

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_C = +25^\circ C$
20V	4.6mΩ @ $V_{GS} = 4.5V$	100A
	8.7mΩ @ $V_{GS} = 2.5V$	80A

**Description**

This new generation P-Channel Enhancement Mode MOSFET has been designed to minimize  $R_{DS(ON)}$  and yet maintain superior switching performance. This device is ideal for use in Notebook battery power management and Loadswitch.

**Applications**

- Motor Control
- DC-DC Converters
- Power Management

**Features**

- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low  $R_{DS(ON)}$  – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- <1.1mm Package Profile – Ideal for Thin Applications
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

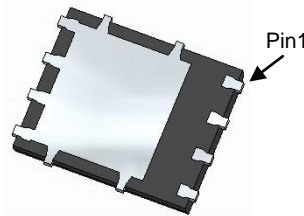
- Case: POWERDI®5060-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Weight: 0.097 grams (Approximate)

NEW PRODUCT

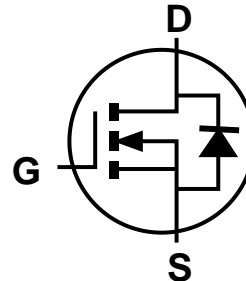
POWERDI®5060-8



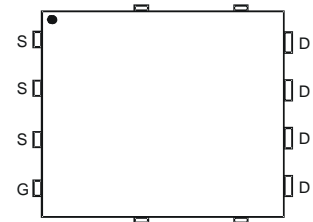
Top View



Bottom View



Internal Schematic



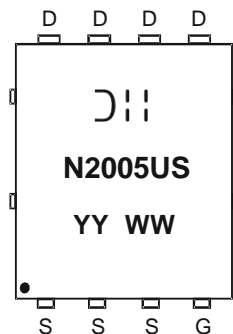
Top View  
Pin Configuration


**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN2005UPS-13	POWERDI®5060-8	2,500 / Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



 = Manufacturer's Marking  
 N2005US = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 15= 2015)  
 WW = Week Code (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	20	A
		T <sub>A</sub> = +70°C		15	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>C</sub> = +25°C	I <sub>D</sub>	100	A
		T <sub>C</sub> = +70°C		88	
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	150	A
Maximum Continuous Body Diode Forward Current (Mounted on Infinite Heatsink)			I <sub>S</sub>	150	A
Avalanche Current (Note 7) L=0.2mH			I <sub>AS</sub>	36	A
Avalanche Energy (Note 7) L=0.2mH			E <sub>AS</sub>	133	mJ

**Thermal Characteristics**

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 5)			P <sub>D</sub>	1.5	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state t < 10s		R <sub>θJA</sub>	98	°C/W
				83	
Total Power Dissipation (Note 6)			P <sub>D</sub>	3.0	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state t < 10s		R <sub>θJA</sub>	51	°C/W
				43	
Thermal Resistance, Junction to Case			R <sub>θJC</sub>	1.5	
Operating and Storage Temperature Range			T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	0.7	1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	—	4.6	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 13.5A
		—	—	8.7		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 13.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 27A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iSS</sub>	—	5337	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oSS</sub>	—	560	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	505	—	pF	
Gate Resistance	R <sub>g</sub>	—	0.7	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	60	—	nC	V <sub>DS</sub> = 16V, I <sub>D</sub> = 27A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	142	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	7	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	11	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	12.4	—	ns	V <sub>GS</sub> = 5V, V <sub>DS</sub> = 10V, R <sub>G</sub> = 4.7Ω, I <sub>D</sub> = 13.5A
Turn-On Rise Time	t <sub>r</sub>	—	29.8	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	117	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	52	—	ns	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	17.8	—	ns	I <sub>F</sub> = 13.5A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	8.6	—	nC	I <sub>F</sub> = 13.5A, di/dt = 100A/µs

- Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.  
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1 inch square copper plate.  
7. I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.  
8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.

POWERDI is a registered trademark of Diodes Incorporated.

