

Product Summary

BV _{DSS}	R _{D(S)} Max	I _D Max T _C = +25°C
30V	3.8mΩ @ V _{GS} = 10V	145A
	6mΩ @ V _{GS} = 4.5V	115A

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:

- Backlighting
- Power Management Functions
- DC-DC Converters

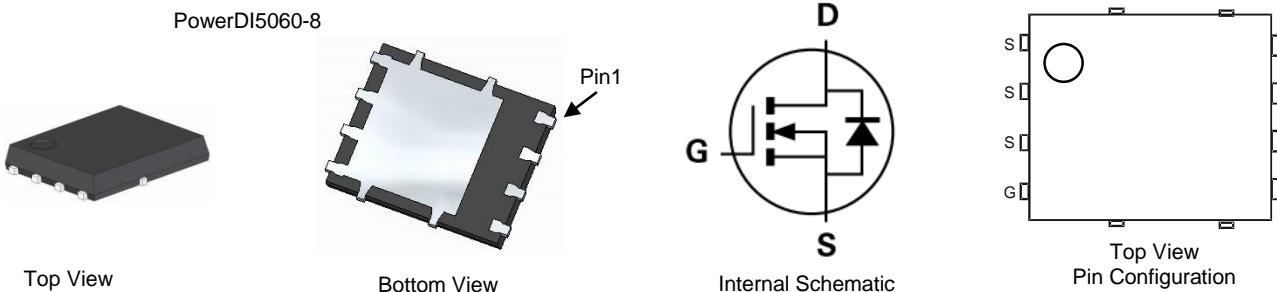
Features and Benefits

- Low R_{D(S)} – Minimizes On-State Losses
- Excellent Q_{gd} x R_{D(S)} Product (FOM)
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% Unclamped Inductive Switching – Ensures More Reliability
- Rated to +175°C – Ideal for High Ambient Temperature Environments
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- The DMTH3004LPSQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.

<https://www.diodes.com/quality/product-definitions/>

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 Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.097 grams (Approximate)



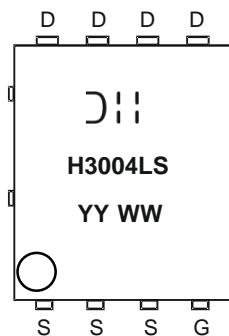
Ordering Information (Note 4)

Part Number	Case	Packaging
DMTH3004LPSQ-13	PowerDI5060-8	2,500/Tape & Reel

Notes:

1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



DII = Manufacturer's Marking
H3004LS = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 21 = 2021)
WW = Week (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.

DMTH3004LPSQ

Document number: DS38443 Rev. 2 - 2

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	+20 -16	V
Continuous Drain Current (Note 5)	$T_A = +25^\circ\text{C}$ $T_A = +100^\circ\text{C}$	I_D	22 16	A
Continuous Drain Current (Note 6)	$T_C = +25^\circ\text{C}$ $T_C = +100^\circ\text{C}$	I_D	145 103	A
Maximum Continuous Body Diode Forward Current		I_S	100	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)		I_{DM}	180	A
Avalanche Current, L=0.3mH		I_{AS}	27	A
Avalanche Energy, L=0.3mH		E_{AS}	110	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation	P_D	136	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	47	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	1.1	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current (Note 8)	I_{DSS}	—	—	10	μA	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$ $T_J = +125^\circ\text{C}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = +20\text{V}, V_{DS} = 0\text{V}$ $V_{GS} = -16\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	1.6	3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.3	3.8	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
	—	—	5	6		$V_{GS} = 4.5\text{V}, I_D = 7\text{A}$
Diode Forward Voltage	V_{SD}	—	0.70	1	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 8)	C_{iss}	—	2370	—	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance (Note 8)	C_{oss}	—	1360	—		
Reverse Transfer Capacitance (Note 8)	C_{rss}	—	240	—		
Gate Resistance	R_g	0.14	0.7	1.75	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
SWITCHING CHARACTERISTICS (Note 8)						
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_g	—	43.7	—	nC	$V_{DS} = 15\text{V}, I_D = 20\text{A}$
Gate-Source Charge	Q_{gs}	—	6.9	—		
Gate-Drain Charge	Q_{gd}	—	8	—		
Turn-On Delay Time	$t_{D(ON)}$	—	6.2	—	ns	$V_{DD} = 15\text{V}, V_{GS} = 10\text{V}, R_G = 3\Omega, R_L = 0.75\Omega$
Turn-On Rise Time	t_R	—	4.2	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	21	—		
Turn-Off Fall Time	t_F	—	8	—		
Body Diode Reverse Recovery Time	t_{RR}	—	25	—	ns	$I_F = 15\text{A}, dI/dt = 500\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	37	—		

