	50	mΩ	V _{GS} = 10V, I _D = 5.1A
		—	45	65		V _{GS} = 4.5V, I _D = 4.4A
Diode Forward Voltage	V _{SD}	—	0.8	1.2	V	V _{GS} = 0V, I _S = 2.6A
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C _{ISS}	—	584	—	pF	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	83	—	pF	
Reverse Transfer Capacitance	C _{RSS}	—	24	—	pF	
Gate Resistance	R _G	—	3.8	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	4.2	—	nC	V _{DS} = 44V, I _D = 5.2A
Total Gate Charge (V _{GS} = 10V)	Q _G	—	8.8	—	nC	
Gate-Source Charge	Q _{GS}	—	1.8	—	nC	
Gate-Drain Charge	Q _{GD}	—	1.8	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	3.4	—	ns	V _{GS} = 10V, V _{DS} = 30V, R _G = 6Ω, I _D = 1A
Turn-On Rise Time	t _R	—	1.9	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	10.1	—	ns	
Turn-Off Fall Time	t _F	—	4.5	—	ns	
Body Diode Reverse Recovery Time	t _{RR}	—	12.9	—	ns	I _F = 2.6A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	5.4	—	nC	I _F = 2.6A, di/dt = 100A/μs

Notes: 10. Short duration pulse test used to minimize self-heating effect.
11. Guaranteed by design. Not subject to product testing.