**DMN2005UPS**

Document number: DS37844 Rev. 2 - 2

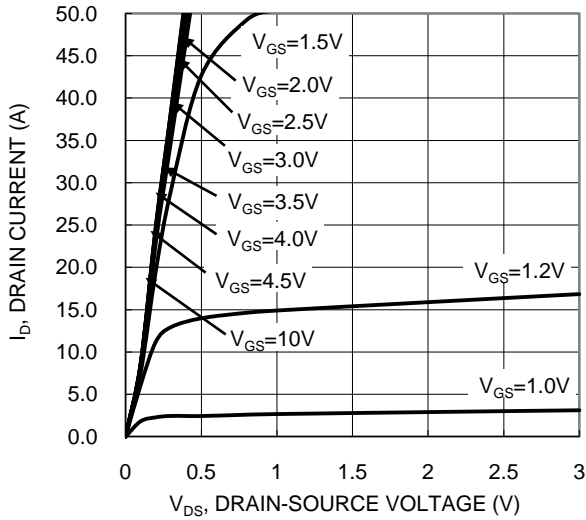


Figure 1. Typical Output Characteristic

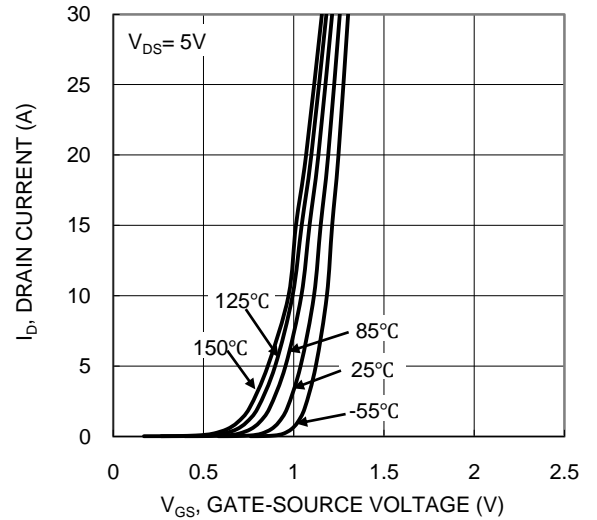


Figure 2. Typical Transfer Characteristic

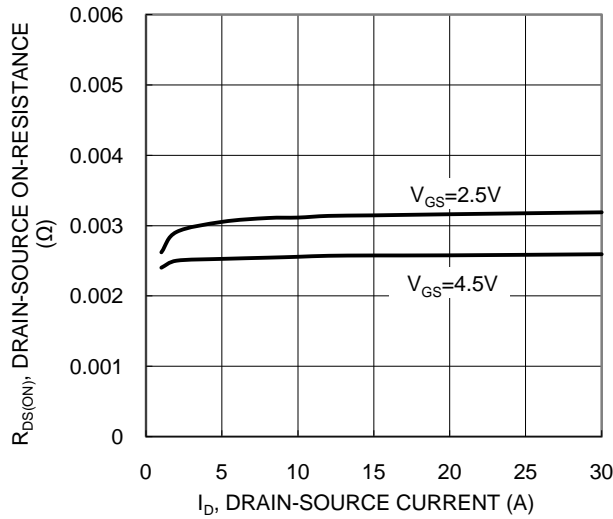


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

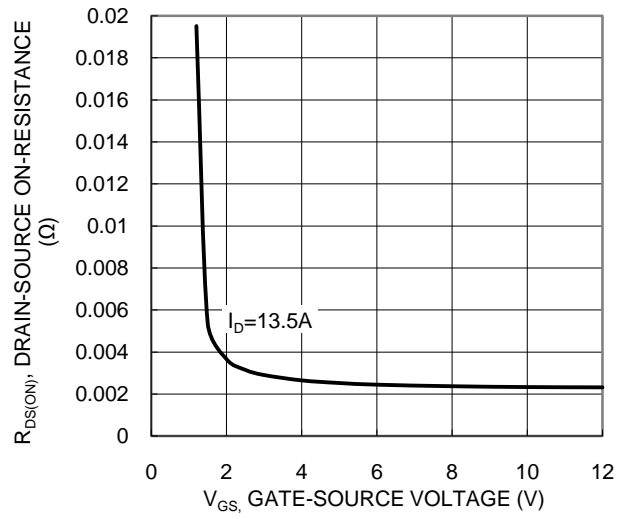