Notes:

5. Device mounted with exposed drain pad on 25mm by 25mm 2oz copper on a single- sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady state.
6. Thermal resistance from junction to soldering point (on the exposed drain pad).
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

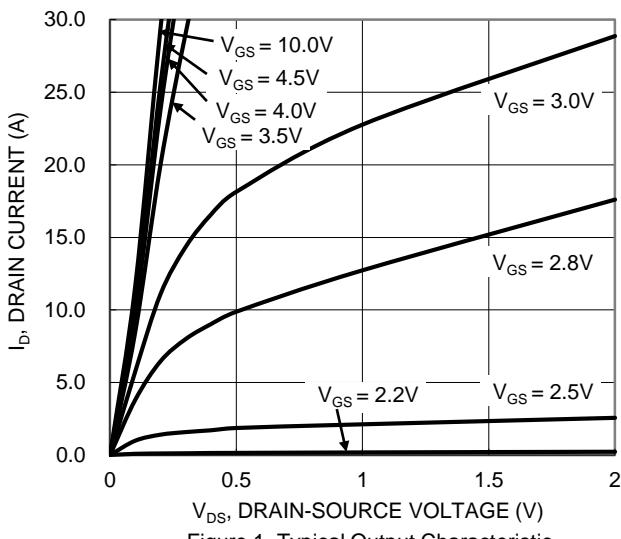


Figure 1. Typical Output Characteristic

