

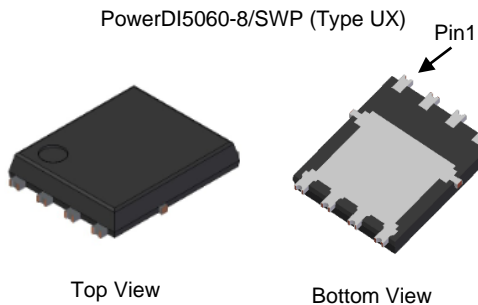
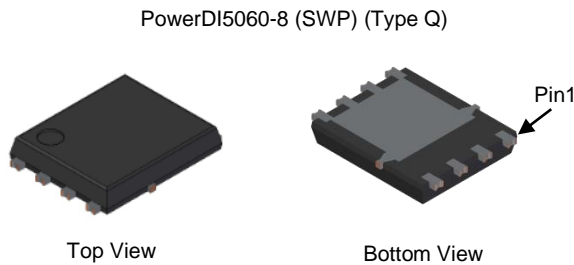
Product Summary

BV _{DSS}	R _{DS(ON)} MAX	I _D MAX T _C = +25°C (Note 9)
60V	6.5mΩ @ V _{GS} = 10V	100A
	10mΩ @ V _{GS} = 4.5V	81.6A

Description and Applications

This MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- Engine management systems
- Body control electronics
- DC-DC converters

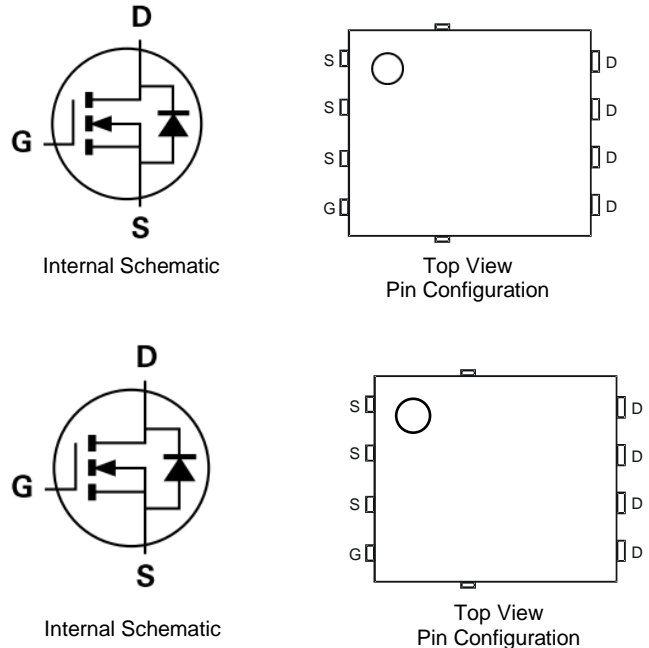


Features

- Rated to +175°C — Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production — Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} — Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- Wettable Flank for Improved Optical Inspection
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
<https://www.diodes.com/quality/product-definitions/>
- **An automotive-compliant part is available under separate datasheet ([DMTH6006LPSWQ](#))**

Mechanical Data

- Package: PowerDI[®]5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish — Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.097 grams (Approximate)



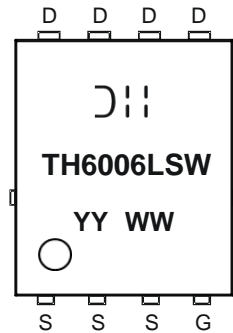
Notes:

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 http://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.

