40V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI8080-5

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_C = +25°C
40V	0.4mΩ @ V_{GS} = 10V	847A
	0.64mΩ @ V_{GS} = 4.5V	669A

Features and Benefits

- 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
- High Conversion Efficiency
- Low $R_{DS(ON)}$—Minimizes Power Losses
- Fast Switching Speed
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMTH4M40LPGWQ 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/

Description and Applications

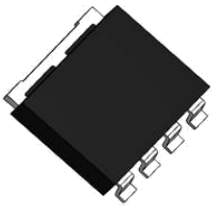
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

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

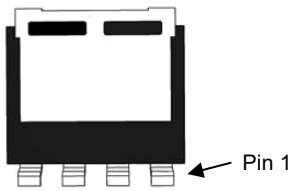
Mechanical Data

- Package: PowerDI®8080-5
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.36 grams (Approximate)

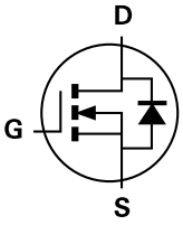
PowerDI8080-5



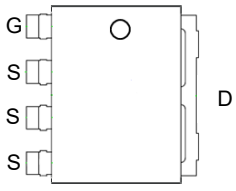
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMTH4M40LPGWQ-13	PowerDI8080-5	2000	Tape & Reel

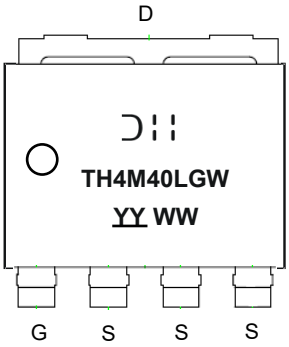
Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. 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/.

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Marking Information



= Manufacturer's Marking
TH4M40LGW = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 26 = 2026)
WW = Week (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 5)	T_C = +25°C	I_D	847	A
	T_C = +100°C		599	
Maximum Continuous Body Diode Forward Current (Note 5)		I_S	700	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I_{DM}	3200	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)		I_{SM}	3200	A
Avalanche Current, L = 1mH		I_{AS}	66	A
Avalanche Energy, L = 1mH		E_{AS}	2178	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	4.6	W
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\theta JA}$	32.3	°C/W
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	341	W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	0.3	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

Notes: 5. Thermal resistance from junction to soldering point (on the exposed drain pad).
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	V_{GS} = 0, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 32V, V_{GS} = 0
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	2.5	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.28	0.4	mΩ	V_{GS} = 10V, I_D = 25A
		—	0.44	0.64	mΩ	V_{GS} = 4.5V, I_D = 25A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0, I_S = 25A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	16698	—	pF	V_{DS} = 20V, V_{GS} = 0 f = 1MHz
Output Capacitance	C_{oss}	—	10257	—		
Reverse Transfer Capacitance	C_{rss}	—	452	—		
Gate Resistance	R_g	—	0.7	—	Ω	V_{DS} = 0, V_{GS} = 0, f = 1MHz
Total Gate Charge	Q_g	—	241	—	nC	V_{DD} = 20V, I_D = 25A V_{GS} = 10V
Gate-Source Charge	Q_{gs}	—	49.9	—		
Gate-Drain Charge	Q_{gd}	—	28.7	—		
Turn-On Delay Time	$t_{D(ON)}$	—	29.3	—	ns	V_{DD} = 20V, V_{GS} = 10V I_D = 25A, R_g = 6Ω
Turn-On Rise Time	t_R	—	45.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	199.6	—		
Turn-Off Fall Time	t_F	—	108.7	—		
Body Diode Reverse-Recovery Time	t_{RR}	—	118.9	—	ns	I_F = 25A, di/dt = 100A/μs
Body Diode Reverse-Recovery Charge	Q_{RR}	—	363.4	—	nC	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

