

Product Summary (Typ. @ $V_{GS} = 3.3V$, $T_A = +25^\circ C$)

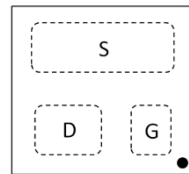
V_{DSS}	$R_{DS(ON)}$	Q_g	Q_{gd}	I_D
12V	14.1m Ω	10.5nC	4.1nC	7.5A

Description

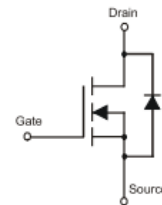
This new generation MOSFET is engineered to minimize on-state losses and switch ultra-fast, making it ideal for high efficiency power transfer. Using Chip-Scale Package (CSP) to increase power density by combining low thermal impedance with minimal $R_{DS(ON)}$ per footprint area.

Applications

- DC-DC Converters
- Battery Management
- Load Switch



Top-View
Pin Configuration



Equivalent Circuit

Features

- TR-MOS Technology with the Lowest $R_{DS(ON)}$:
 $R_{DS(ON)} = 14.1m\Omega$ to Minimize On-State Losses
- CSP with Footprint 1.0mm x 1.0mm
- Height = 0.29mm for Low Profile
- **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: X3-DSN1010-3
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminal Finish: Matte Tin Annealed Over Copper Pillar (E3)
- Solder Cap Material: SnAg (Ag: 2.0+/-0.5%)
- Weight: 0.00062 grams (Approximate)

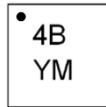
Ordering Information (Note 4)

Part Number	Case	Packaging
DMN1017UCP3-7	X3-DSN1010-3	3000/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 (Note 5)

Marking 1

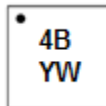


4B = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: 1 = 2021)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2017	...	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	E	...	I	J	K	L	M	N	O	P	R	S
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

Marking 2



4B = Product Type Marking Code
 YW = Date Code Marking
 Y or \bar{Y} = Year (ex: 1 = 2021)
 W or \bar{W} = Week (ex: a = Week 27; z Represents Week 52 and 53)

Date Code Key

Year	2017	...	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	7	...	1	2	3	4	5	6	7	8	9	0
Week	1-26			27-52				53				
Code	A-Z			a-z				z				

Note: 5. The marking code changed to Marking 2 from week 6, 2021.

Maximum Ratings

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V_{DS}	12	V	
Gate-Source Voltage	V_{GS}	± 8	V	
Continuous Drain Current @ $V_{GS} = 3.3V$ (Note 6)	I_D	$T_A = +25^\circ C$	5.4	A
		$T_A = +70^\circ C$	4.3	A
Continuous Drain Current @ $V_{GS} = 3.3V$ (Note 7)	I_D	$T_A = +25^\circ C$	7.5	A
		$T_A = +70^\circ C$	6.1	A
Pulsed Drain Current (Pulse Duration 10 μs , Duty Cycle $\leq 1\%$)	I_{DM}	15	A	
Continuous Source-Drain Diode Current (Note 7)	I_S	1.47	A	
Pulse Diode Forward Current (Note 7)	I_{SM}	15	A	