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMTH6006LPSW-13	PowerDI5060-8 (SWP) (Type Q)	2500	Tape & Reel
DMTH6006LPSW-13	PowerDI5060-8/SWP (Type UX)	2500	Tape & Reel

Note: 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information


= Manufacturer's Marking
 TH6006LSW = Product Type Marking Code
 YYWW or YYWW = Date Code Marking
 YY or YY = Last Two Digits of Year (ex: 24 = 2024)
 WW = Week Code (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, $V_{GS} = 10\text{V}$ (Note 5)	I_D	$T_A = +25^\circ\text{C}$	17.2
		$T_A = +100^\circ\text{C}$	12.1
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Notes 6 & 9)	I_D	$T_C = +25^\circ\text{C}$	100
		$T_C = +100^\circ\text{C}$	71.6
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	400	A
Maximum Continuous Body Diode Forward Current (Note 7)	I_S	100	A
Pulsed Body Diode Forward Current (10 μs Pulse, Duty Cycle = 1%)	I_{SM}	400	A
Avalanche Current, $L = 0.1\text{mH}$	I_{AS}	28.5	A
Avalanche Energy, $L = 0.1\text{mH}$	E_{AS}	40.7	mJ

- Notes:
- Device mounted on FR-4 substrate PCB, 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.
 - Limited by package.

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$ P_D	2.88	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	52	$^\circ\text{C}/\text{W}$
Total Power Dissipation (Note 6)	$T_C = +25^\circ\text{C}$ P_D	100	W
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	1.5	$^\circ\text{C}/\text{W}$
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}	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.2	—	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	4.9	6.5	m Ω	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	7.1	10		$V_{GS} = 4.5\text{V}, I_D = 10\text{A}$
Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	$V_{GS} = 0\text{V}, I_S = 20\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	2162	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	761	—		
Reverse Transfer Capacitance	C_{rss}	—	58	—		
Gate Resistance	R_g	—	0.7	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	18.1	—	nC	$V_{DS} = 30\text{V}, I_D = 20\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_g	—	34.9	—		
Gate-Source Charge	Q_{gs}	—	6.1	—		
Gate-Drain Charge	Q_{gd}	—	7.3	—		
Turn-On Delay Time	$t_{D(ON)}$	—	6.0	—	ns	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, I_D = 20\text{A}, R_g = 3\Omega$
Turn-On Rise Time	t_r	—	5.4	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	20.4	—		
Turn-Off Fall Time	t_f	—	7.8	—		
Body Diode Reverse Recovery Time	t_{RR}	—	35.8	—	ns	$I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	40.2	—	nC	

- Notes:
- Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
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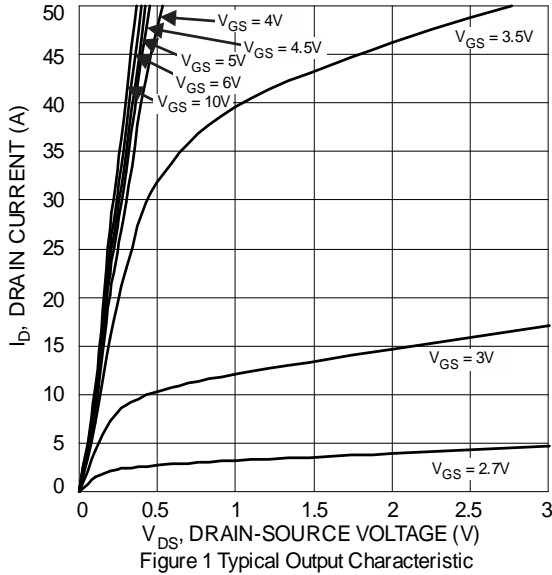