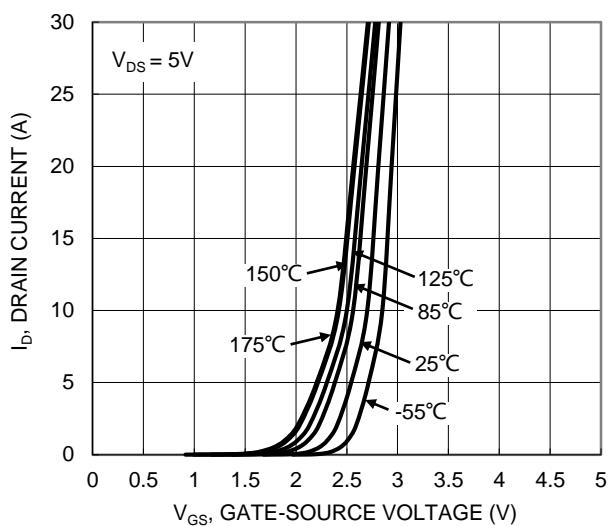


Figure 2. Typical Transfer Characteristic

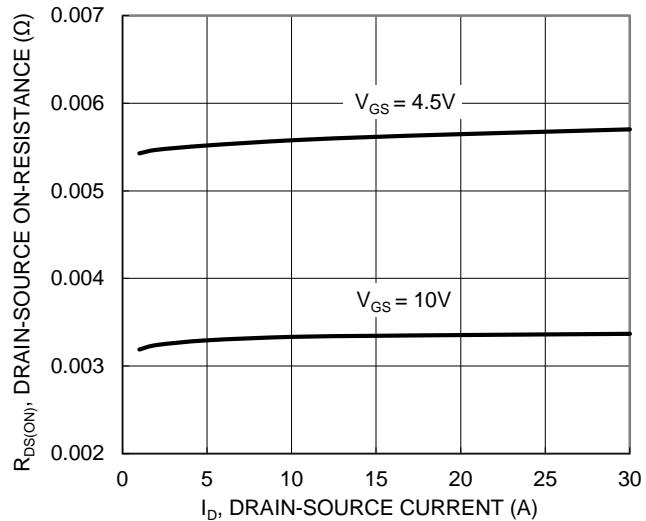


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

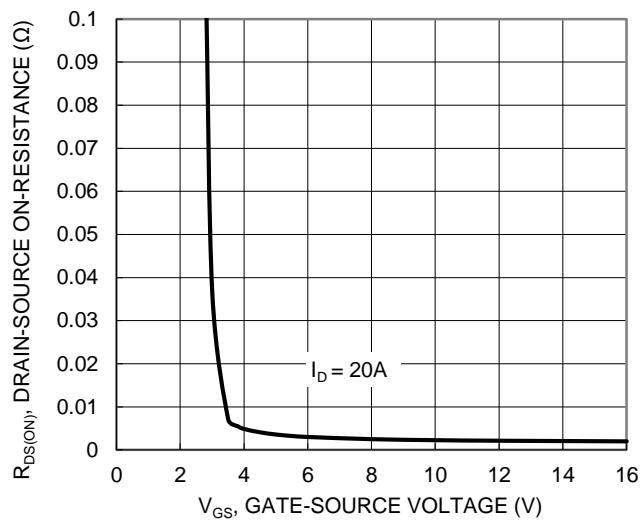


Figure 4. Typical Transfer Characteristic

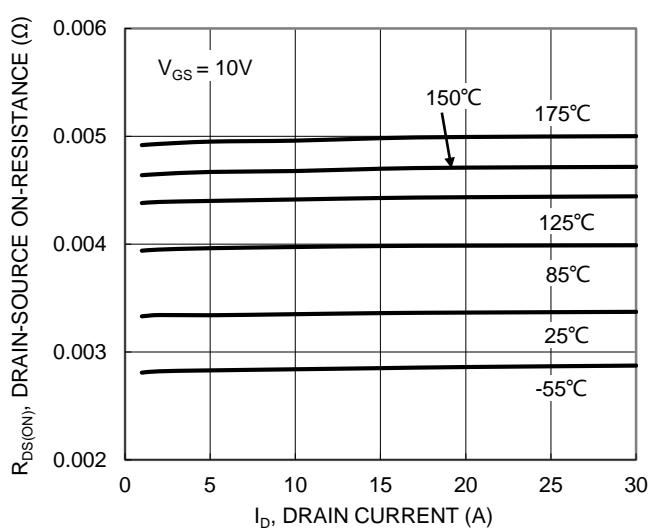