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P_D	0.74	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	167	$^\circ C/W$
Total Power Dissipation (Note 7)	P_D	1.47	W
Thermal Resistance, Junction to Ambient (Note 7)	$R_{\theta JA}$	85	$^\circ C/W$
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
OFF CHARACTERISTICS (Note 8)						
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	μA	$V_{DS} = 9.6V, V_{GS} = 0V$
Gate-Body Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 8V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.4	0.7	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	14.1	17.0	m Ω	$V_{GS} = 3.3V, I_D = 5.0A$
		—	14.4	19.0		$V_{GS} = 3.0V, I_D = 5.0A$
		—	15.5	21.0		$V_{GS} = 2.5V, I_D = 5.0A$
		—	16.0	23.0		$V_{GS} = 2.3V, I_D = 5.0A$
		—	16.8	24.0		$V_{GS} = 2.1V, I_D = 5.0A$
		—	21.3	34.0		$V_{GS} = 2.1V, I_D = 5.0A, +125^\circ C$ (Note 9)
		—	20.0	30.0		$V_{GS} = 1.8V, I_D = 3.0A$
Forward Transfer Admittance	$ Y_{fs} $	—	6.6	—	S	$V_{DS} = 6V, I_S = 1.0A$
Body Diode Forward Voltage	V_{SD}	—	0.7	1	V	$V_{GS} = 0V, I_S = 1.0A$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1002	1503	pF	$V_{DS} = 6V, V_{GS} = 0V,$ $f = 1.0MHz$
Output Capacitance	C_{oss}	—	312	468	pF	
Reverse Transfer Capacitance	C_{rss}	—	259	389	pF	
Gate Resistance	R_g	—	2.2	4.4	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge	Q_g	—	10.5	16	nC	$V_{GS} = 3.3V, V_{DS} = 6V,$ $I_D = 5.0A$
Gate-Source Charge	Q_{gs}	—	1.0	1.5	nC	
Gate-Drain Charge	Q_{gd}	—	4.1	6.2	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.7	10	ns	$V_{DD} = 6V, I_D = 5.0A$ $V_{GEN} = 4.5V, R_G = 1\Omega, R_L = 1.2\Omega$
Turn-On Rise Time	t_R	—	6.3	15	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	17.9	35	ns	
Turn-Off Fall Time	t_F	—	7.5	15	ns	
Reverse Recovery Charge	Q_{RR}	—	2.7	5	nC	
Body Diode Reverse Recovery Time	t_{RR}	—	14.2	28	ns	$I_F = 5A, di/dt = 100A/\mu s$

- 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.