Figure 1 Typical Output Characteristic

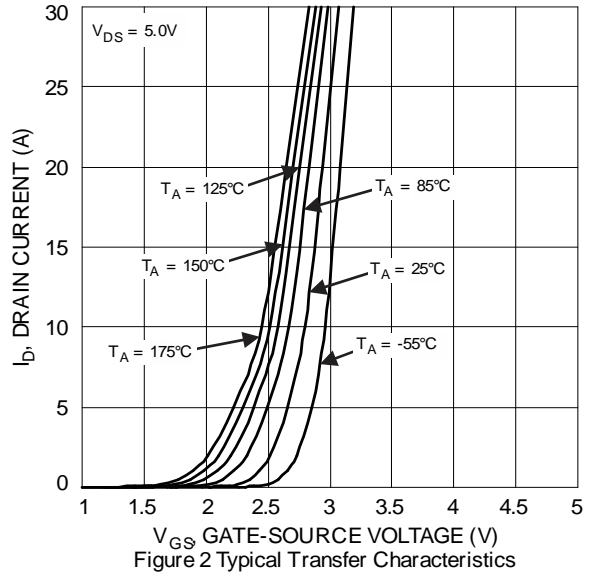


Figure 2 Typical Transfer Characteristics

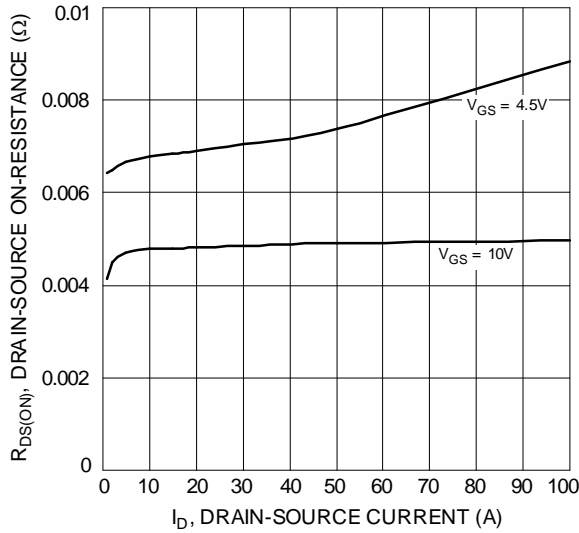


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

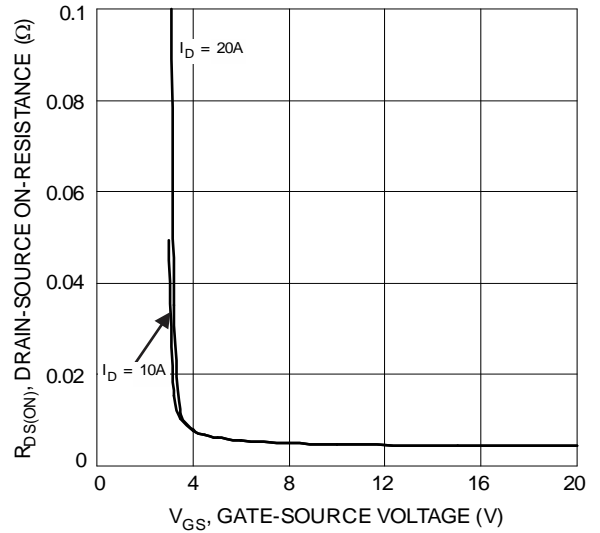


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

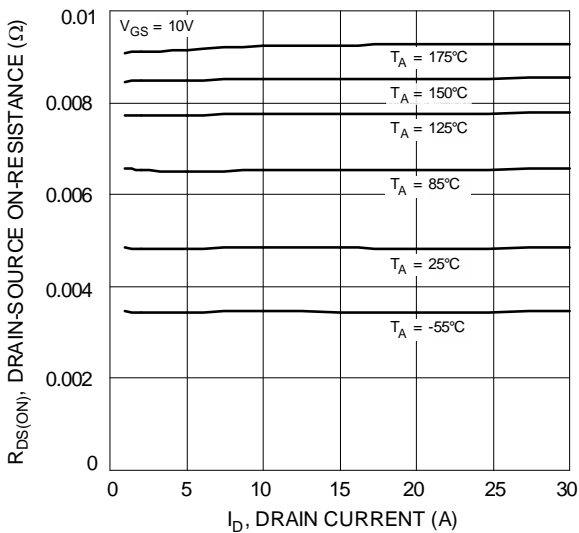