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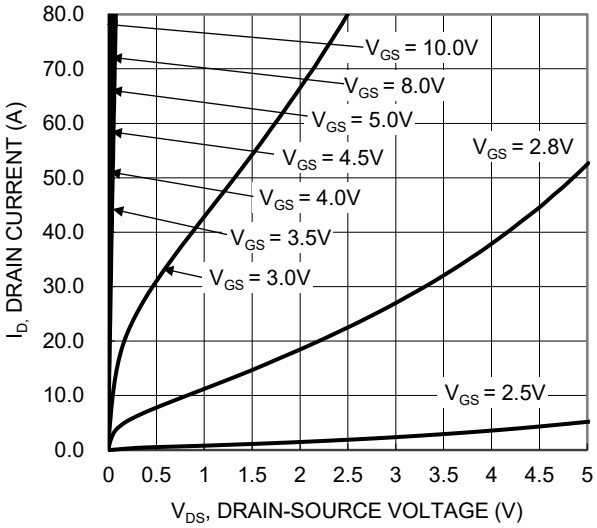


Figure 1. Typical Output Characteristic

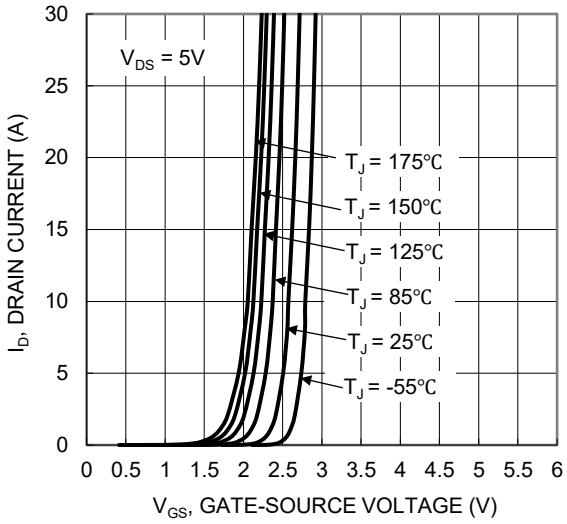


Figure 2. Typical Transfer Characteristic

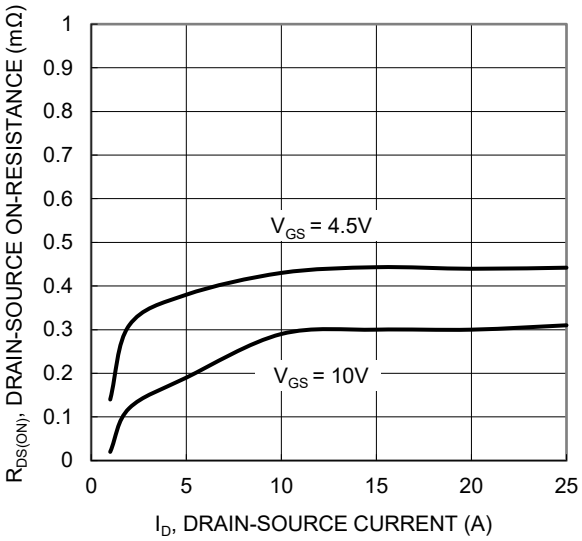


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

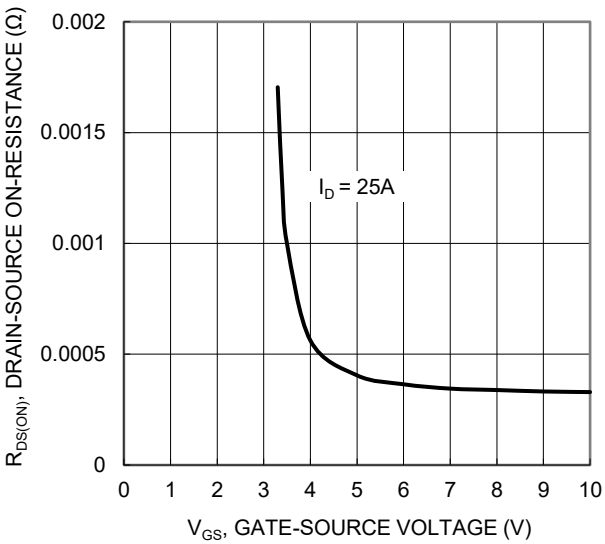


