

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
30V	1.35mΩ @ V <sub>GS</sub> = 10V	150A
	2.4mΩ @ V <sub>GS</sub> = 4.5V	100A

## Description and Applications

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

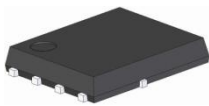
## Features and Benefits

- Low R<sub>DS(ON)</sub> – Minimizes On-State Losses
- Excellent Q<sub>gd</sub> x R<sub>DS(ON)</sub> Product (FOM)
- Advanced Technology for DC-DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% Unclamped Inductive Switching – Ensures More Reliability
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

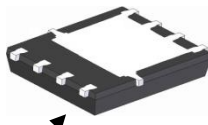
## Mechanical Data

- Case: PowerDI5060-8 (Type K)
- 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
- Weight: 0.097 grams (Approximate)

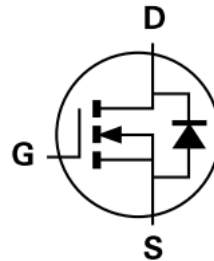
PowerDI5060-8 (Type K)



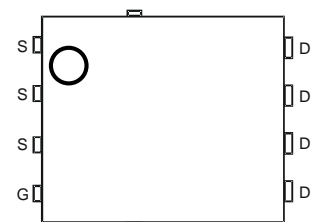
Top View



Bottom View



Internal Schematic



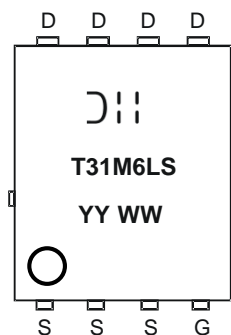
Top View  
Pin Configuration

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMT31M6LPS-13	PowerDI5060-8 (Type K)	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



D;|| = Manufacturer's Marking  
T31M6LS = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Year (ex: 16 = 2016)  
WW = Week (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>	30	V	
Gate-Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current, V <sub>GS</sub> = 10V (Note 6)	I <sub>D</sub>	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	35.8 28.6	A
Continuous Drain Current, V <sub>GS</sub> = 10V (Note 7)		T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	150 128	A
Maximum Continuous Body Diode Forward Current (Note 7)	I <sub>S</sub>	83	A	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	160	A	
Avalanche Current, L=1mH	I <sub>AS</sub>	25.5	A	
Avalanche Energy, L=1mH	E <sub>AS</sub>	325	mJ	

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.3	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	99	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	50	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	100	W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	1.2	°C/W
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>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = 20V, V <sub>DS</sub> = 0V V <sub>GS</sub> = -16V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	1.1	1.35	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A
		—	1.6	2.4		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 20A
Diode Forward Voltage	V <sub>SD</sub>	—	—	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 2A
<b>DYNAMIC CHARACTERISTICS (Note 19)</b>						
Input Capacitance	C <sub>iSS</sub>	—	7019	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oSS</sub>	—	3372	—		
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	554	—		
Gate Resistance	R <sub>g</sub>	—	0.94	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	123	—	nC	V <sub>DD</sub> = 15V, I <sub>D</sub> = 20A
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	59.1	—		
Gate-Source Charge	Q <sub>gs</sub>	—	14.9	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	24.5	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	8.6	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 10V, R <sub>g</sub> = 3Ω, I <sub>D</sub> = 20A
Turn-On Rise Time	t <sub>r</sub>	—	20.2	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	71.5	—		
Turn-Off Fall Time	t <sub>f</sub>	—	42.3	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	37.2	—	ns	I <sub>F</sub> = 20A, di/dt = 500A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	73.6	—	nC	

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  - Thermal resistance from junction to soldering point (on the exposed drain pad).
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