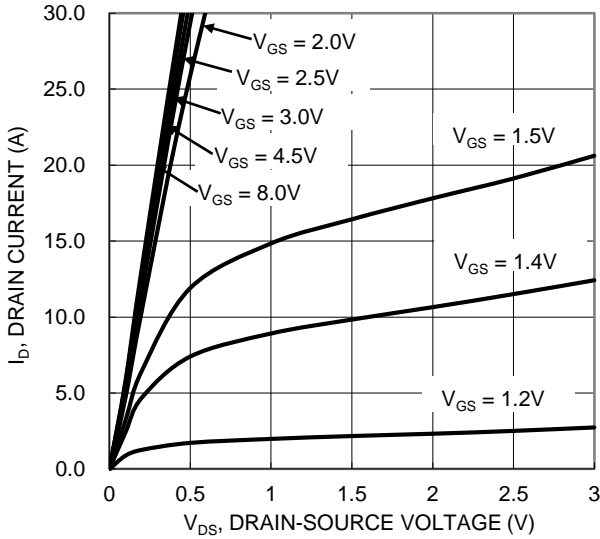


Figure 1. Typical Output Characteristic

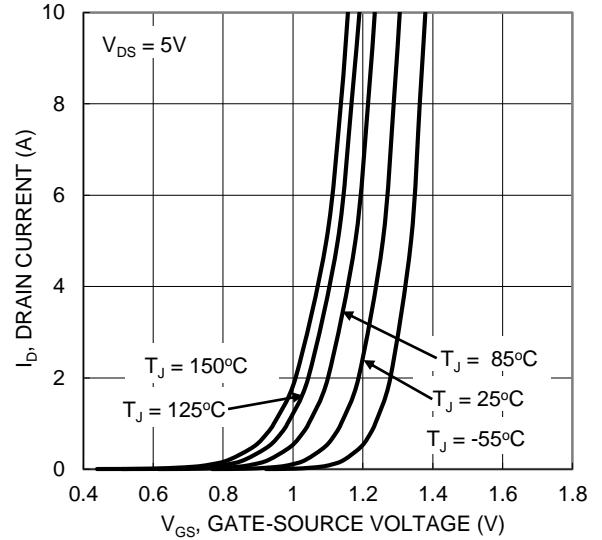


Figure 2. Typical Transfer Characteristic

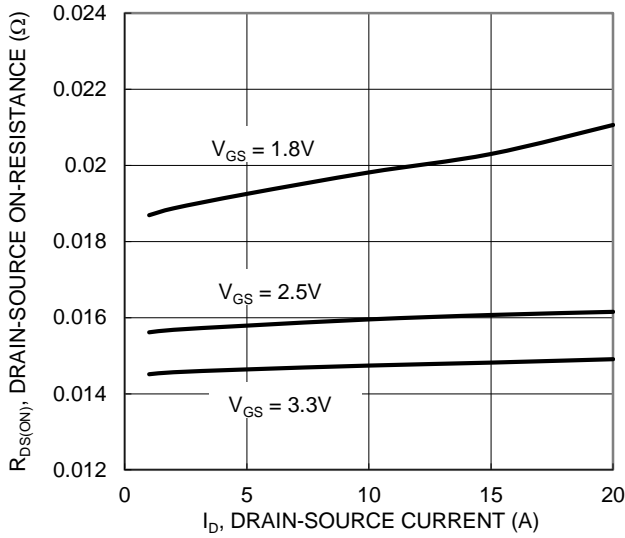


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

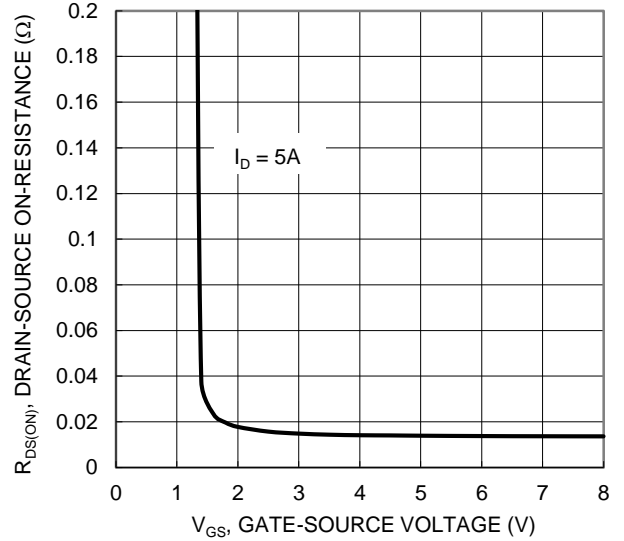


Figure 4. Typical Transfer Characteristic

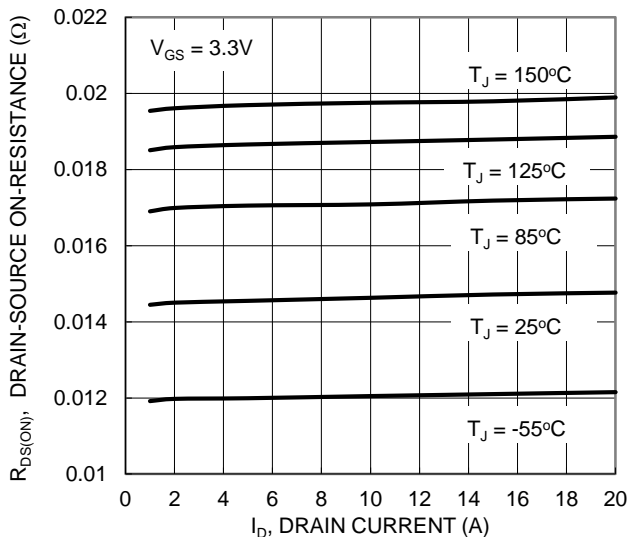