Figure 4. Typical Transfer Characteristic

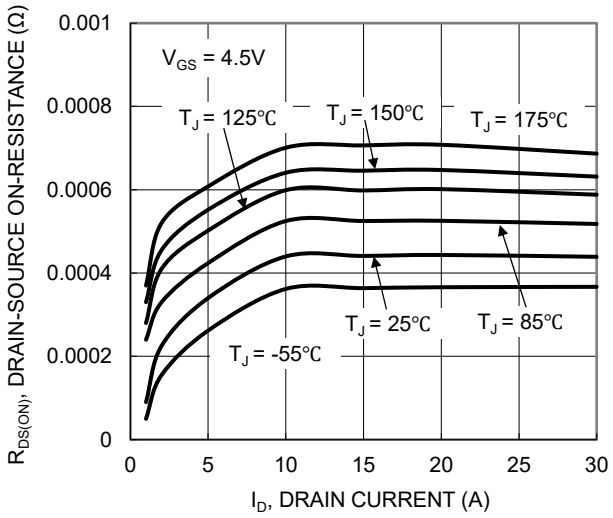


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

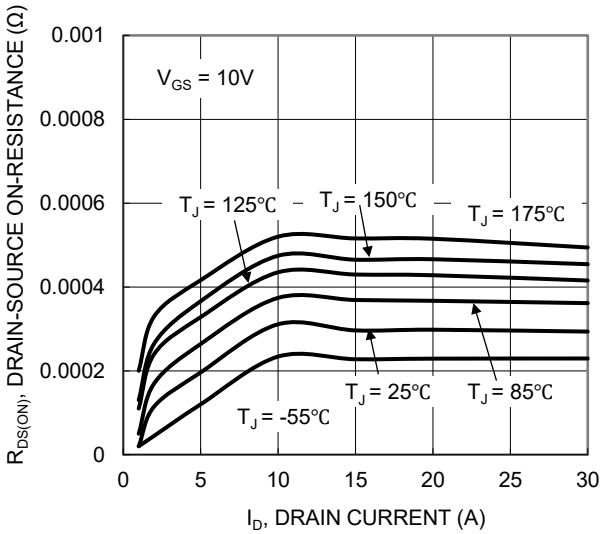


Figure 6. Typical On-Resistance vs. Drain Current and Junction Temperature

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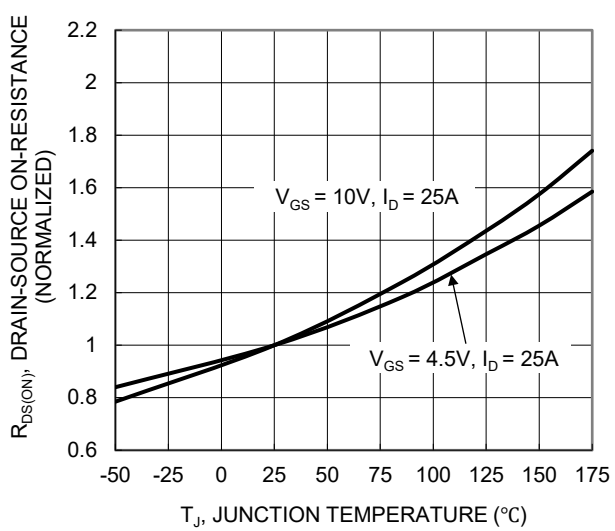


