

**Product Summary** (Typ. @  $V_{GS} = 4.5V$ ,  $T_A = +25^{\circ}C$ )

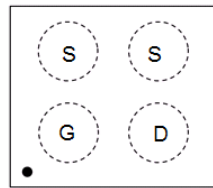
$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
12V	38m $\Omega$	4.0A

**Description**

This new generation MOSFET is engineered to minimize on-state losses and switch ultra-fast, making it ideal for high-efficiency power transfer. It uses Chip-Scale Package (CSP) to increase power density by combining low thermal impedance with minimal  $R_{DS(ON)}$  per footprint area.

**Applications**

- DC-DC Converters
- Battery Management
- Load Switch



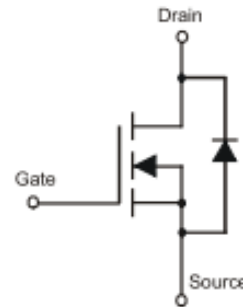
Top-View  
Pin Configuration

**Features**

- TR-MOS Technology with the Lowest  $R_{DS(ON)}$
- CSP with Footprint 0.81mm x 0.81mm (Typ.)
- Height = 0.29mm for Low Profile
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

**Mechanical Data**

- Case: X3-DSN0808-4
- Terminal Connections: See Diagram Below
- Terminal Finish: Matte Tin Annealed Over Copper Pillar<sup>Ⓔ</sup>
- UBM: 203 $\mu$ m



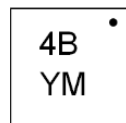
Equivalent Circuit

**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN1053UCP4-7	X3-DSN0808-4	3,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  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**



4B = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: E = 2017)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022
Code	D	E	F	G	H	I	J

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

## Maximum Ratings

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	12	V
Gate-Source Voltage	$V_{GSS}$	$\pm 8$	V
Continuous Source Current @ $V_{GS} = 4.5V$ (Note 5)	$I_D$	$T_A = +25^\circ C$	2.7
		$T_A = +70^\circ C$	2.2
Continuous Source Current @ $V_{GS} = 4.5V$ (Note 6)	$I_D$	$T_A = +25^\circ C$	4.0
		$T_A = +70^\circ C$	3.2
Pulsed Drain Current (Pulse Duration 10 $\mu s$ , Duty Cycle $\leq 1\%$ )	$I_{DM}$	8	A
Continuous Source-Drain Diode Current	$I_S$	0.74	A
Pulse Diode Forward Current	$I_{SM}$	15	A