Figure 4. Typical Transfer Characteristic

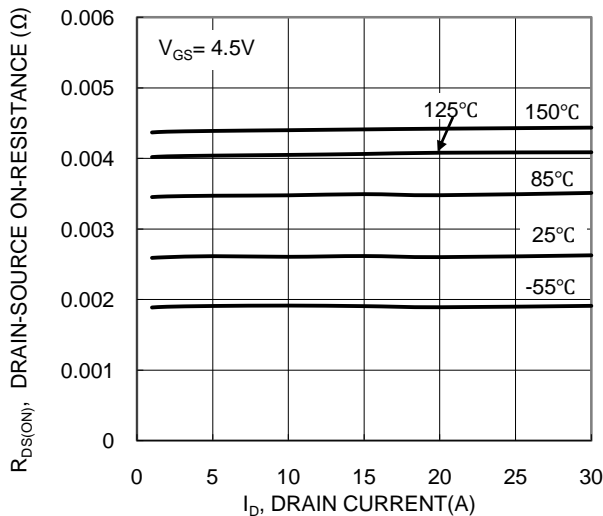


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

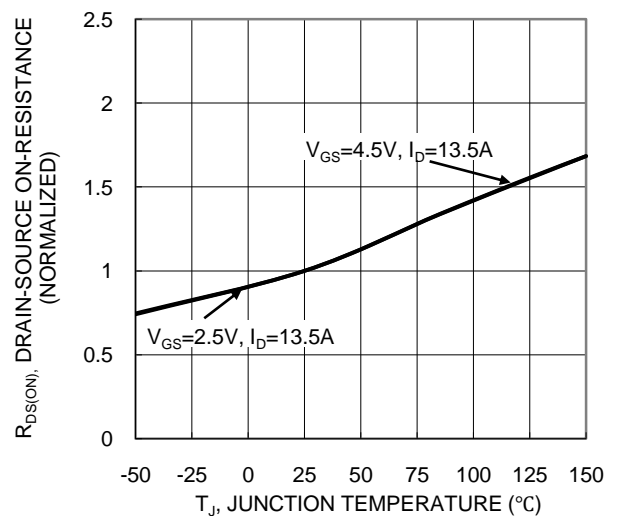


Figure 6. On-Resistance Variation with Junction Temperature

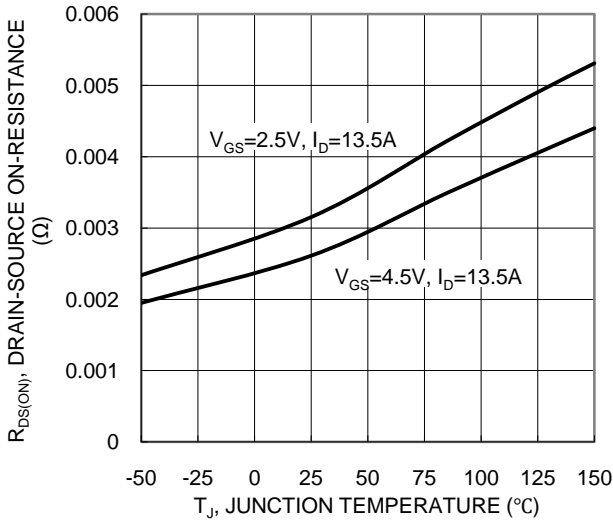


Figure 7. On-Resistance Variation with Junction Temperature