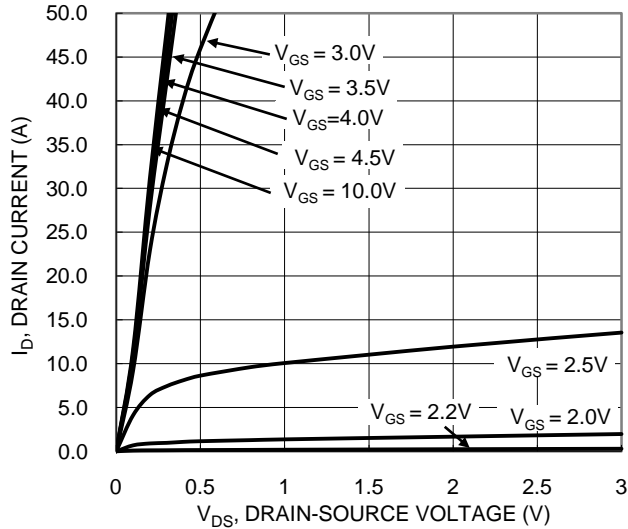


Figure 1. Typical Output Characteristic

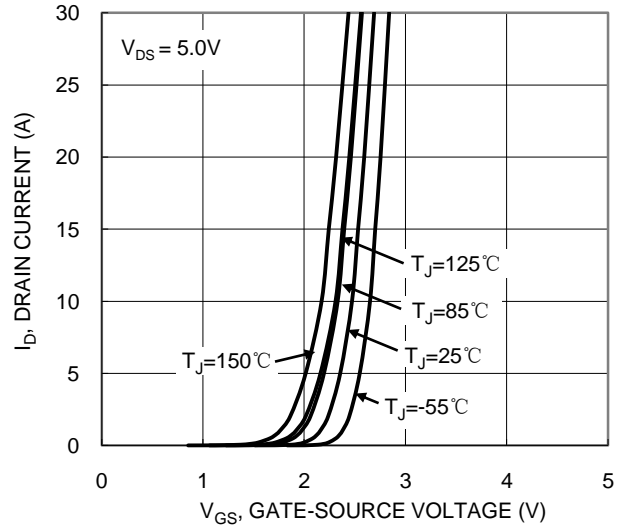


Figure 2. Typical Transfer Characteristic

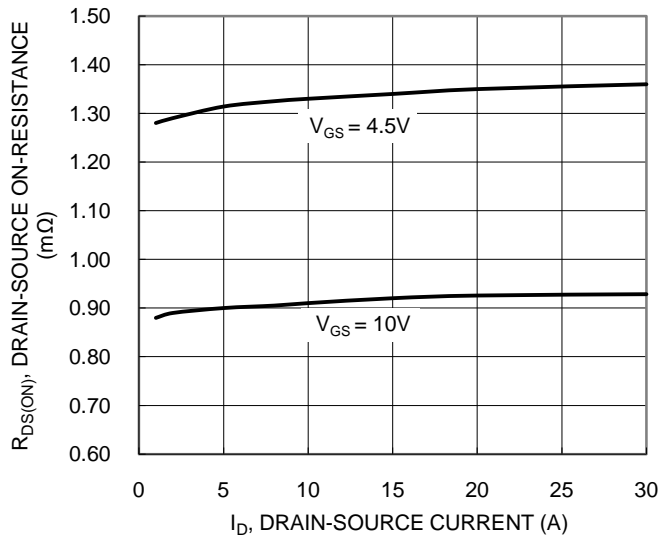


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