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

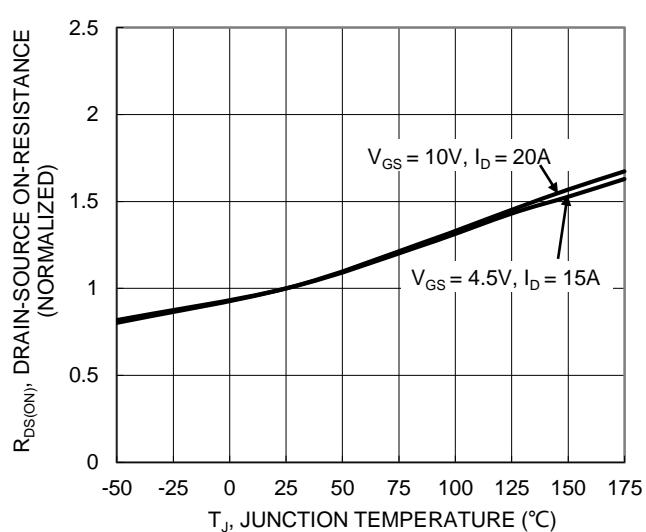
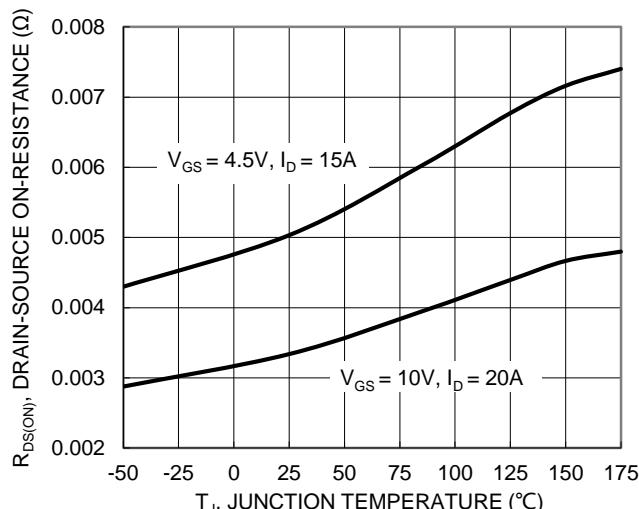
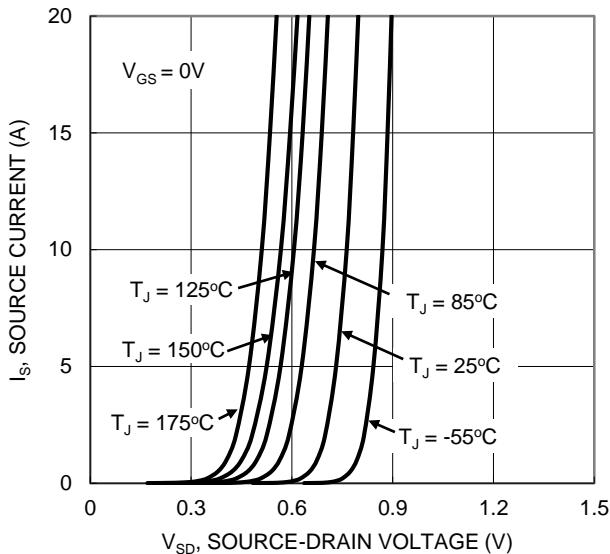


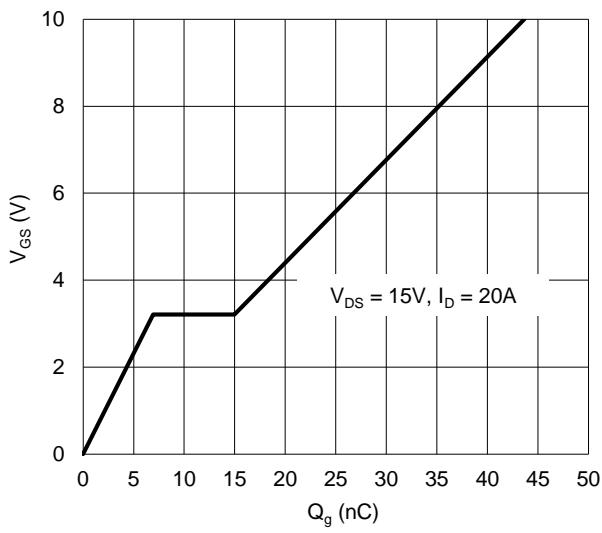
Figure 6. On-Resistance Variation with Junction Temperature



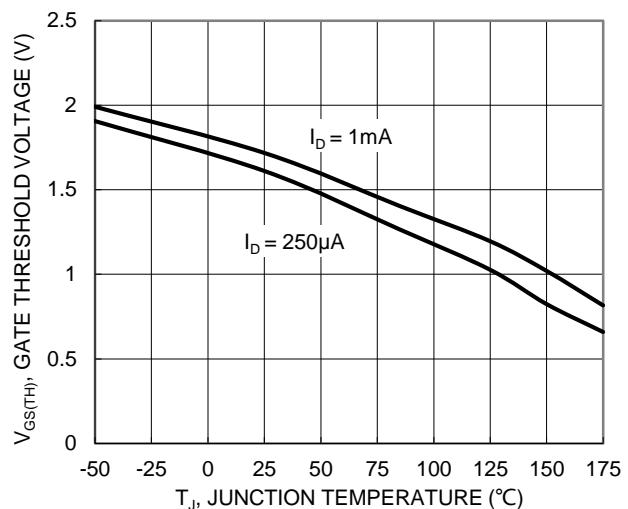
$V_{GS} = 4.5V, I_D = 15A$
 $V_{GS} = 10V, I_D = 20A$