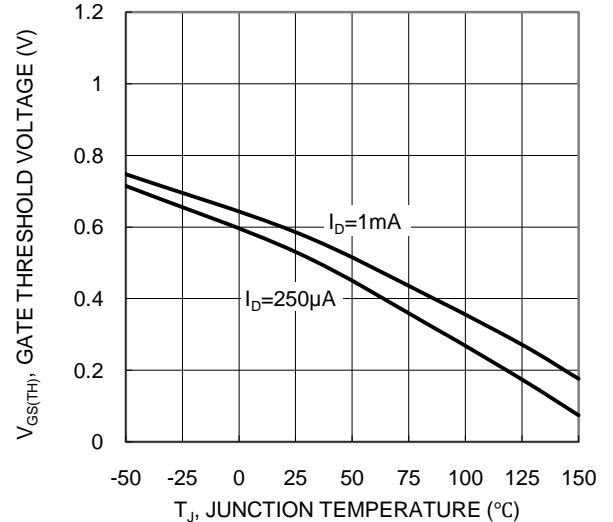


Figure 8. Gate Threshold Variation vs. Junction Temperature

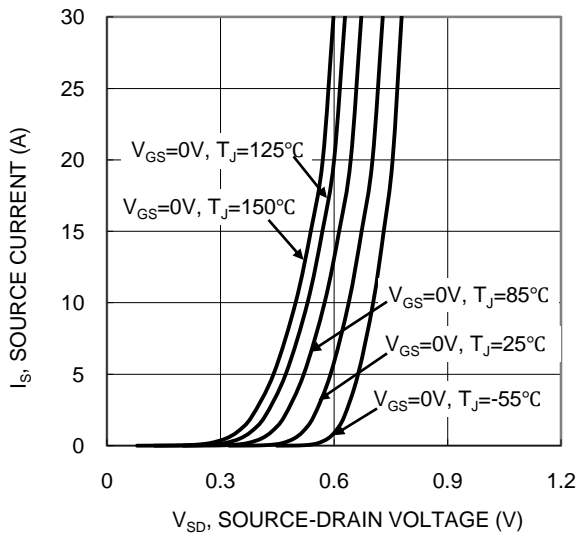


Figure 9. Diode Forward Voltage vs. Current

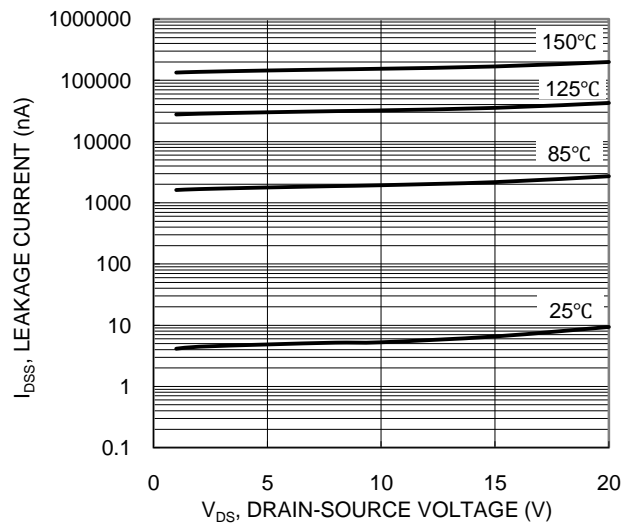


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

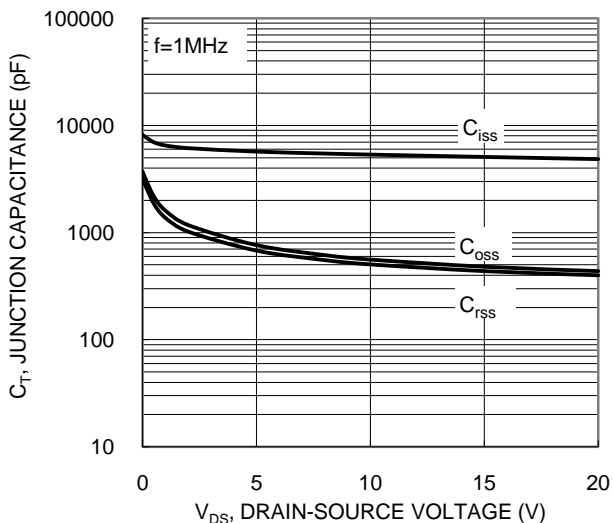


