

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
-20V	1.9Ω @ V _{GS} = -4.5V	-0.51A
	2.4Ω @ V _{GS} = -2.5V	-0.46A
	3.4Ω @ V _{GS} = -1.8V	-0.38A
	5.0Ω @ V _{GS} = -1.5V	-0.31A

Description

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.

Applications

- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

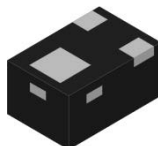
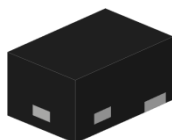
Features and Benefits

- Low Package Profile
- 0.6mm × 0.4mm Package Footprint
- Low On-Resistance
- Very Low Gate Threshold Voltage: -1.0V Max
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

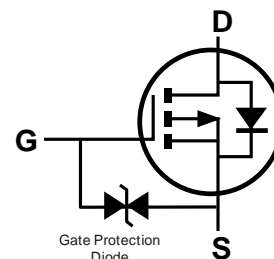
Mechanical Data

- Case: X2-DFN0604-3
- Case 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 Lead-Frame. Solderable per MIL-STD-202, Method 208 **(3)**
- Weight: 0.001 grams (Approximate)

X2-DFN0604-3



Top View
Package Pin Configuration



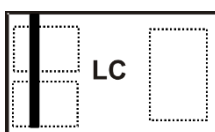
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP22D5UFO-7B	X2-DFN0604-3	10,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 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



Top View
Bar Denotes Gate
and Source Side

LC = Product Type Marking Code

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	± 8	V
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-0.51	A
		$T_A = +85^\circ\text{C}$		-0.41	
Pulsed Drain Current (Note 6)			I_{DM}	-0.6	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	Steady State	P_D	0.77	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	163	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	Steady State	P_D	0.34	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	368	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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}	-20	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 5\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.95	1.9	Ω	$V_{GS} = -4.5\text{V}, I_D = -100\text{mA}$
		—	1.2	2.4		$V_{GS} = -2.5\text{V}, I_D = -50\text{mA}$
		—	1.4	3.4		$V_{GS} = -1.8\text{V}, I_D = -20\text{mA}$
		—	1.7	5.0		$V_{GS} = -1.5\text{V}, I_D = -10\text{mA}$
Diode Forward Voltage	V_{SD}	—	-0.5	-1.1	V	$V_{GS} = 0\text{V}, I_S = -10\text{mA}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	17	—	pF	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	4.1	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.7	—	pF	
Gate Resistance	R_g	—	3.3	—	k Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge	Q_g	—	0.3	—	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -10\text{V}, I_D = -250\text{mA}$
Gate-Source Charge	Q_{gs}	—	0.04	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	7.3	—	ns	$V_{DD} = -15\text{V}, V_{GS} = -4.5\text{V}, R_G = 2\Omega, I_D = -200\text{mA}$
Turn-On Rise Time	t_R	—	20.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	185	—	ns	
Turn-Off Fall Time	t_F	—	97	—	ns	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 - Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided. 10 μs pulse duty cycle = 1%.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