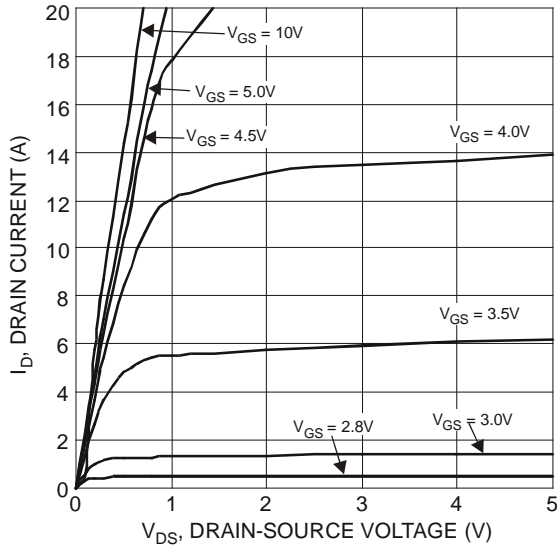


Figure 1 Typical Output Characteristics

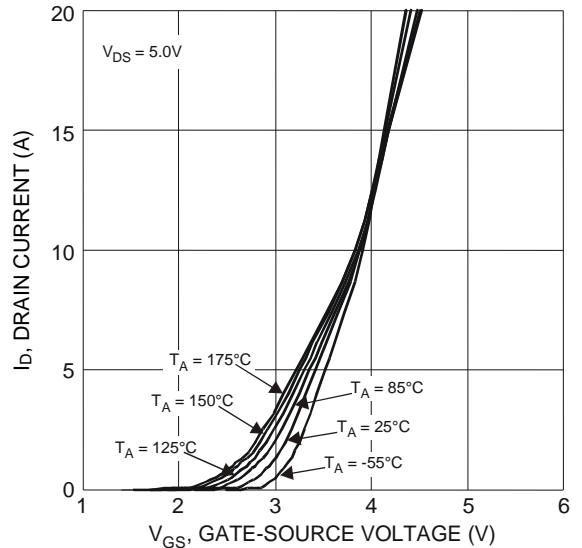


Figure 2 Typical Transfer Characteristics

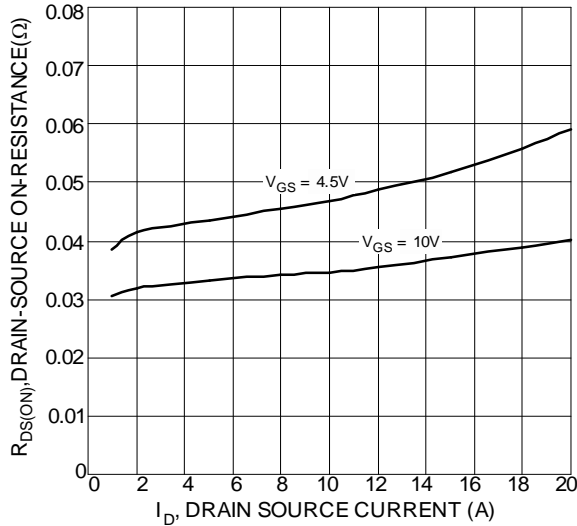


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

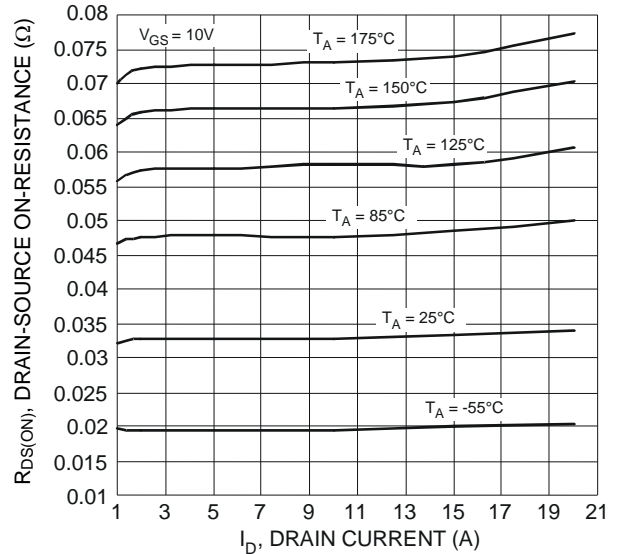


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