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

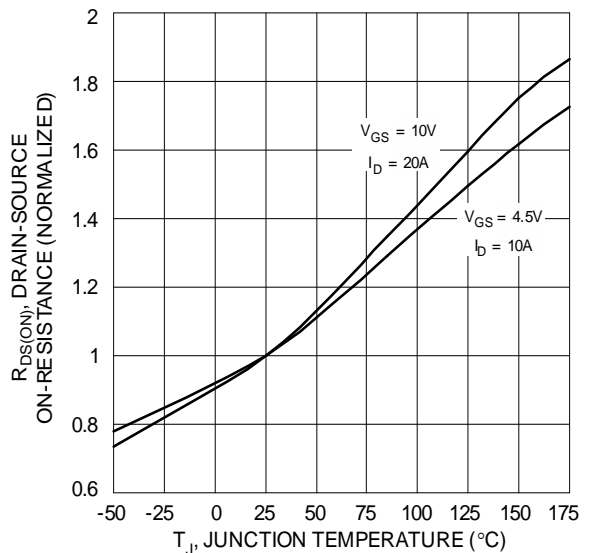


Figure 6 On-Resistance Variation with Temperature

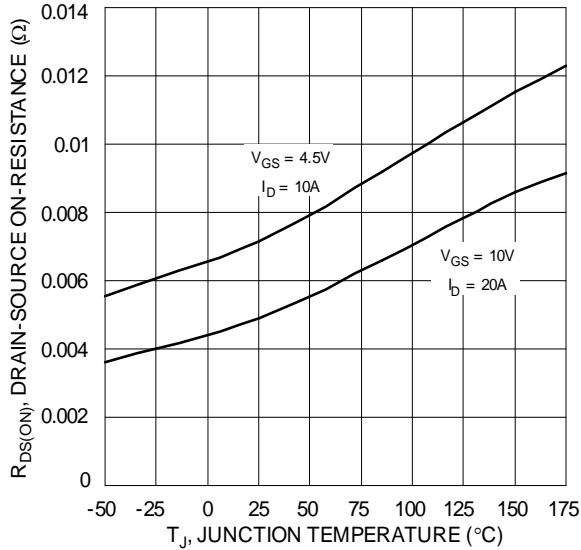


Figure 7 On-Resistance Variation with Temperature

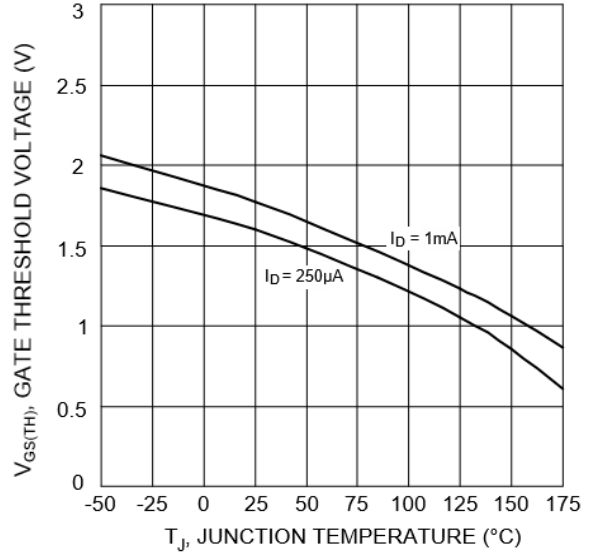


Figure 8 Gate Threshold Variation vs. Junction Temperature