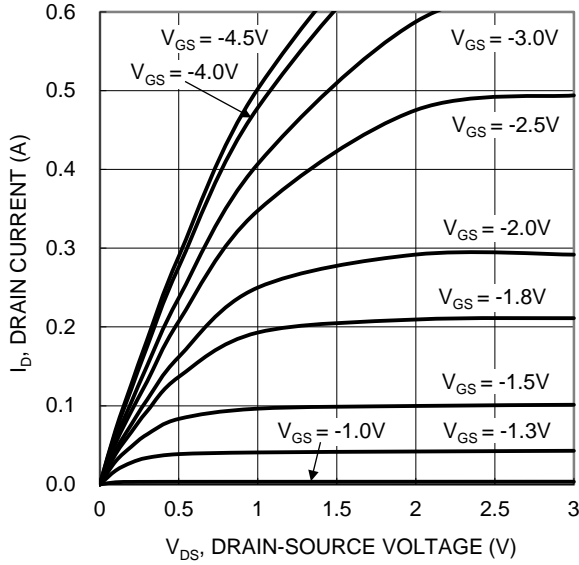


Figure 1. Typical Output Characteristic

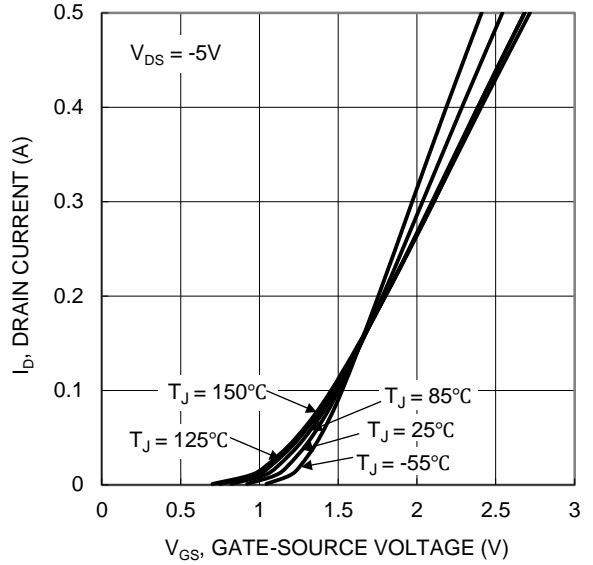


Figure 2. Typical Transfer Characteristic

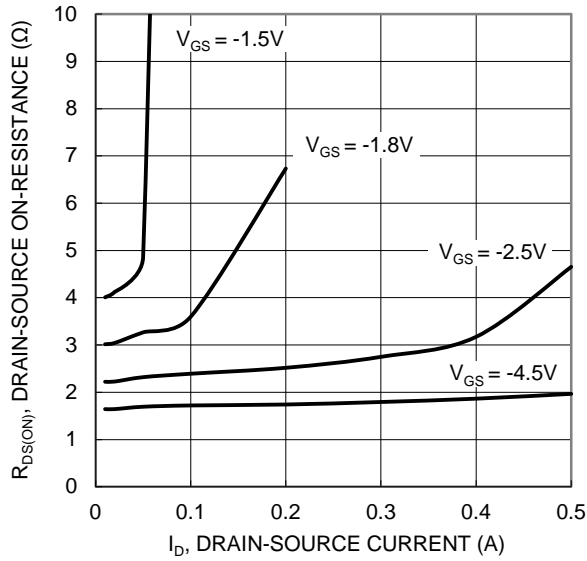


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

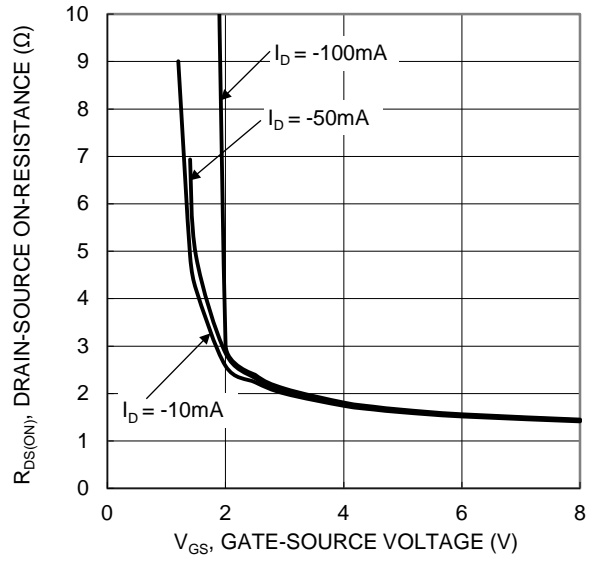


Figure 4. Typical Transfer Characteristic

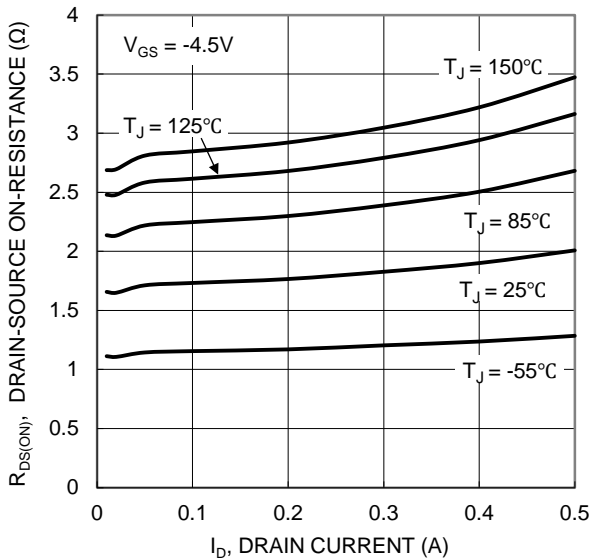


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