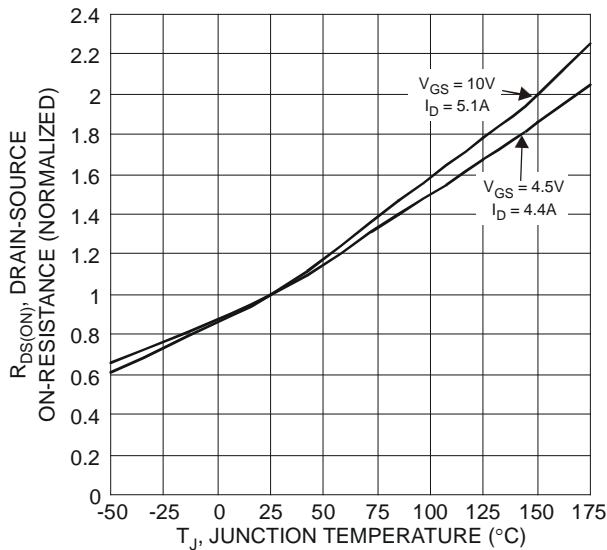


Figure 5 On-Resistance Variation with Temperature

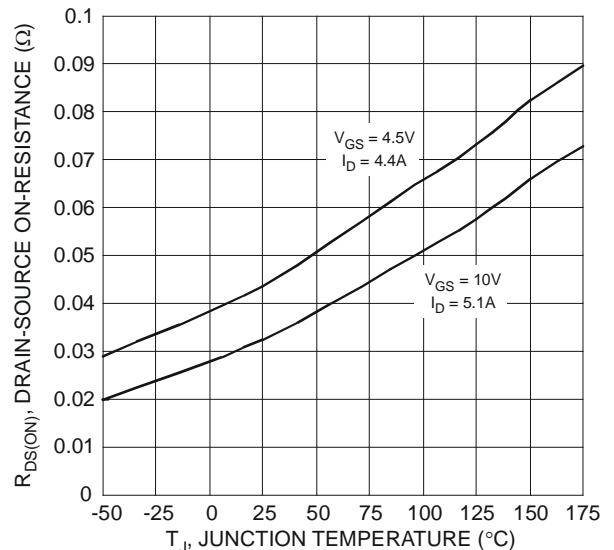


Figure 6 On-Resistance Variation with Temperature

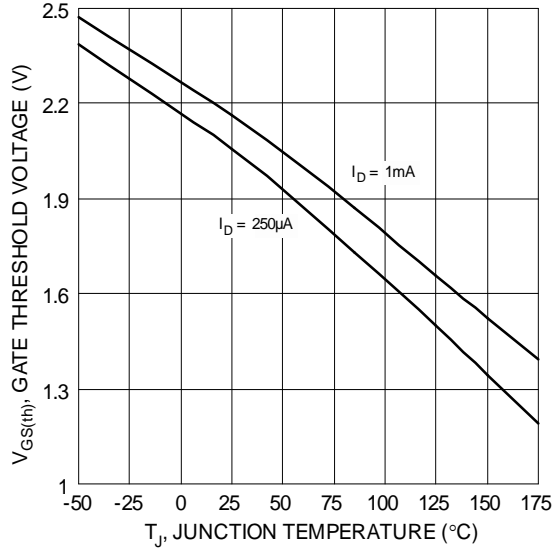


Figure 7 Gate Threshold Variation vs. Junction Temperature

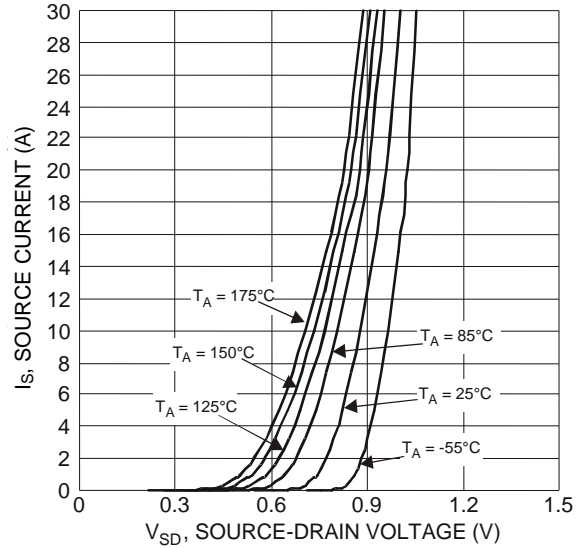