Figure 7. On-Resistance Variation with Junction Temperature

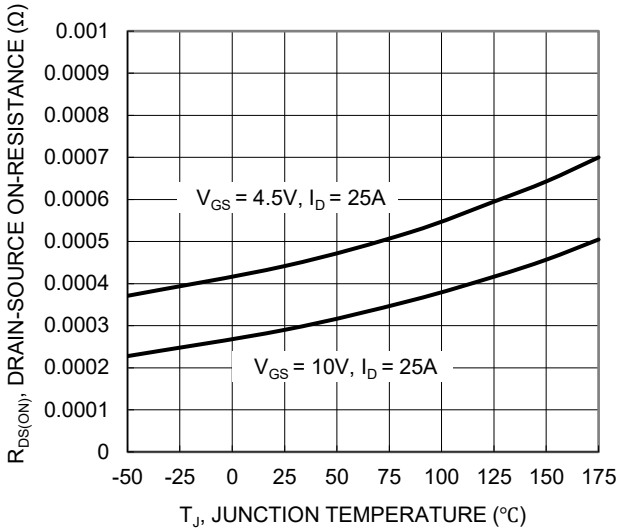


Figure 8. On-Resistance Variation with Junction Temperature

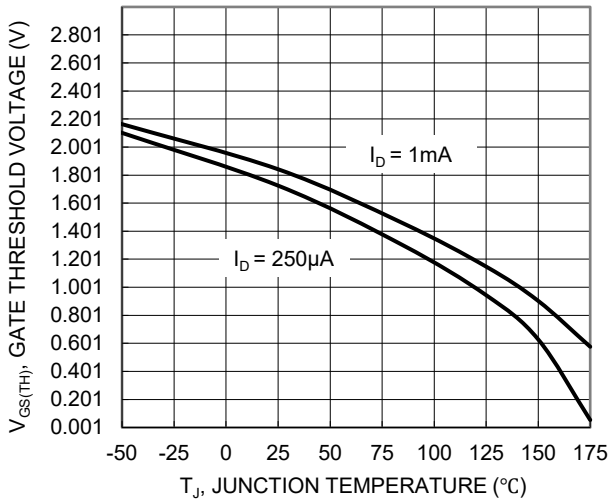


Figure 9. Gate Threshold Variation vs. Junction Temperature

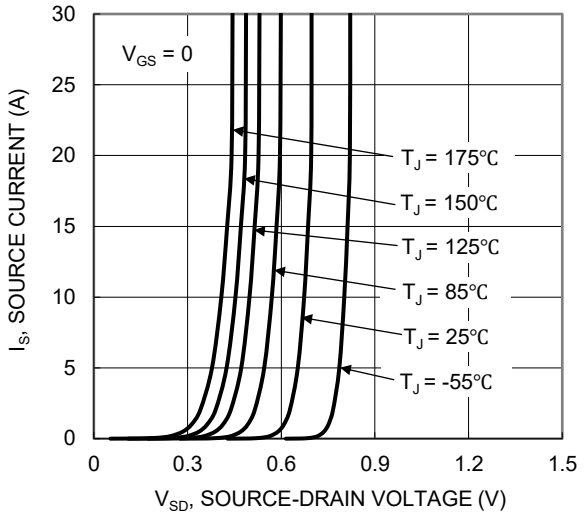