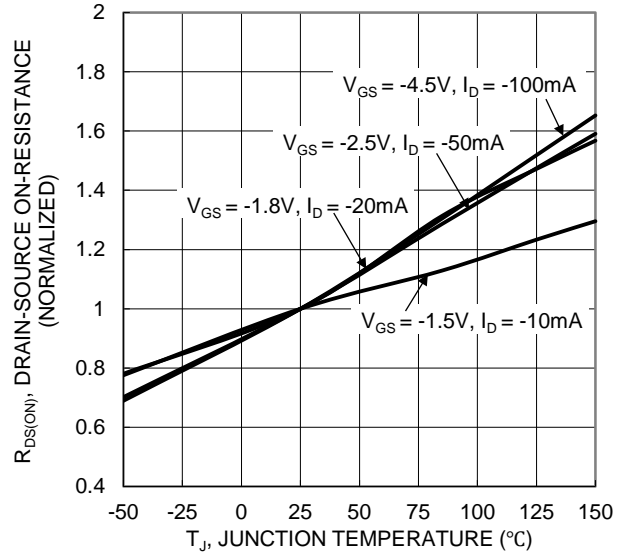


Figure 6. On-Resistance Variation with Junction Temperature

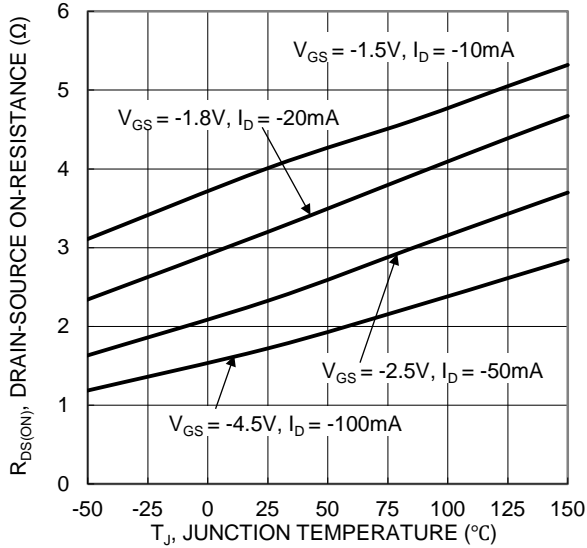


Figure 7. On-Resistance Variation with Junction Temperature

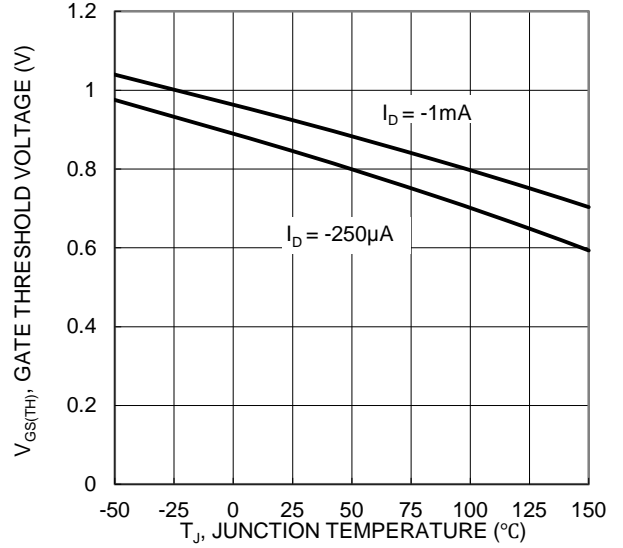


Figure 8. Gate Threshold Variation vs. Junction Temperature

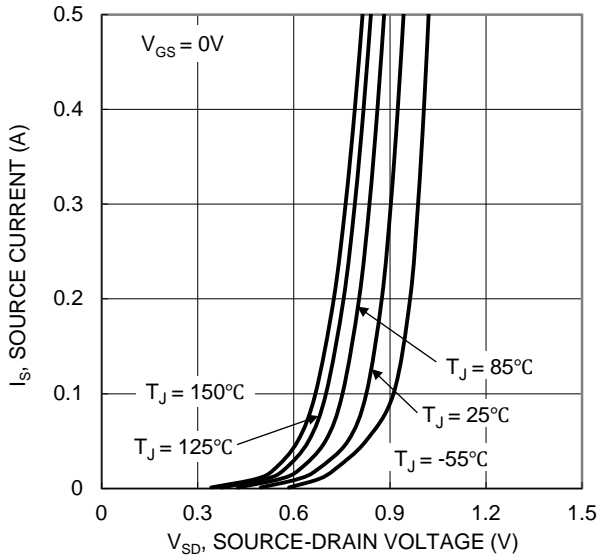


Figure 9. Diode Forward Voltage vs. Current