Figure 8 Diode Forward Voltage vs. Current

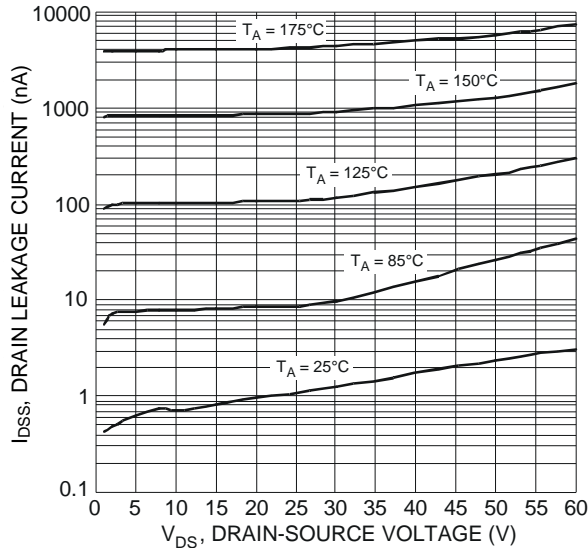


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

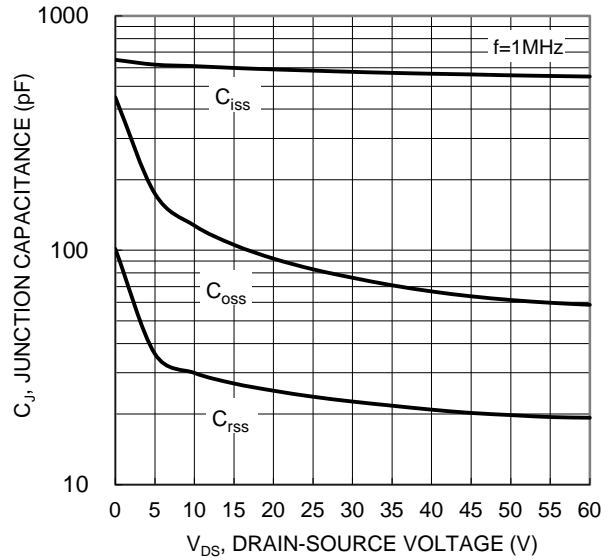


Figure 10 Typical Junction Capacitance

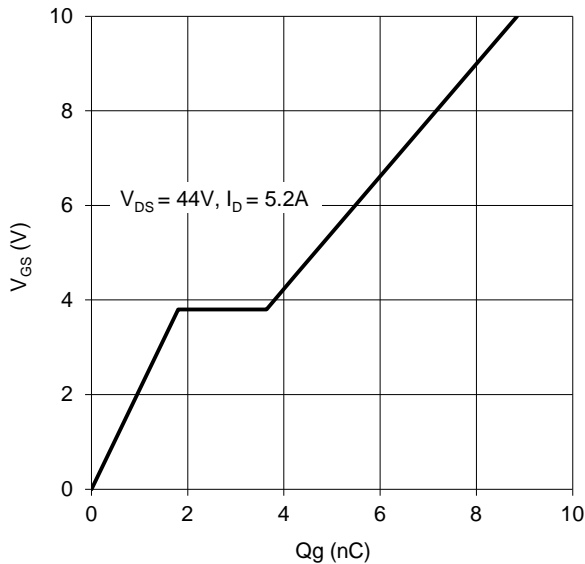


Figure 11 Gate Charge

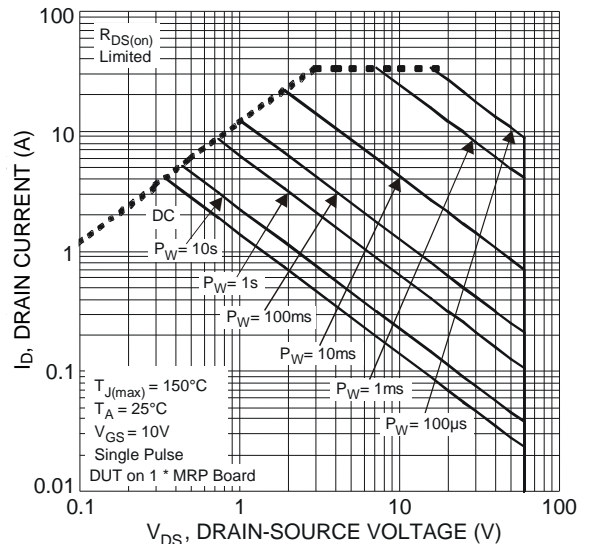
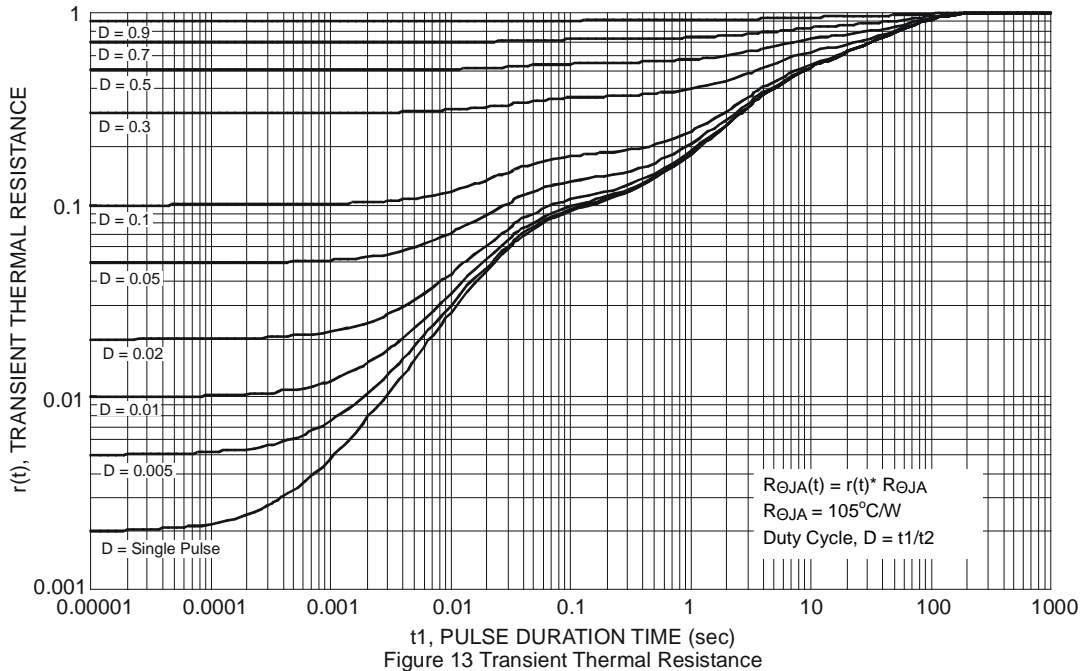