Figure 10. Diode Forward Voltage vs. Current

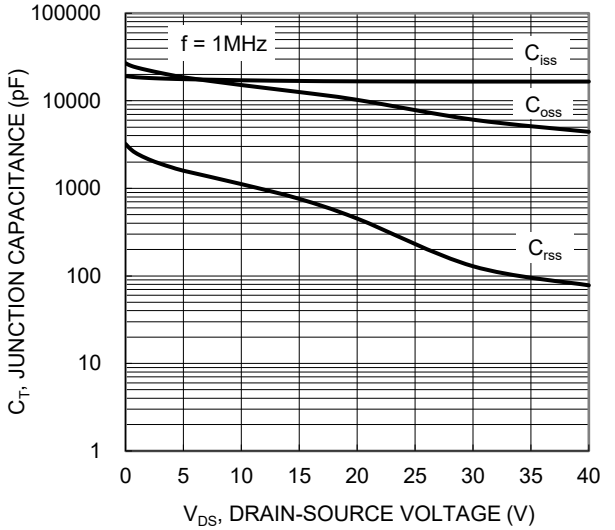


Figure 11. Typical Junction Capacitance

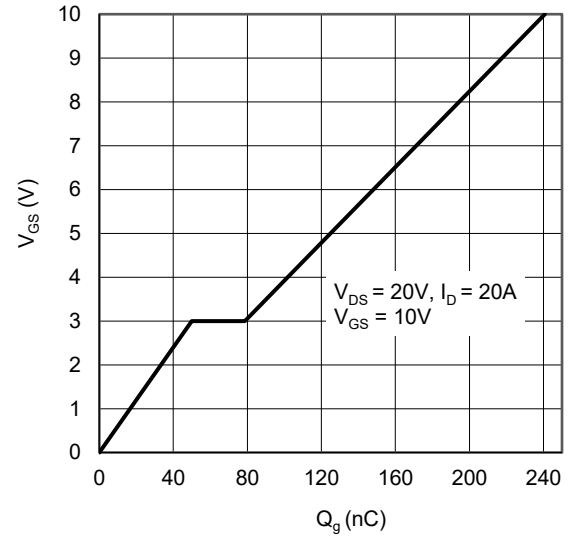


Figure 12. Gate Charge

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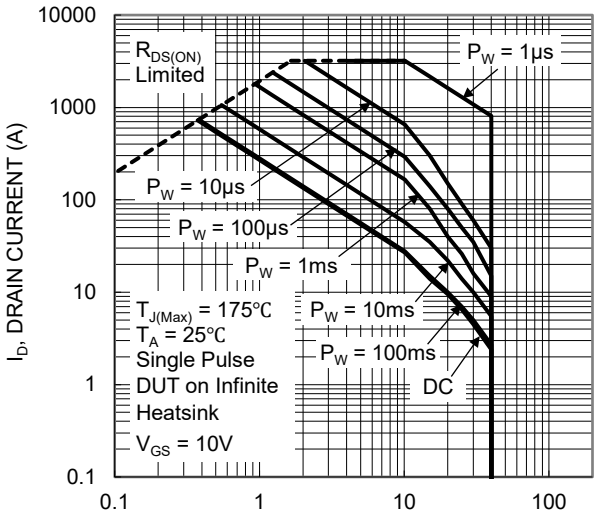