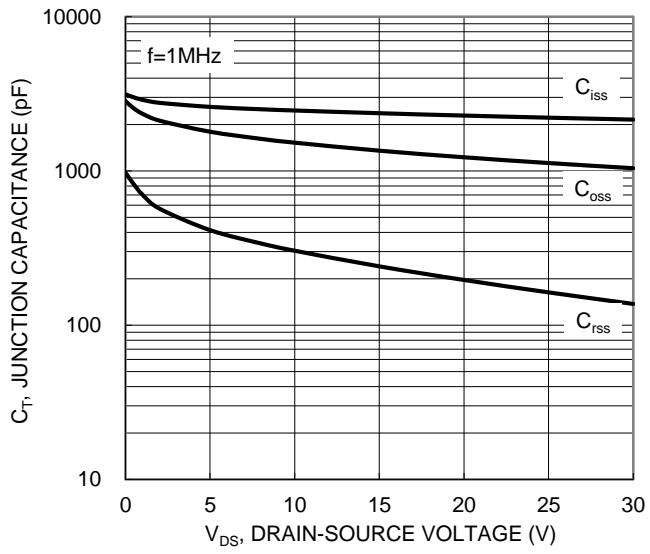
$V_{GS} = 0V$



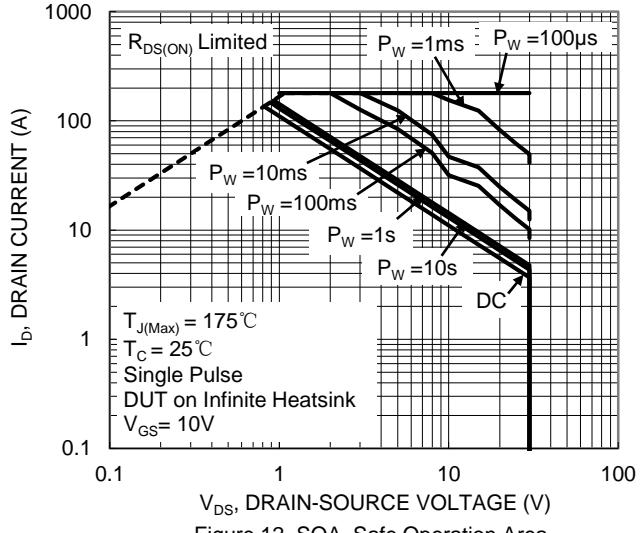
$V_{DS} = 15V, I_D = 20A$



$I_D = 1mA$
 $I_D = 250\mu A$



$f = 1MHz$



$T_{J(\text{Max})} = 175^\circ C$
 $T_C = 25^\circ C$
Single Pulse
DUT on Infinite Heatsink
 $V_{GS} = 10V$