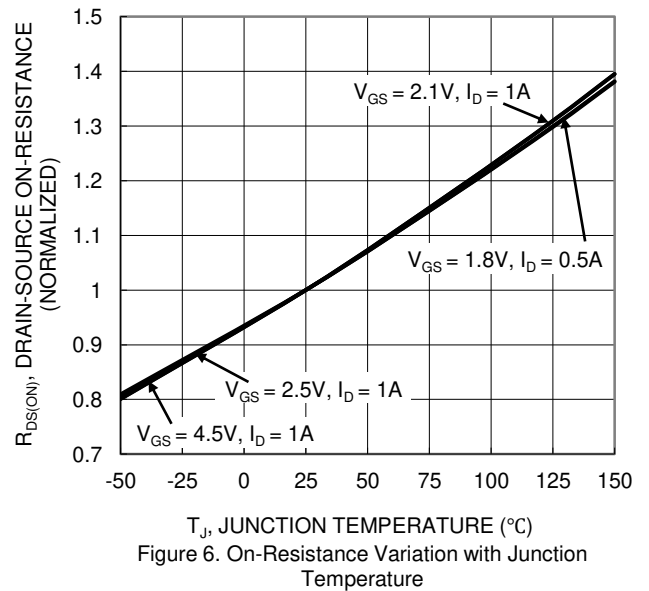
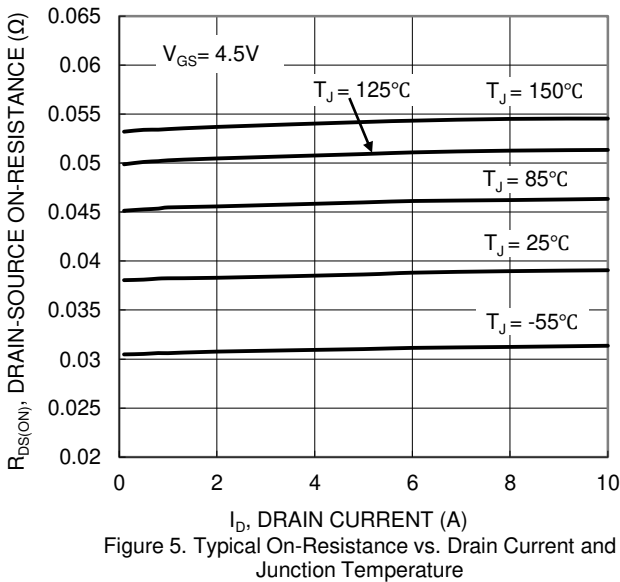
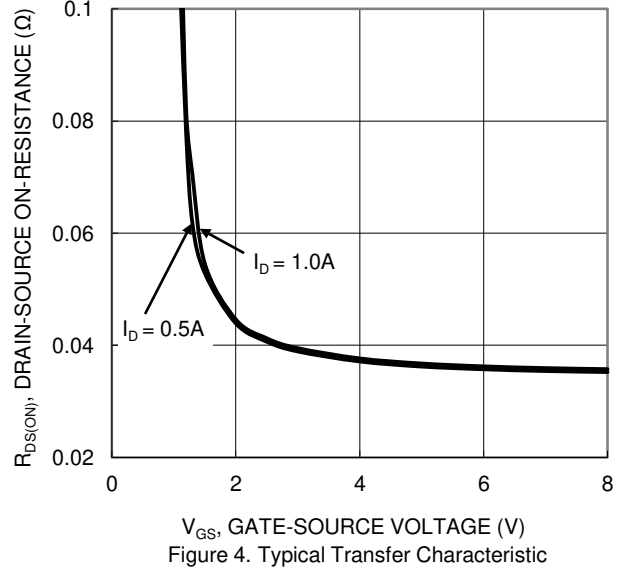
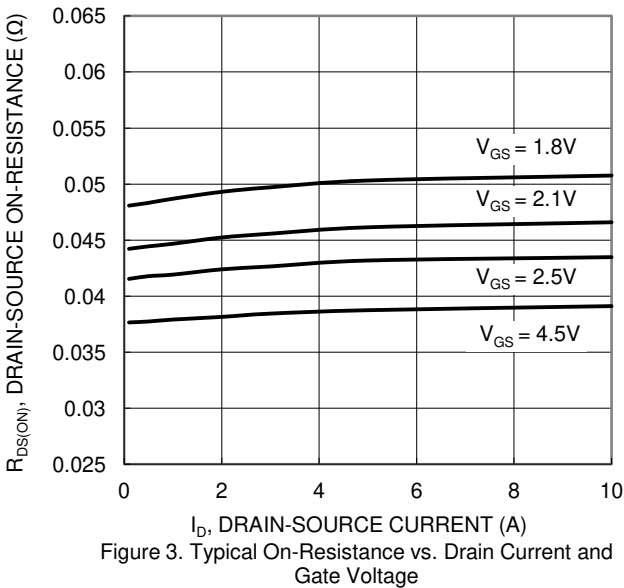
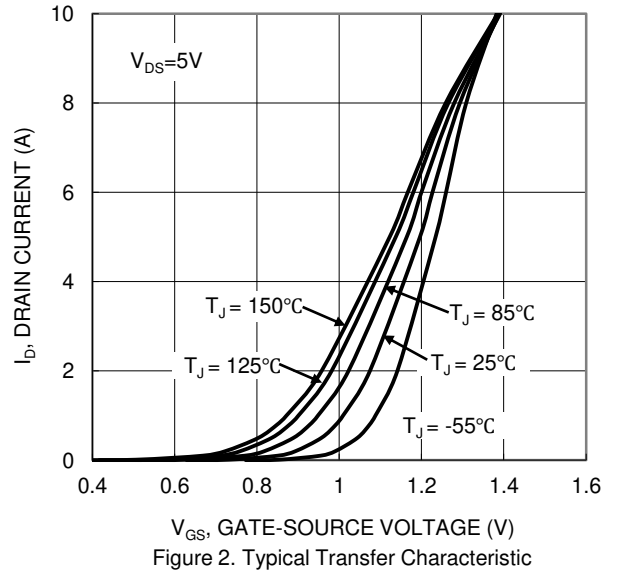
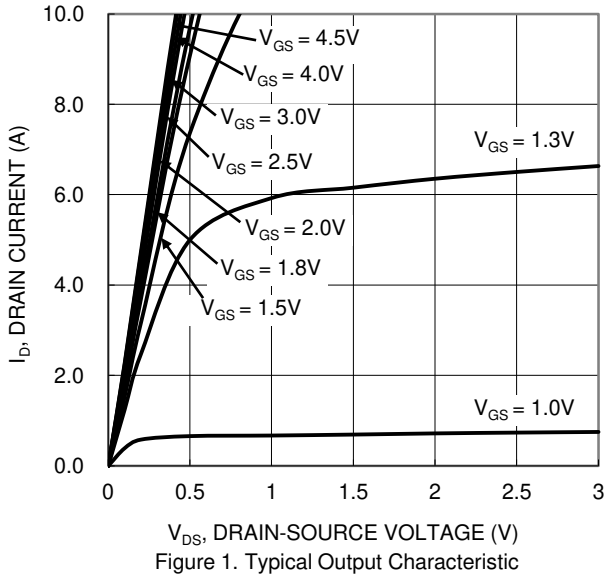
## Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	0.74	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	167	$^\circ C/W$
Total Power Dissipation (Note 6)	$P_D$	1.34	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	93	$^\circ C/W$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ C$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
<b>OFF CHARACTERISTICS (Note 7)</b>							
Drain-Source Breakdown Voltage	$BV_{DSS}$	12	-	-	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	1.0	$\mu A$	$V_{DS} = 9.6V, V_{GS} = 0V$	
Gate-Body Leakage	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS} = \pm 8V, V_{DS} = 0V$	
<b>ON CHARACTERISTICS (Note 7)</b>							
Gate Threshold Voltage	$V_{GS(TH)}$	0.35	0.5	0.7	V	$V_{DS} = V_{GS}, I_D = 250\mu A$	
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	38	42	m $\Omega$	$V_{GS} = 4.5V, I_D = 1.0A$	
			42	50			$V_{GS} = 2.5V, I_D = 1.0A$