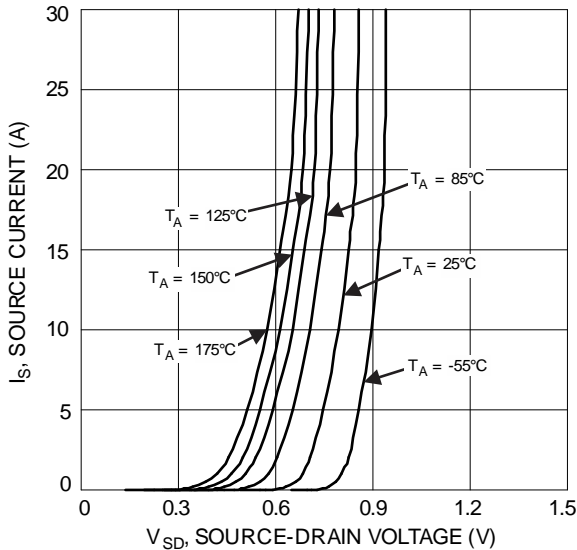


Figure 9 Diode Forward Voltage vs. Current

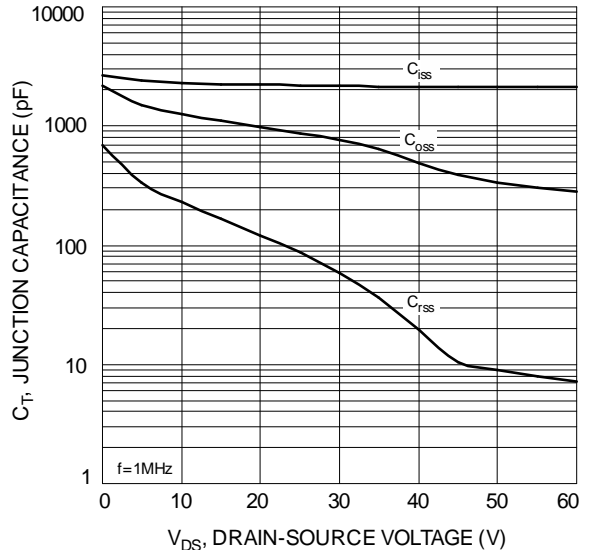


Figure 10 Typical Junction Capacitance

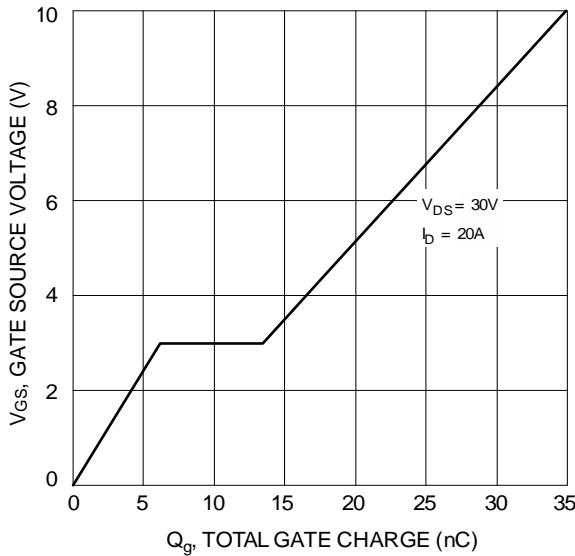


Figure 11 Gate Charge

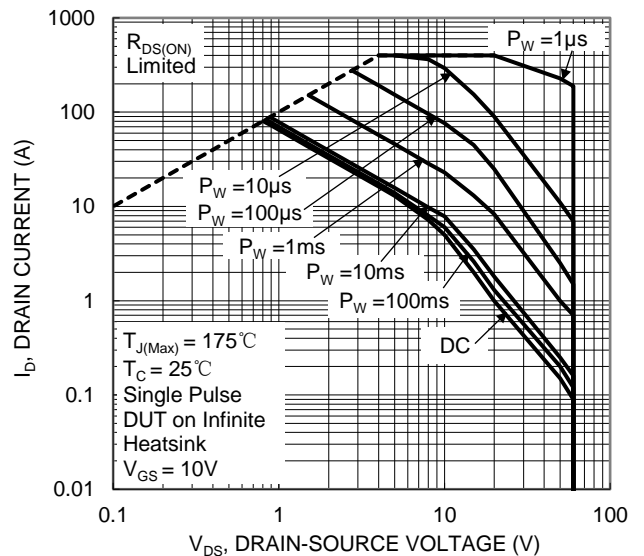
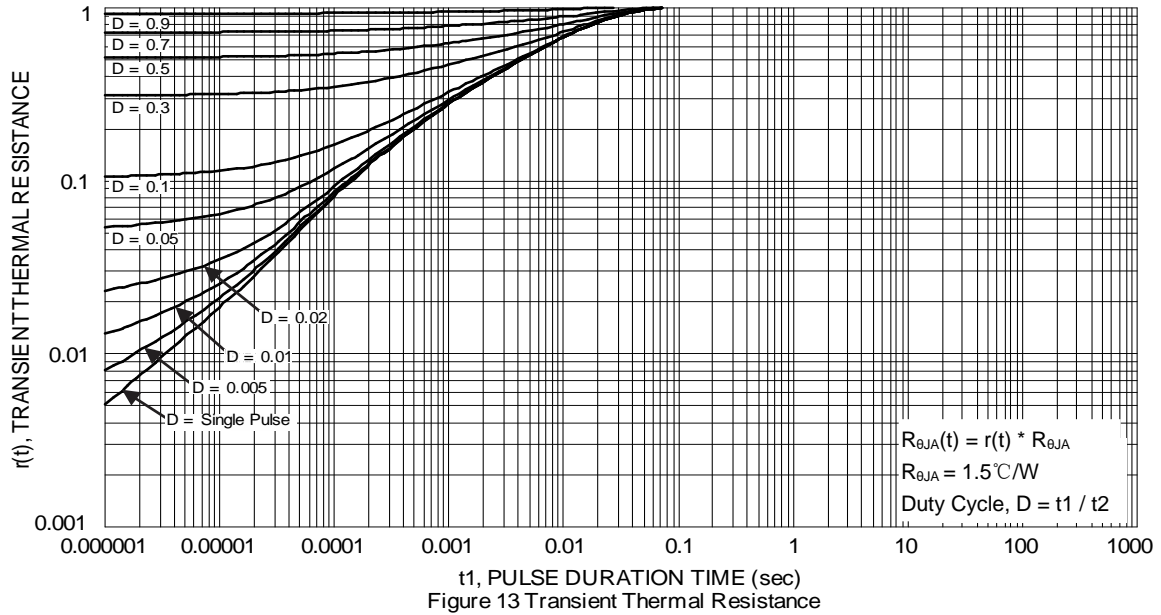