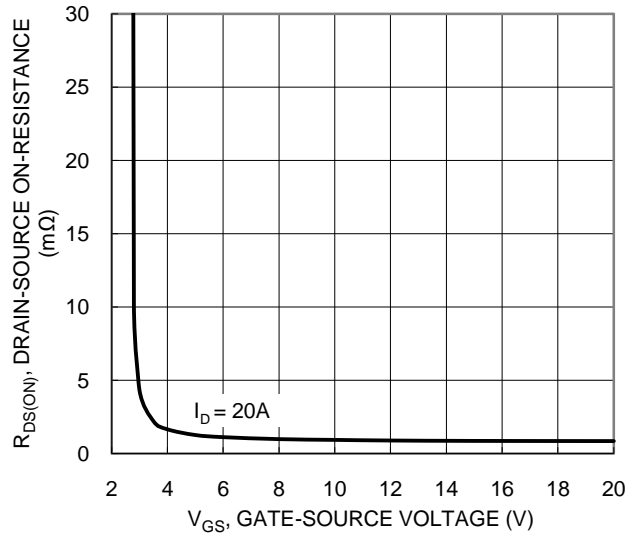


Figure 4. Typical Transfer Characteristic

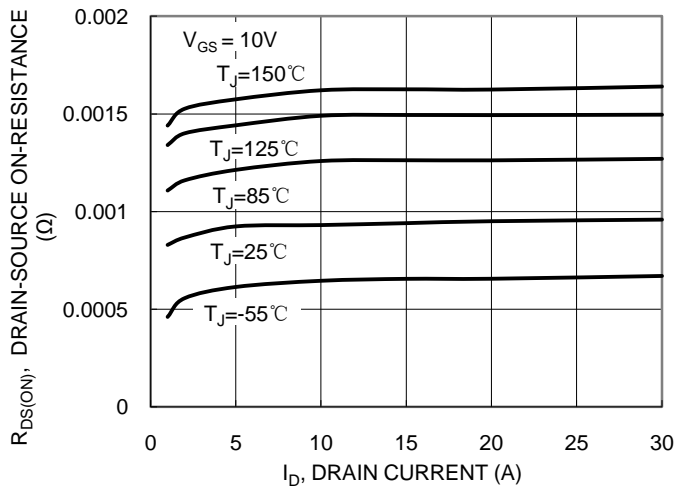


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

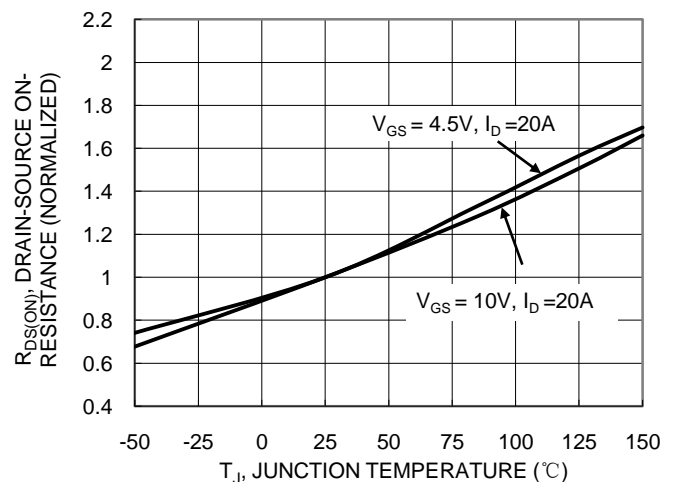