			45	53			$V_{GS} = 2.1V, I_D = 1.0A$
			49	65			$V_{GS} = 1.8V, I_D = 0.5A$
			57	80			$V_{GS} = 1.5V, I_D = 0.2A$
			82	110			$V_{GS} = 1.2V, I_D = 0.1A$
Forward Transfer Admittance	$ Y_{fs} $	-	6.0	-	S	$V_{DS} = 6V, I_S = 1.0A$	
Body Diode Forward Voltage	$V_{SD}$	-	0.7	1	V	$V_{GS} = 0V, I_S = 1.0A$	
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>							
Input Capacitance	$C_{iss}$	-	612	908	pF	$V_{DS} = 6V, V_{GS} = 0V,$ $f = 1.0MHz$	
Output Capacitance	$C_{oss}$	-	91	127	pF		
Reverse Transfer Capacitance	$C_{rss}$	-	84	126	pF		
Gate Resistance	$R_g$	-	1.3	2.6	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$	
Total Gate Charge	$Q_g$	-	7.2	15	nC	$V_{GS} = 4.5V, V_{DS} = 6V,$ $I_D = 1.0A$	
Gate-Source Charge	$Q_{gs}$	-	0.6	-	nC		
Gate-Drain Charge	$Q_{gd}$	-	1.3	-	nC		
Turn-On Delay Time	$t_{D(ON)}$	-	3.6	10	ns	$V_{DD} = 6V, I_D = 1.0A$ $V_{GEN} = 4.5V, R_G = 1\Omega, R_L = 6\Omega$	
Turn-On Rise Time	$t_R$	-	6.0	14	ns		
Turn-Off Delay Time	$t_{D(OFF)}$	-	13.5	32	ns		
Turn-Off Fall Time	$t_F$	-	2	4	ns		
Reverse Recovery Charge	$Q_{RR}$	-	0.7	1.5	nC	$I_F = 1A, di/dt = 100A/\mu s$	
Body Diode Reverse Recovery Time	$t_{RR}$	-	6.4	14	ns		