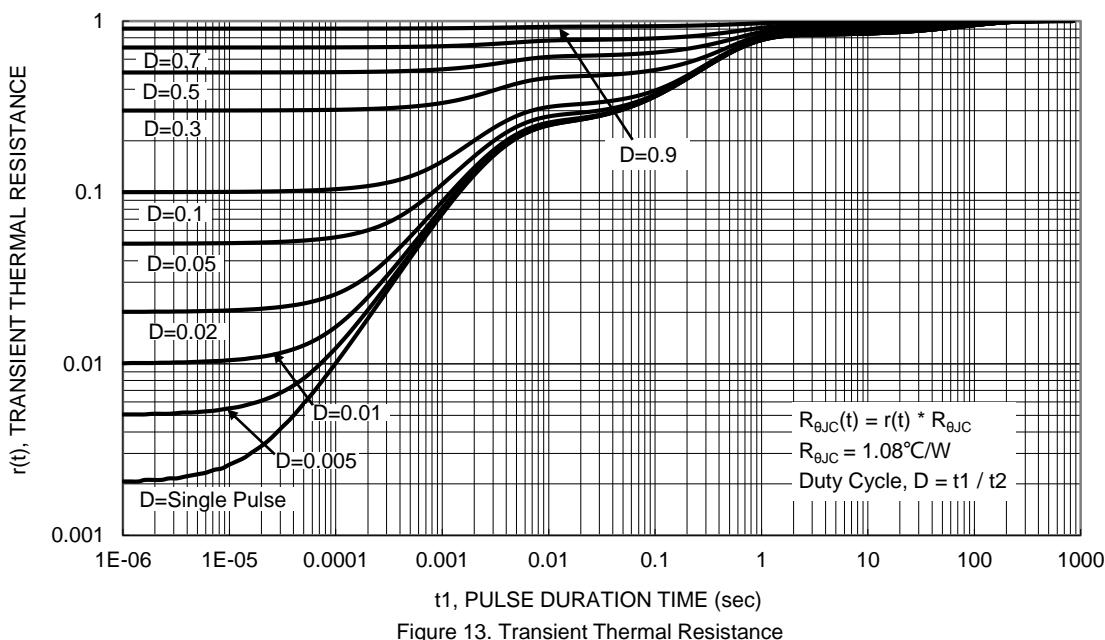
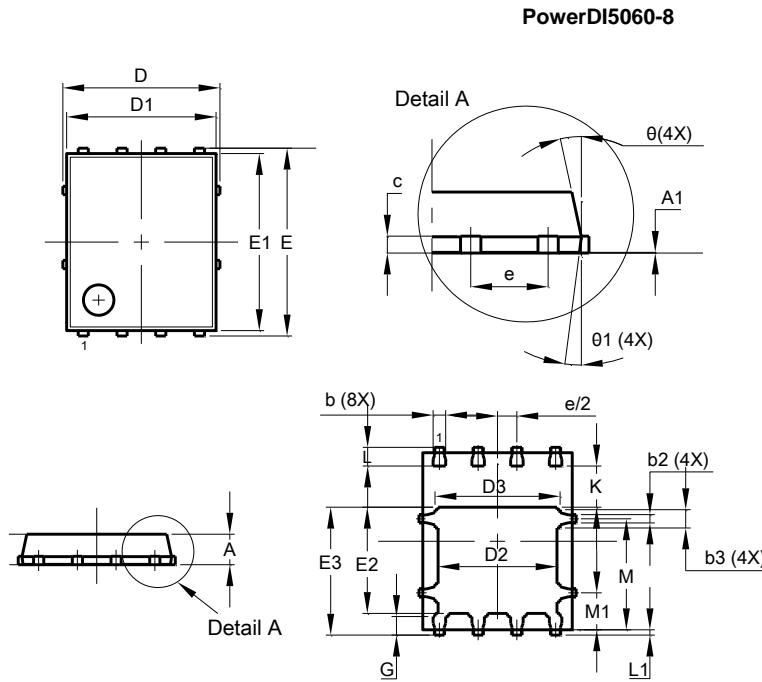


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

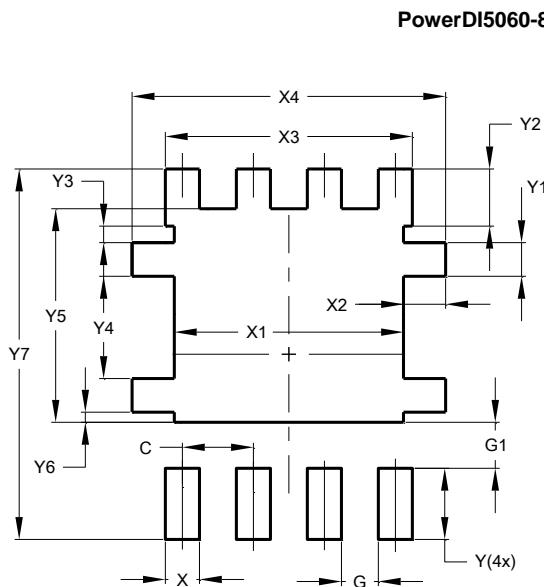
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



PowerDI5060-8			
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			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> 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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