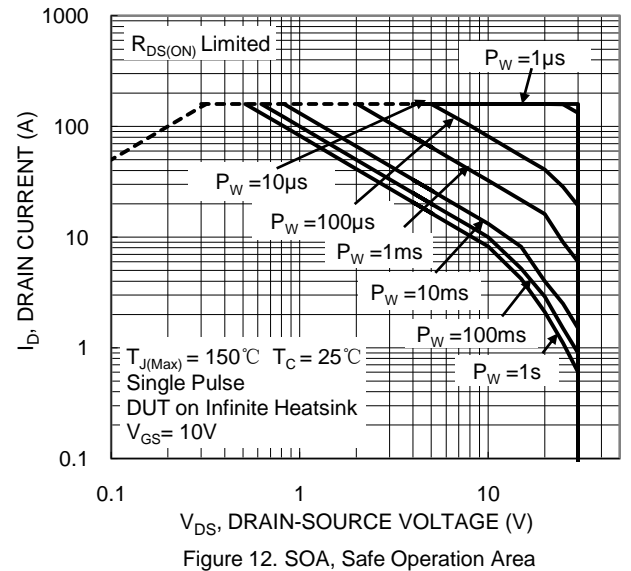
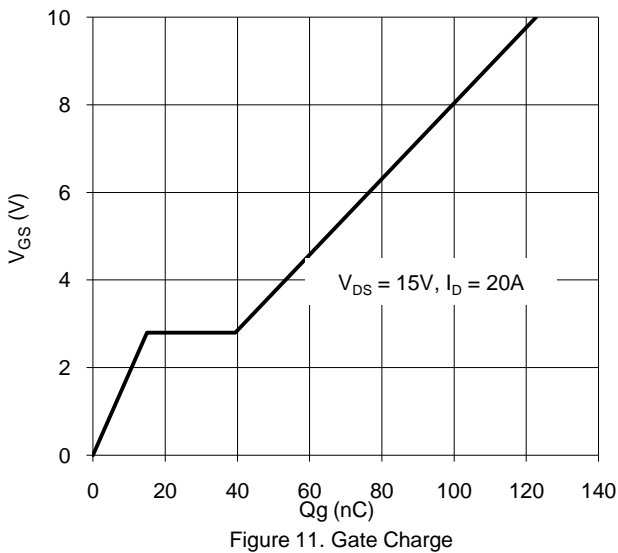
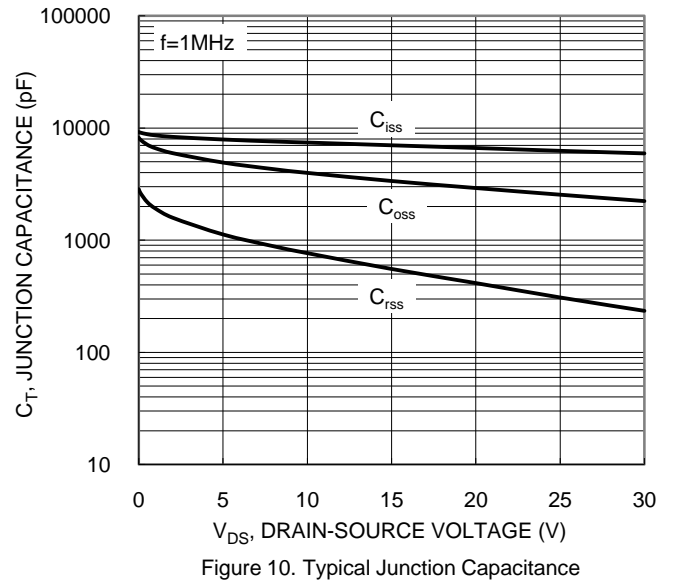
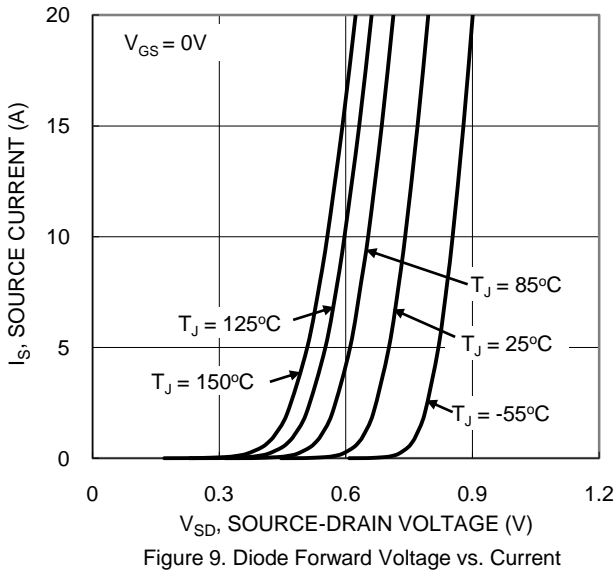
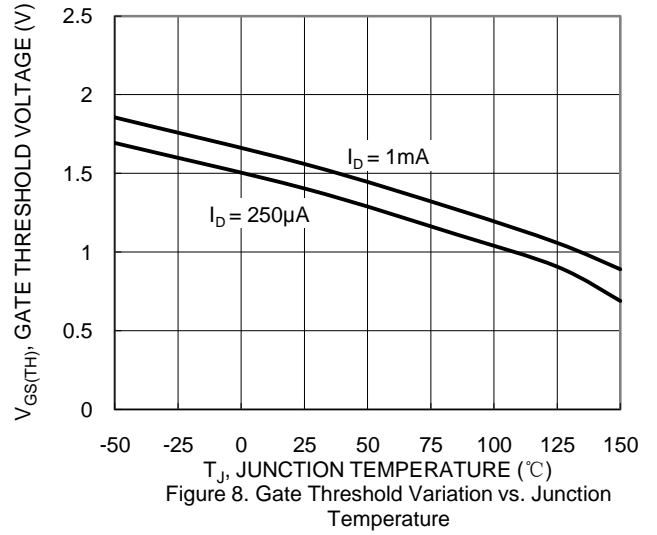
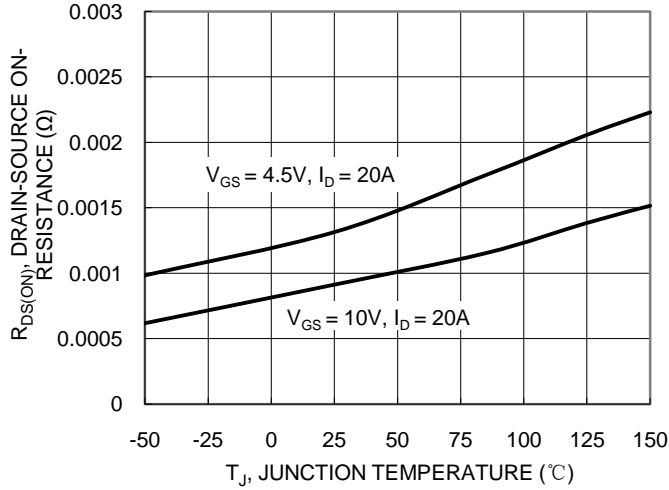