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

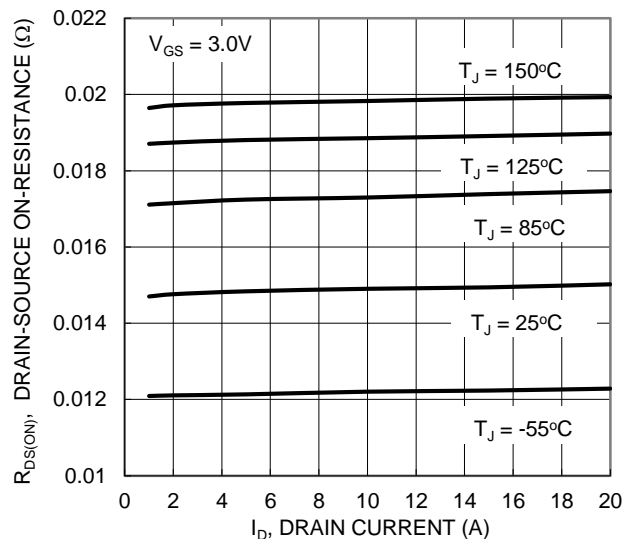


Figure 6. Typical On-Resistance vs. Drain Current and Junction Temperature

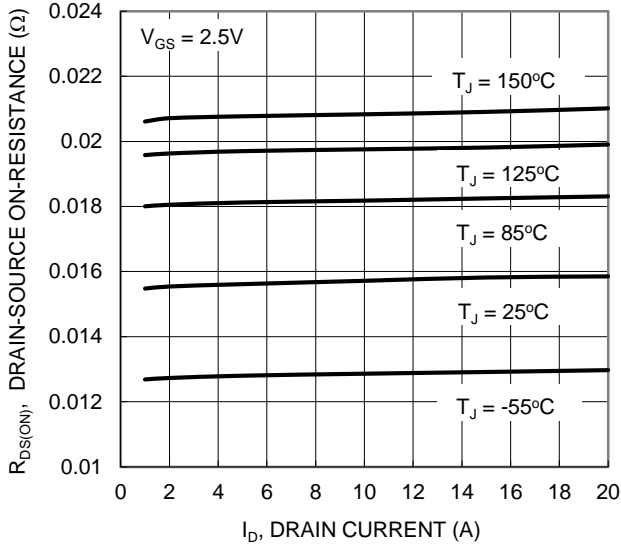


Figure 7. Typical On-Resistance vs. Drain Current and Junction Temperature

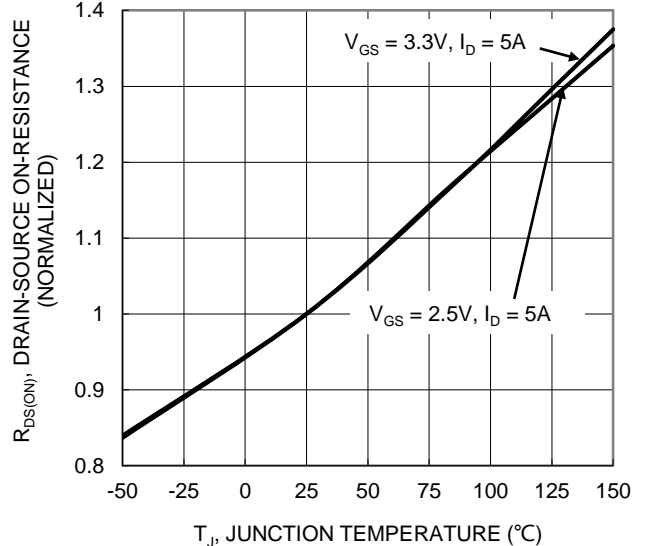


Figure 8. On-Resistance Variation with Junction Temperature