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.



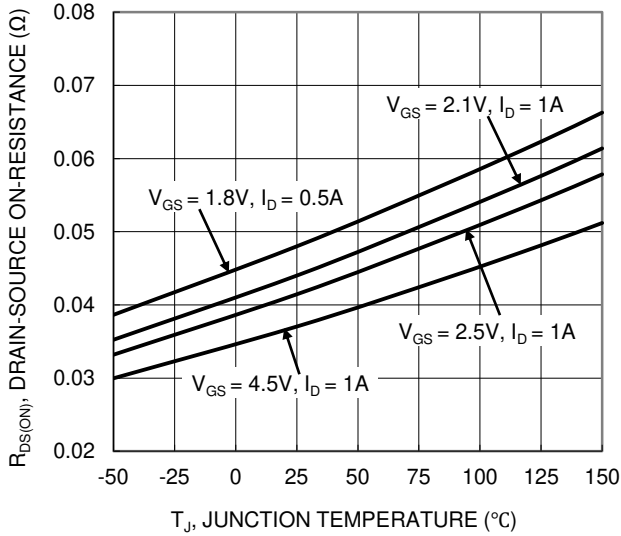


Figure 7. On-Resistance Variation with Junction Temperature

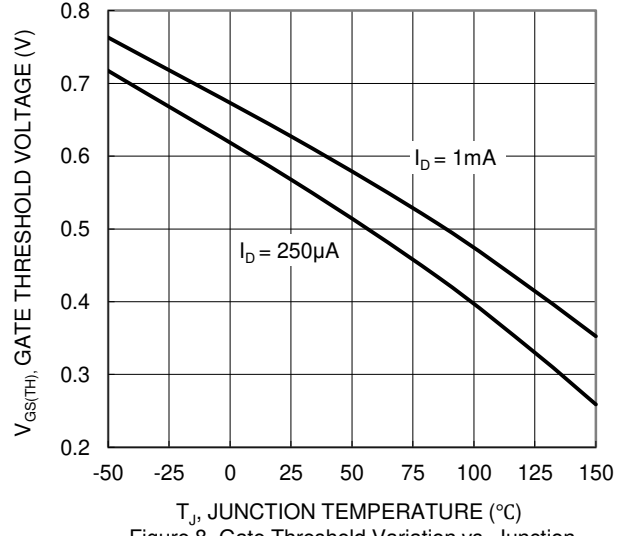


Figure 8. Gate Threshold Variation vs. Junction Temperature

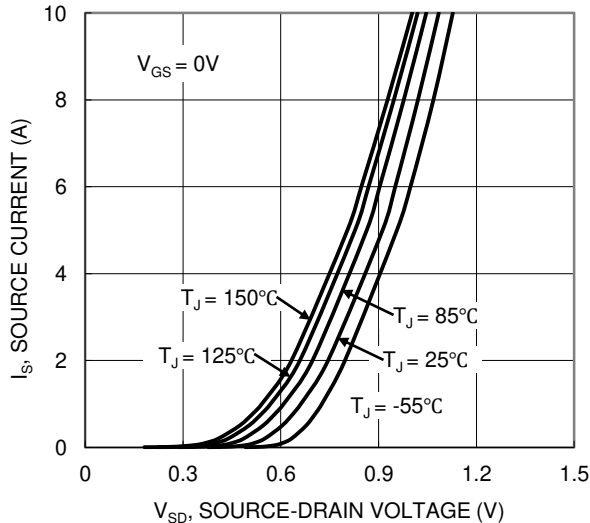


Figure 9. Diode Forward Voltage vs. Current

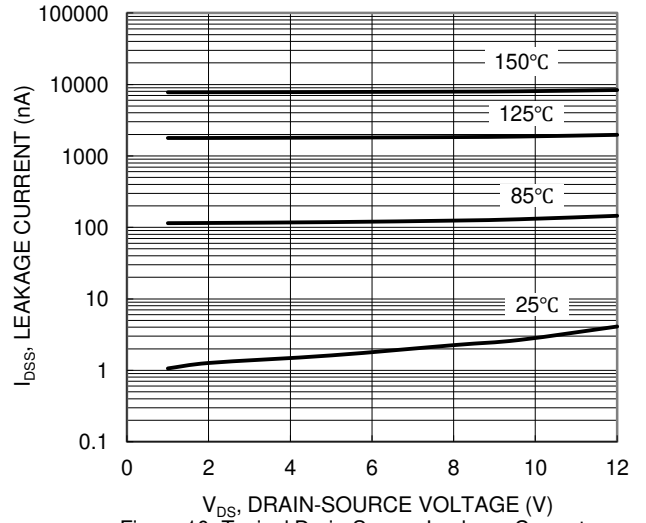


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