Figure 6. On-Resistance Variation with Temperature



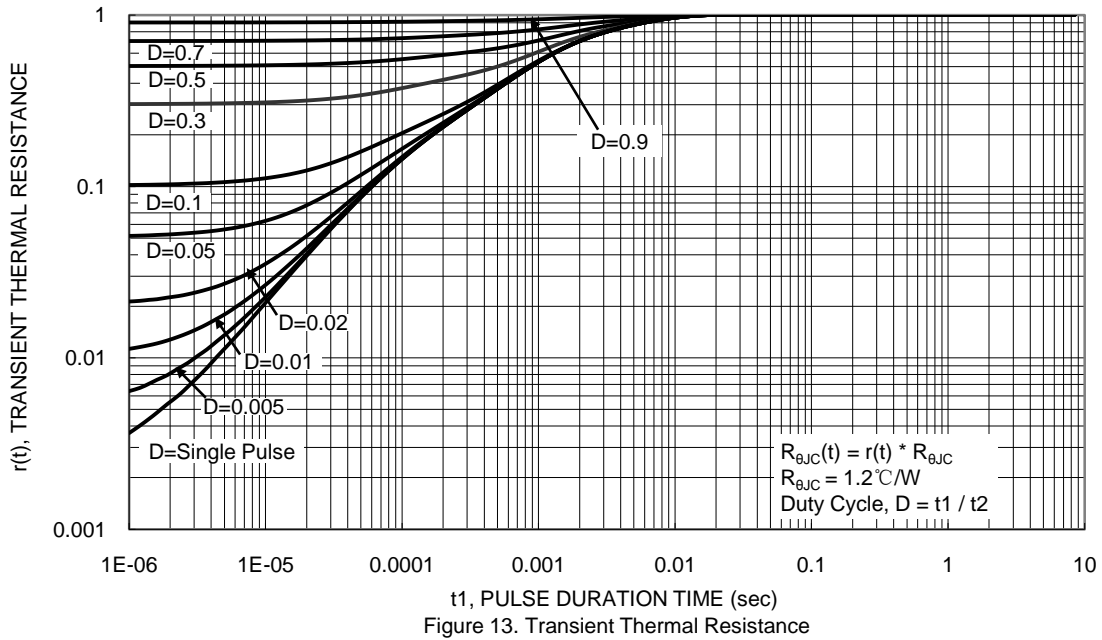
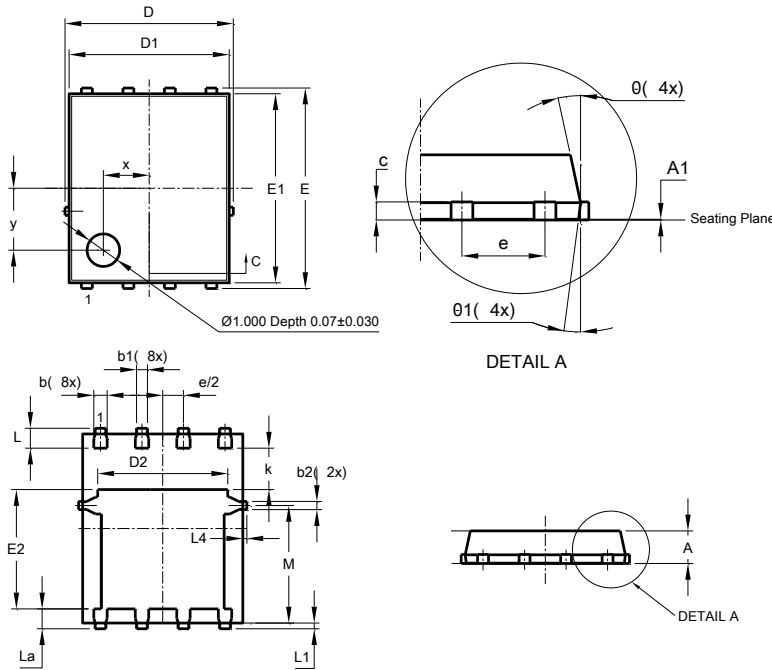


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI5060-8 (Type K)**

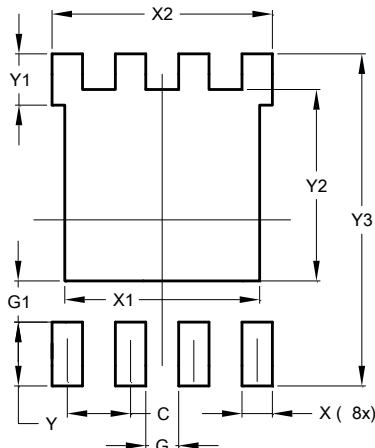


PowerDI5060-8 (Type K)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	-	-	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.725	3.66
E	1.27BSC		
k	-	-	1.27
L	0.51	0.71	0.61
La	0.51	0.675	0.61
L1	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 K)**



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

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