Figure 11. Typical Junction Capacitance

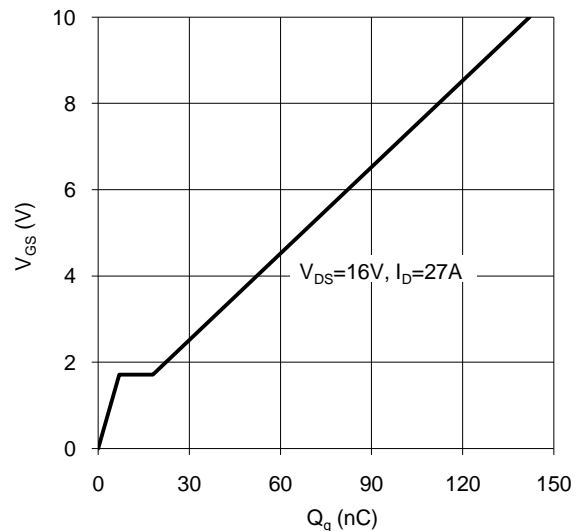
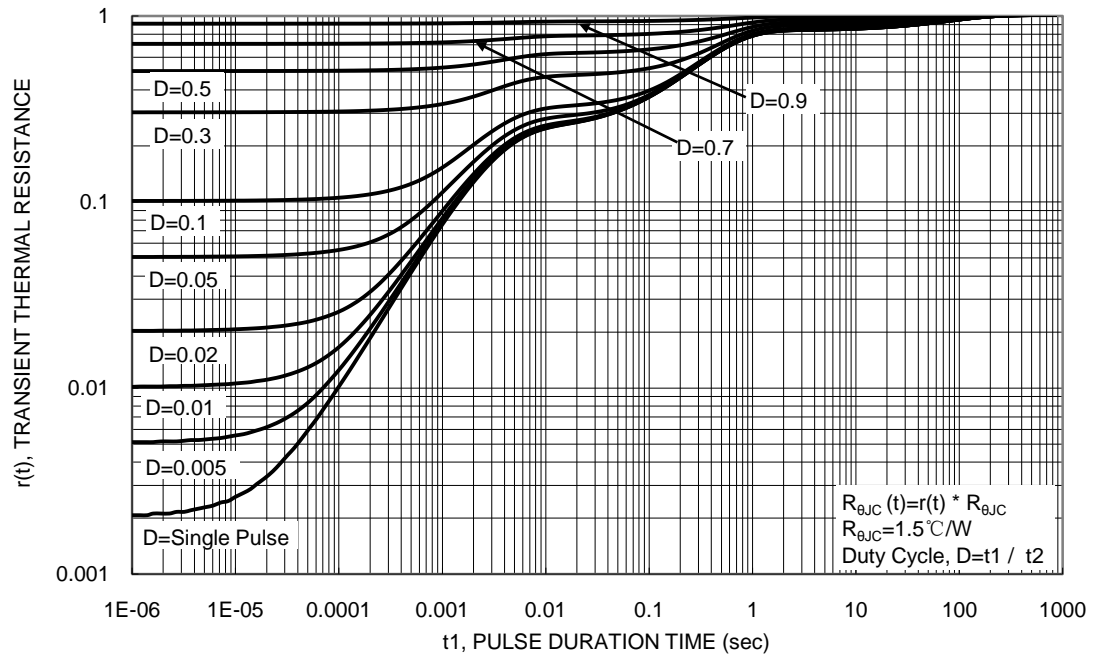
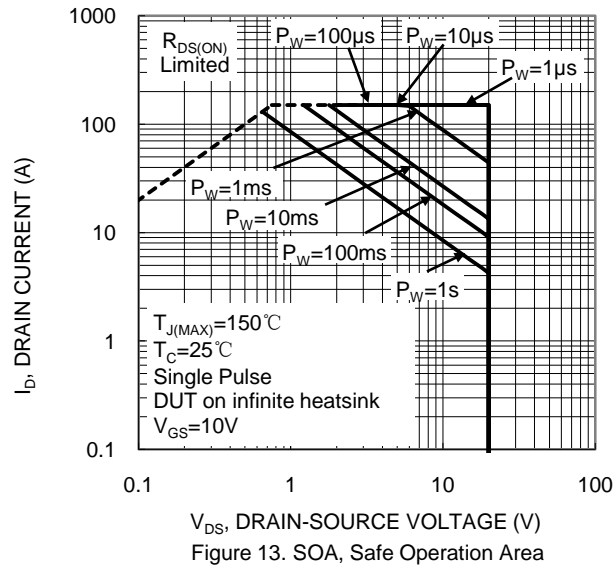
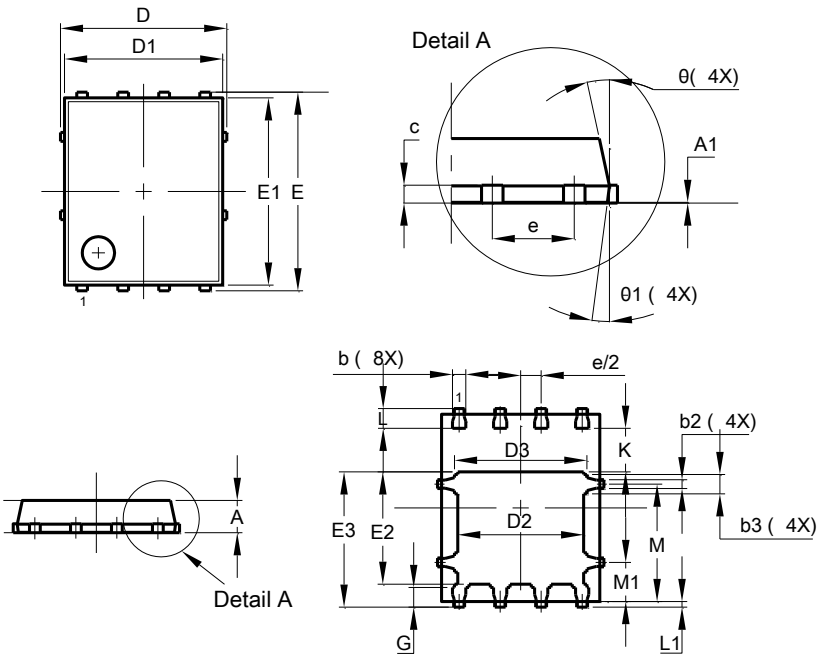


Figure 12. Gate Charge



**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

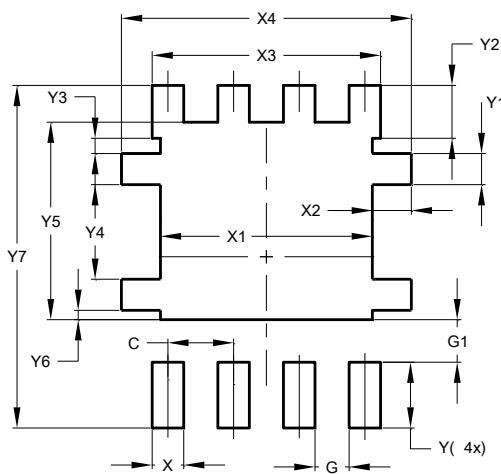


POWERDI <sup>®</sup> 5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	-
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
K	0.51	-	-
L	0.51	0.71	0.61
L1	0.100	0.200	0.175
M	3.235	4.035	3.635
M1	1.00	1.40	1.21
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

NEW PRODUCT

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610

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