Figure 13. SOA, Safe Operation Area

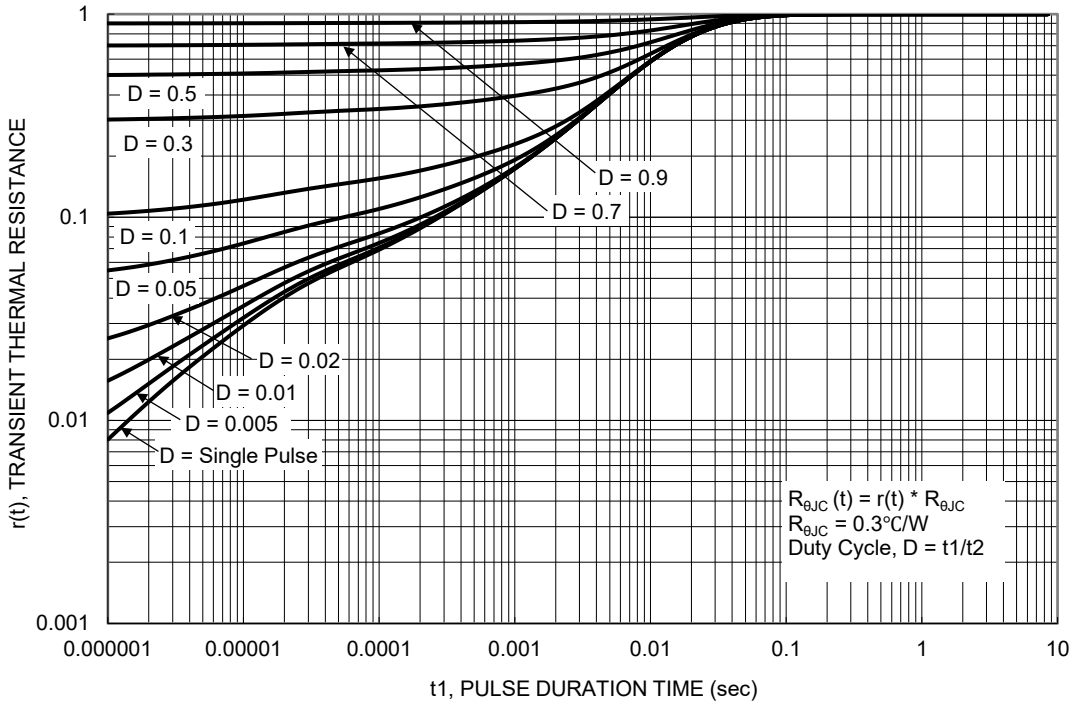


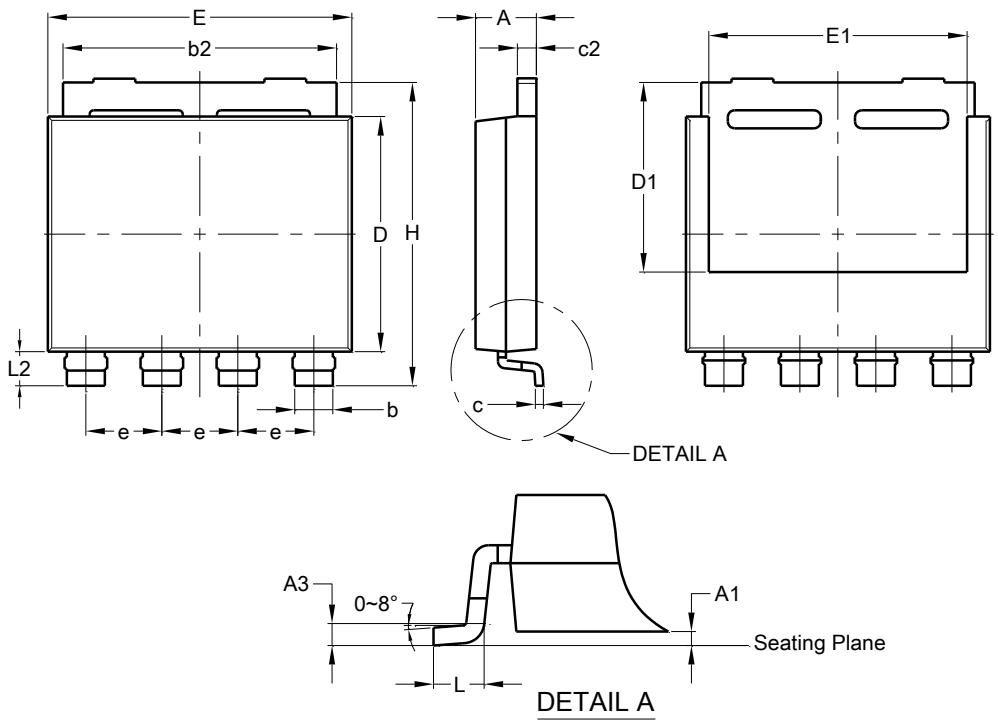
Figure 14. Transient Thermal Resistance

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Package Outline Dimensions

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

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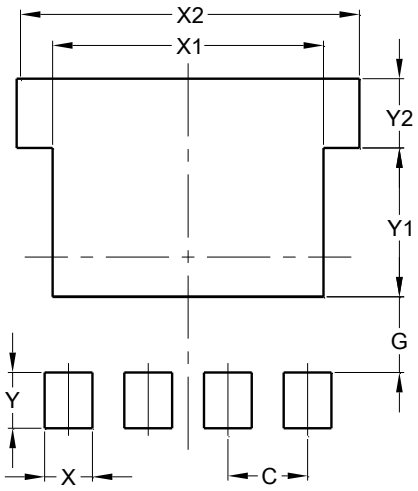


PowerDI8080-5			
Dim	**Min**	**Max**	**Typ**
A	1.50	1.70	--
A1	0.00	0.15	--
A3	--	--	0.25
b	0.90	1.10	--
b2	7.10	7.30	--
c	0.18	0.24	--
c2	0.47	0.57	--
D	6.10	6.30	--
D1	4.90	5.10	--
E	7.90	8.10	--
E1	6.70	6.90	--
e	--	--	2.00
H	7.80	8.10	--
L	0.60	0.80	--
L2	0.90	1.30	--
All Dimensions in mm			

Suggested Pad Layout

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

PowerDI8080-5



Dimensions	Value (in mm)
C	2.00
G	1.90
X	1.20
X1	6.80
X2	8.60
Y	1.40
Y1	3.74
Y2	1.76

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