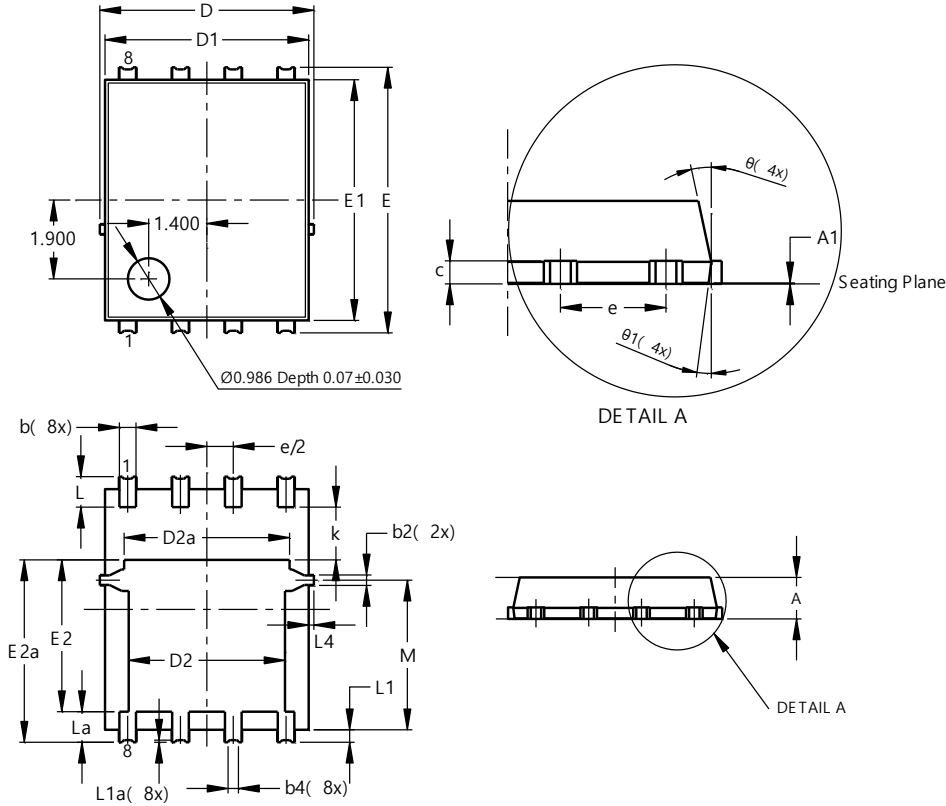
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