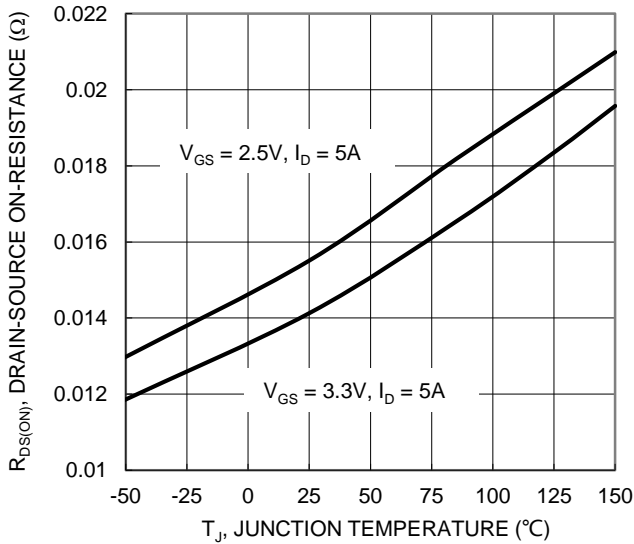


Figure 9. On-Resistance Variation with Junction Temperature

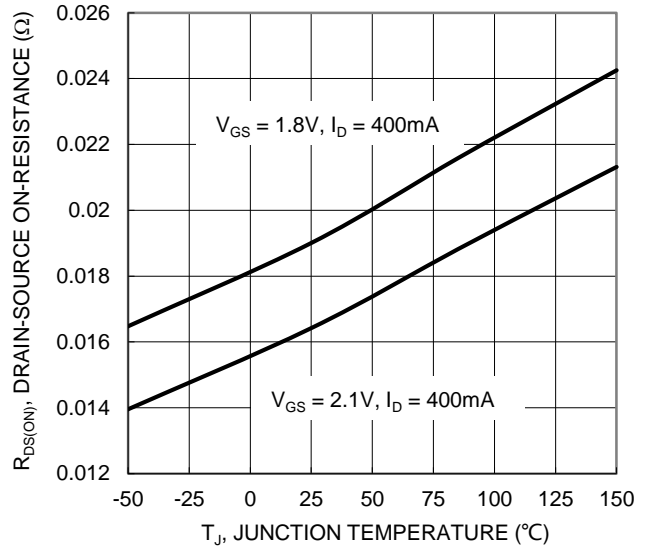


Figure 10. On-Resistance Variation with Junction Temperature

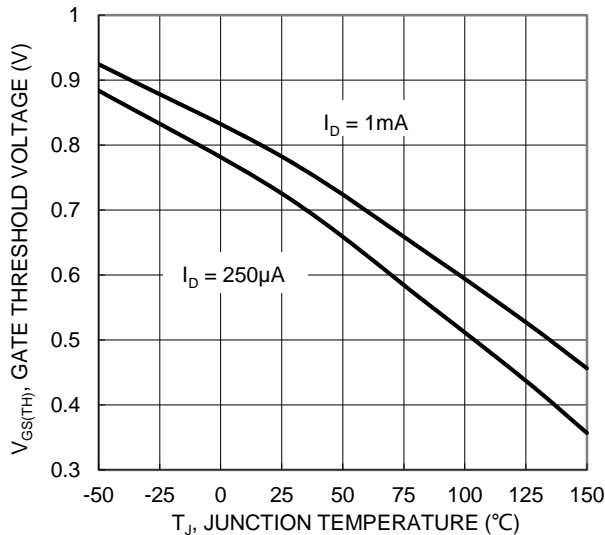


Figure 11. Gate Threshold Variation vs. Junction Temperature

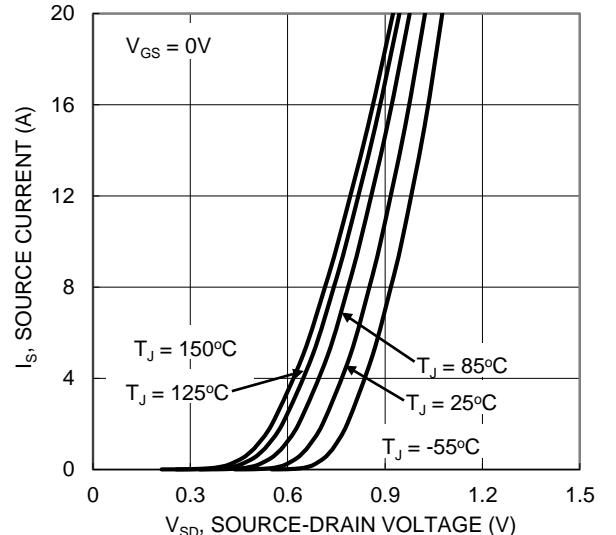


Figure 12. Diode Forward Voltage vs. Current