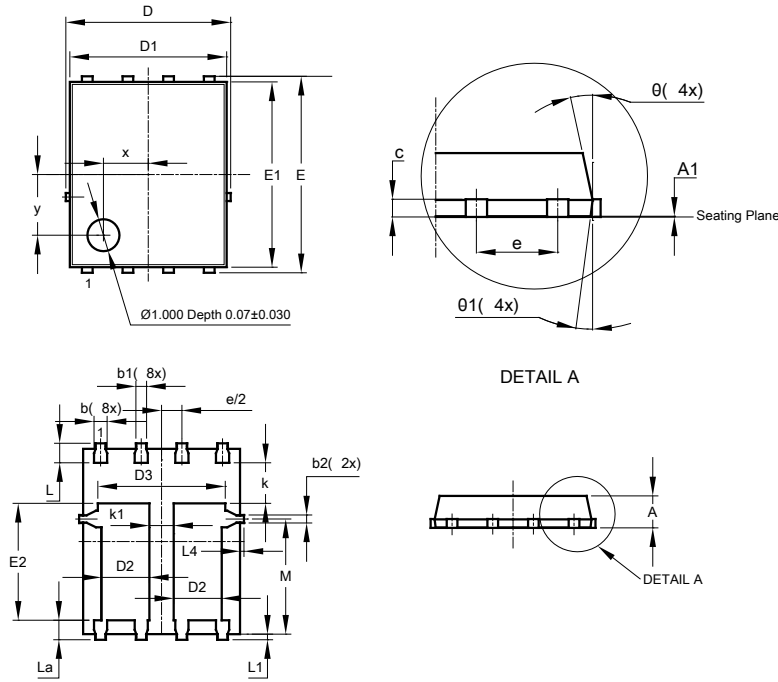
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8 (Type C)

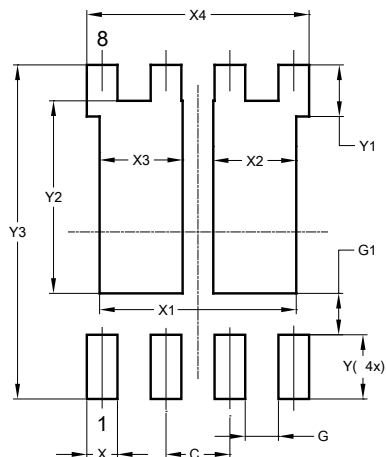


PowerDI5060-8 (Type C)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	1.40	1.60	1.50
D3	—	—	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.76	3.66
e	1.27BSC		
k	—	—	1.27
k1	0.56	—	-
L	0.51	0.71	0.61
La	0.51	0.71	0.61
L1	0.05	0.20	0.175
L4	—	—	0.125
M	3.50	3.71	3.605
x	—	—	1.400
y	—	—	1.900
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8 (Type C)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	3.910
X2	1.650
X3	1.650
X4	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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