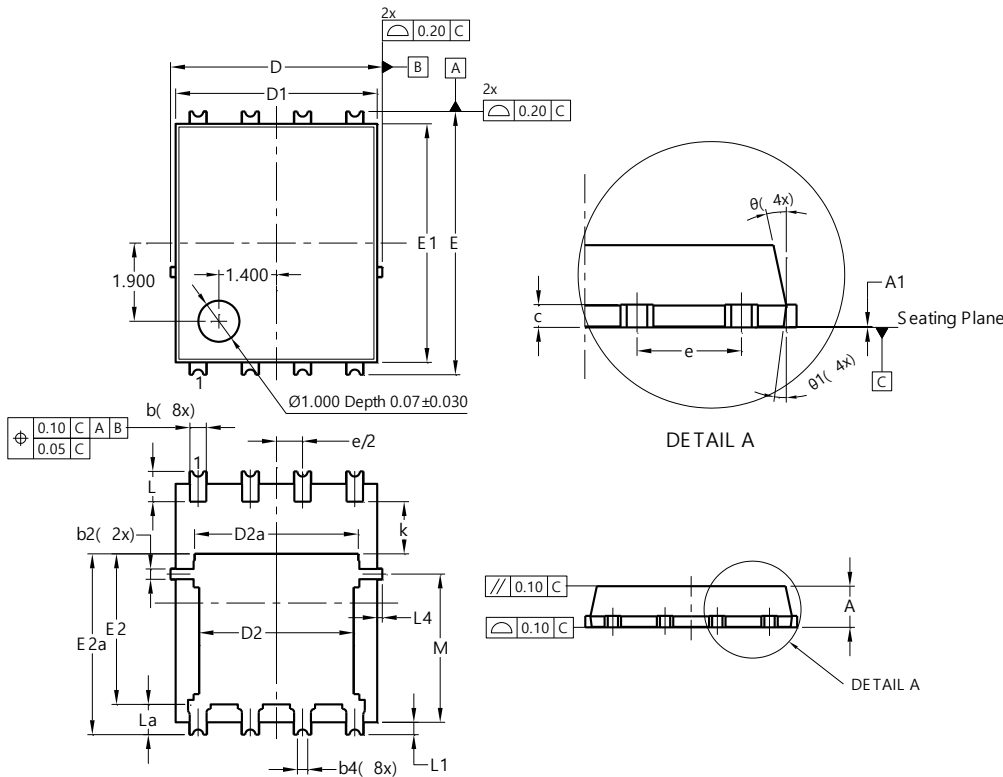
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8 (SWP) (Type Q)



PowerDI5060-8 (SWP) (Type Q)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
L1a	0.050REF		
L4	0.025	0.225	0.125
M	3.205	4.005	3.605
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

PowerDI5060-8/SWP (Type UX)

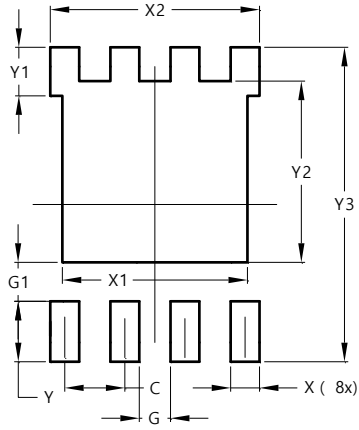


PowerDI5060-8/SWP (Type UX)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
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c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
L4	0.025	0.225	0.125
M	3.205	4.005	3.605
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

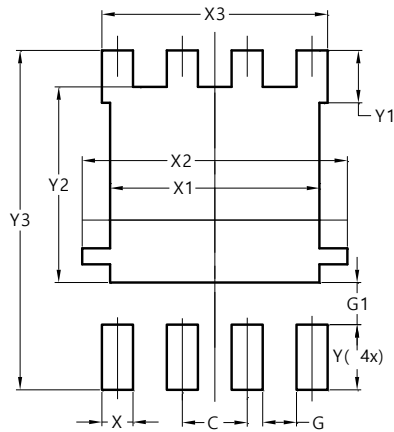
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8 (SWP) (Type Q)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

PowerDI5060-8/SWP (Type UX)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	5.190
X3	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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