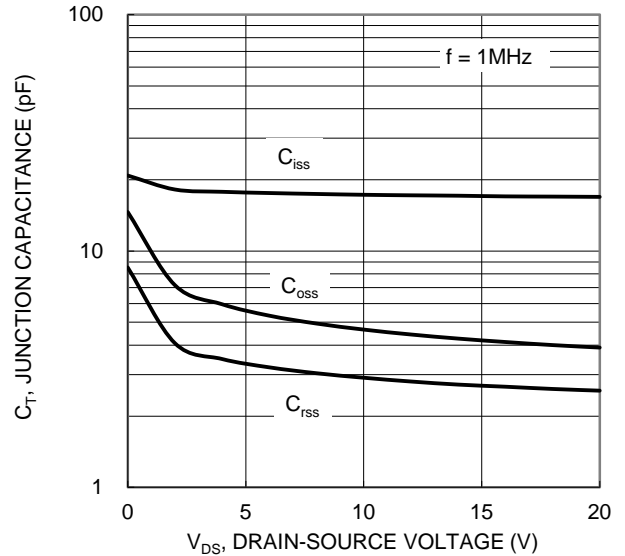


Figure 10. Typical Junction Capacitance

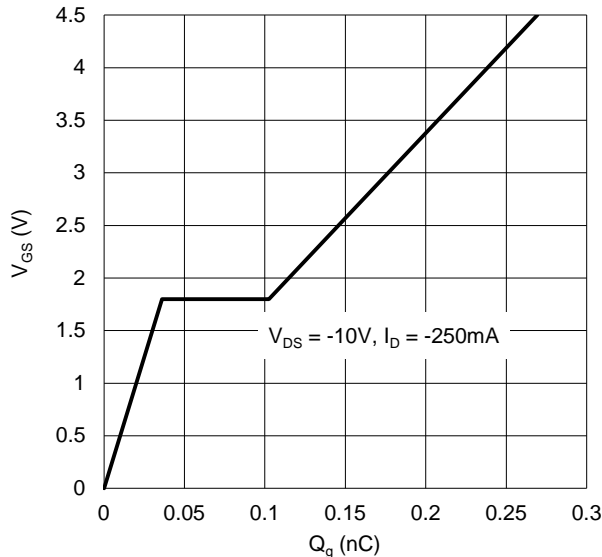


Figure 11. Gate Charge

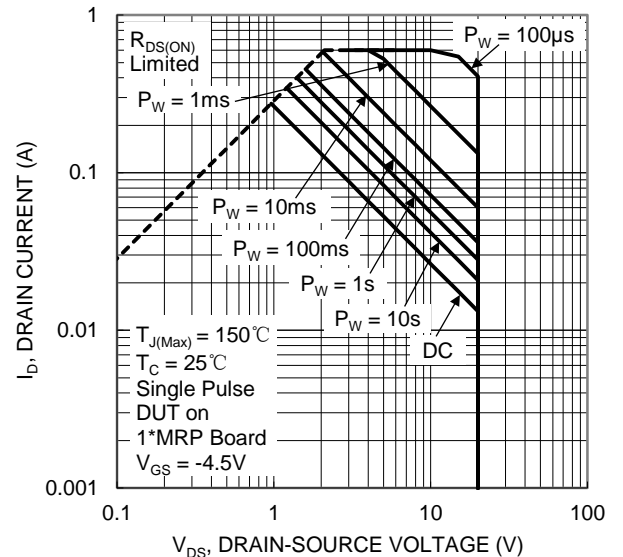


Figure 12. SOA, Safe Operation Area

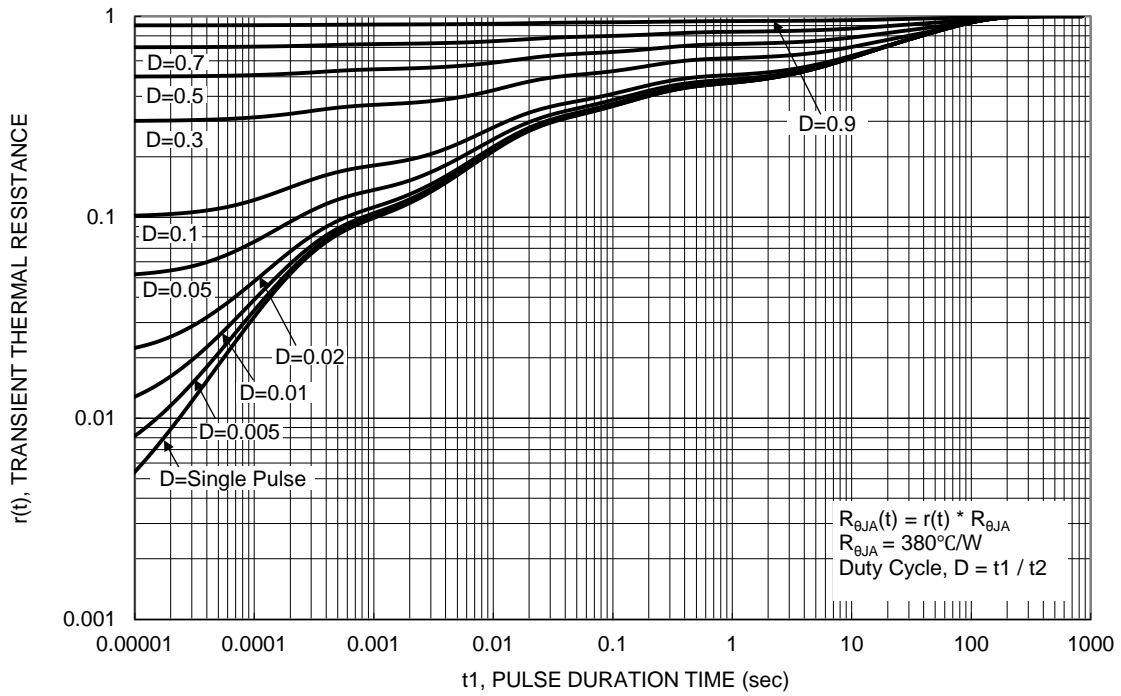
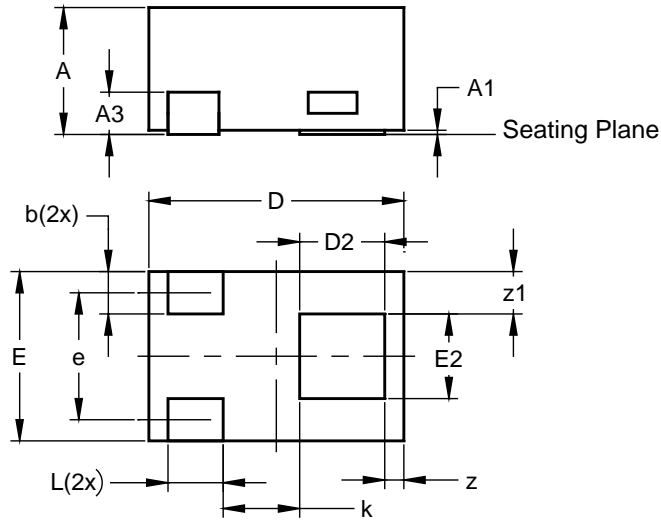


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

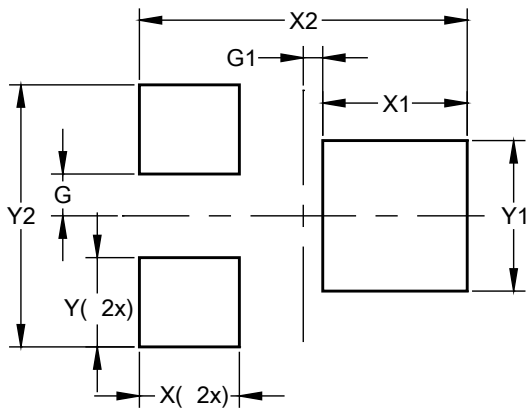
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



X2-DFN0604-3			
Dim	Min	Max	Typ
A	--	0.40	0.36
A1	0.00	0.03	0.02
A3	--	--	0.10
b	0.07	0.15	0.10
D	0.55	0.65	0.60
D2	0.15	0.25	0.20
E	0.35	0.45	0.40
E2	0.15	0.25	0.20
e	--	--	0.30
k	0.15	--	--
L	0.10	0.18	0.13
z	--	--	0.045
z1	--	--	0.10
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
G	0.075
G1	0.035
X	0.180
X1	0.260
X2	0.590
Y	0.160
Y1	0.270
Y2	0.470

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