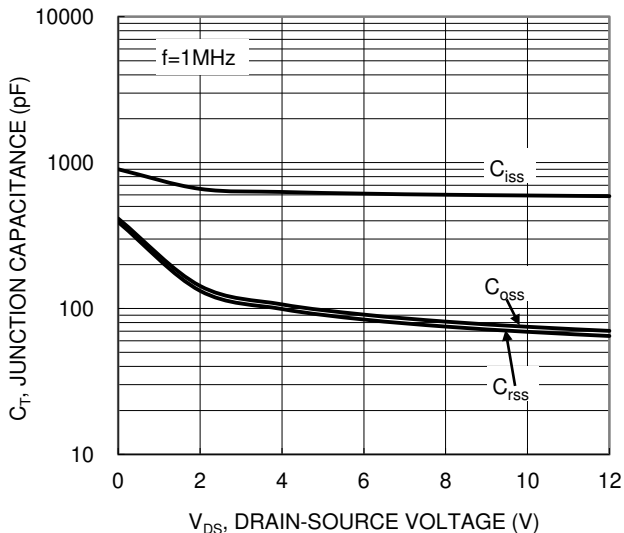


Figure 11. Typical Junction Capacitance

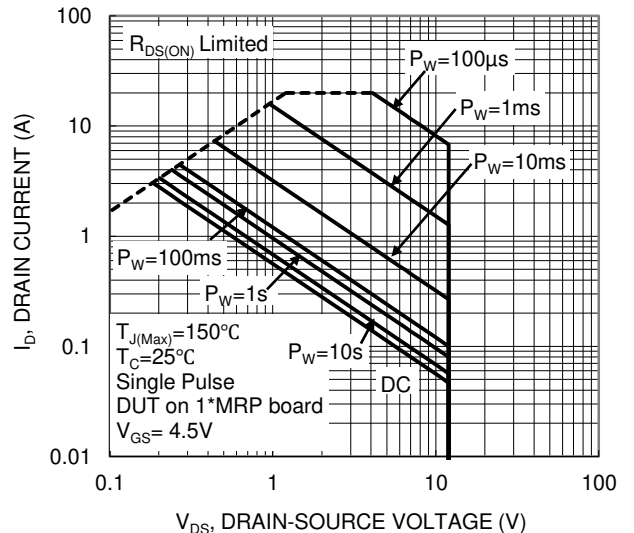


Figure 12. SOA, Safe Operation Area

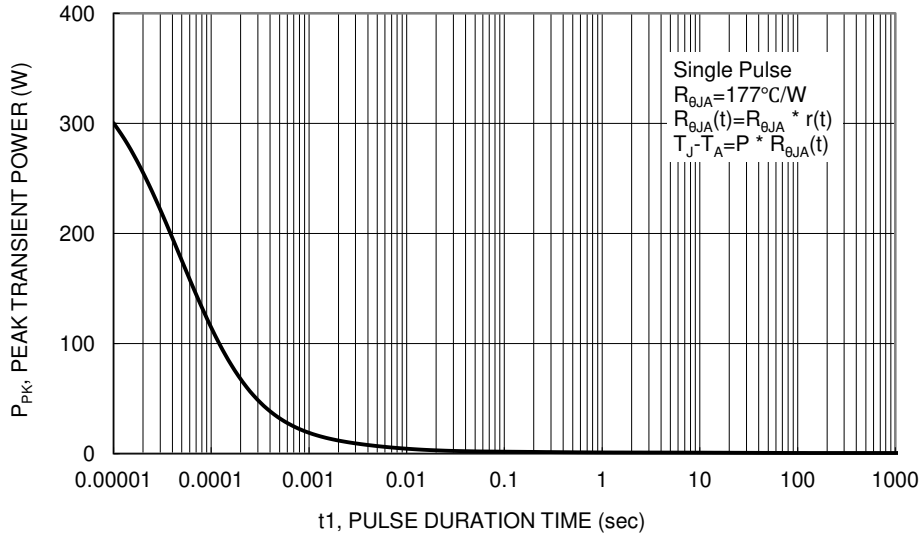


Figure 13. Single Pulse Maximum Power Dissipation

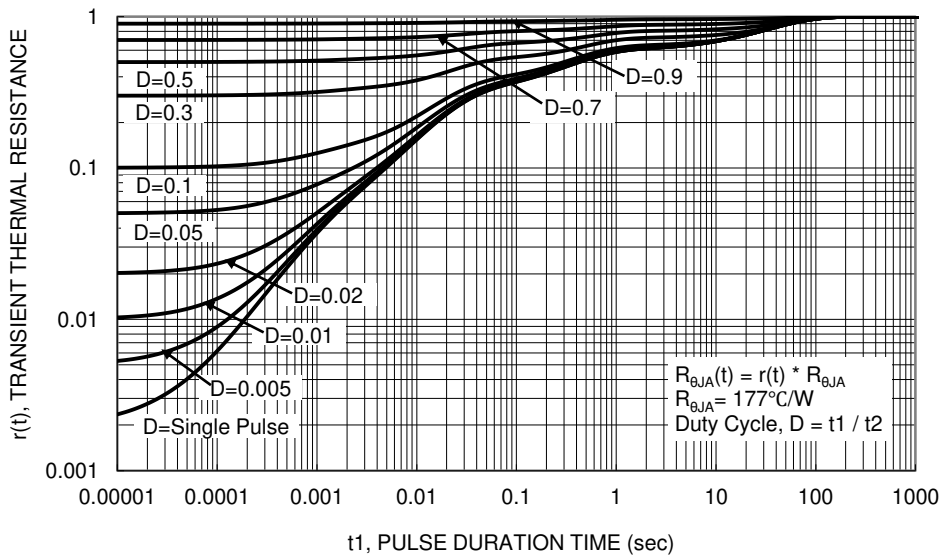
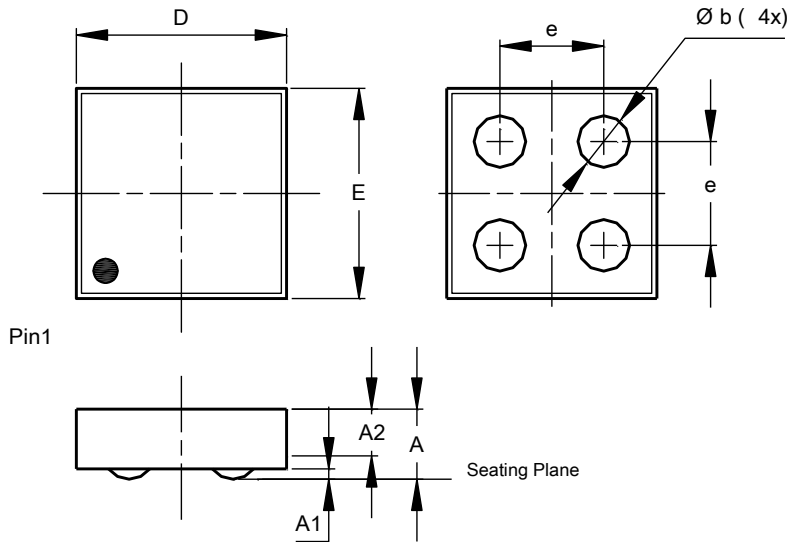


Figure 14. Transient Thermal Resistance

**Package Outline Dimensions**

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

**X3-DSN0808-4**

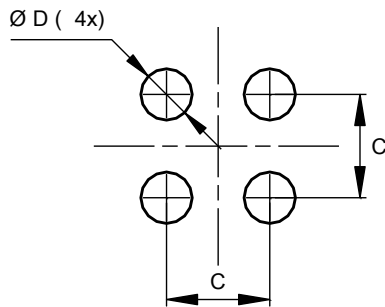


X3-DSN0808-4			
Dim	Min	Max	Typ
A	0.2510	0.2890	0.2700
A1	0.0360	0.0440	0.0400
A2	0.2150	0.2450	0.2300
b	0.1836	0.2244	0.2040
D	0.7900	0.8300	0.810
E	0.7900	0.8300	0.810
e	-	-	0.400
All Dimensions in mm			

**Suggested Pad Layout**

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

**X3-DSN0808-4**



Dimensions	Value (in mm)
C	0.400
D	0.2040

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