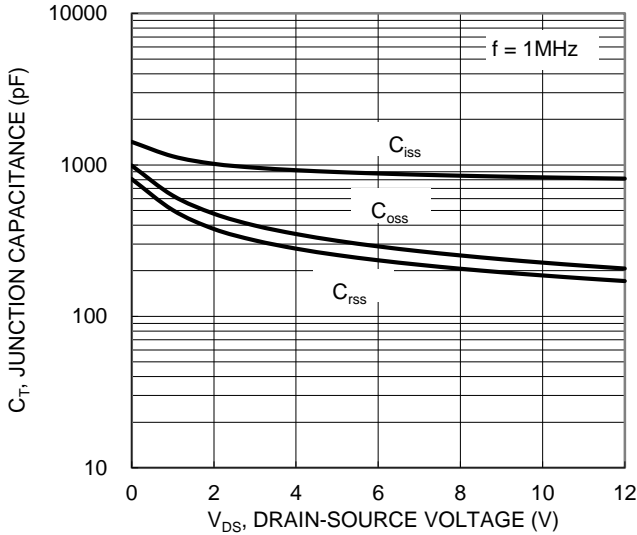


Figure 13. Typical Junction Capacitance

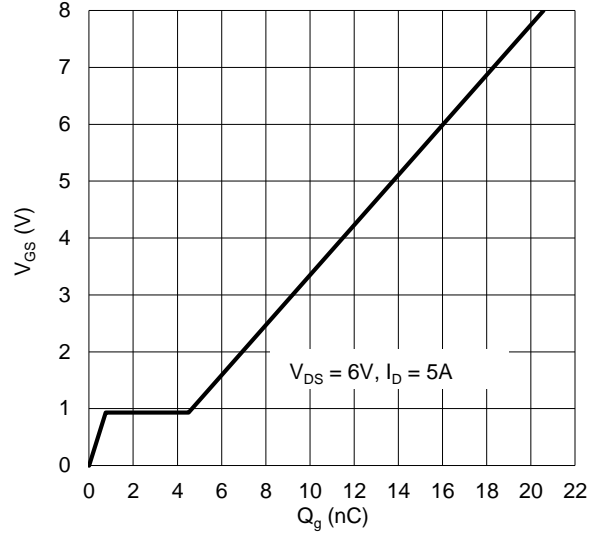


Figure 14. Gate Charge

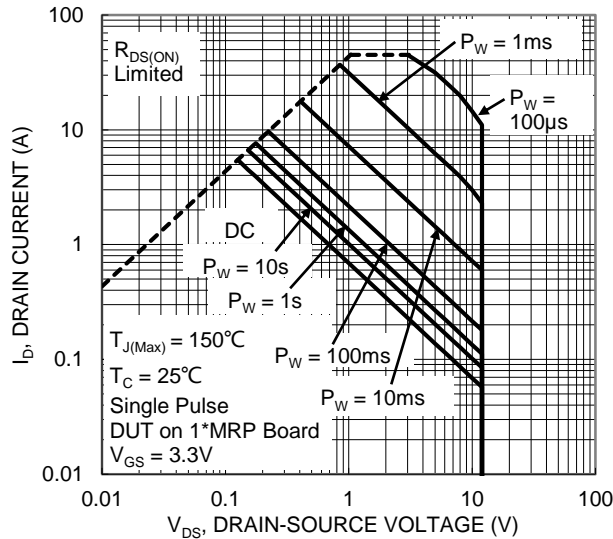


Figure 15. SOA, Safe Operation Area

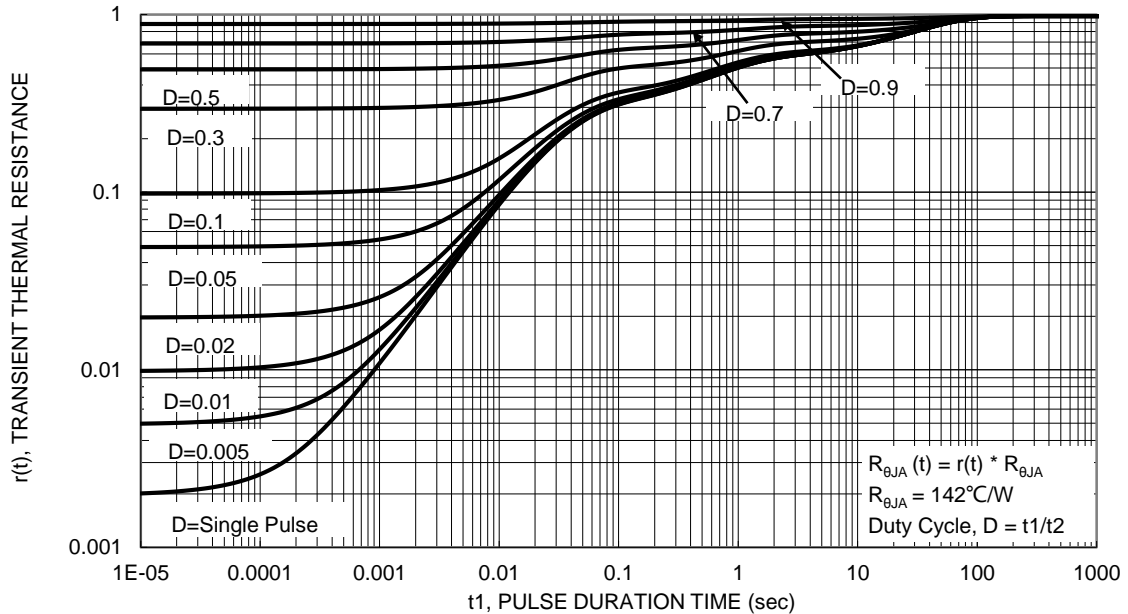
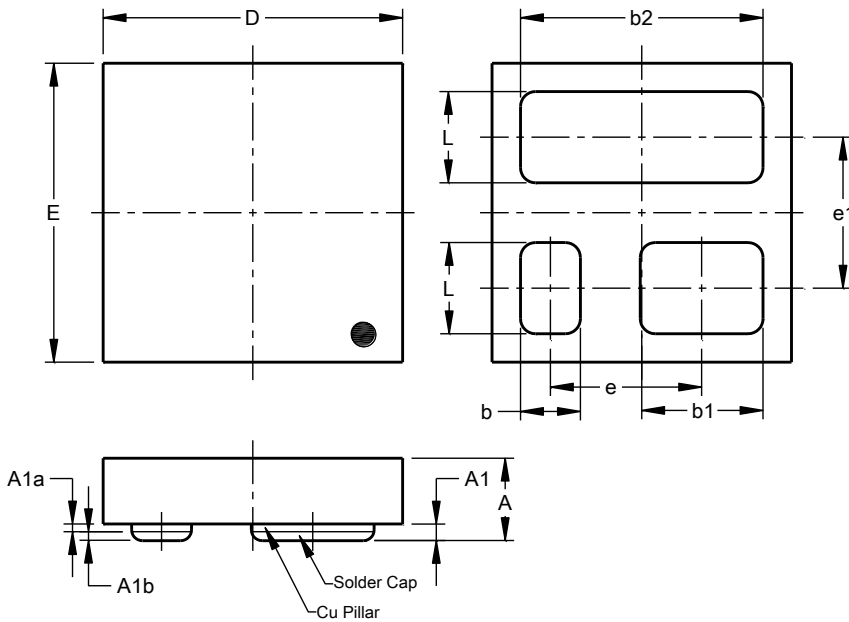


Figure 16. Transient Thermal Resistance

Package Outline Dimensions

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

X3-DSN1010-3

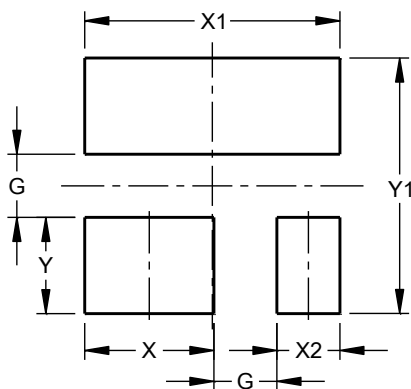


X3-DSN1010-3			
Dim	Min	Max	Typ
A	-	0.29	0.27
A1	0.034	0.046	0.04
A1a	0.015	0.025	0.02
A1b	0.017	0.023	0.02
b	0.18	0.22	0.20
b1	0.39	0.43	0.41
b2	0.79	0.83	0.81
D	0.92	1.00	0.96
E	0.92	1.00	0.96
e	-	-	0.505
e1	-	-	0.505
L	0.285	0.325	0.305
All Dimensions in mm			

Suggested Pad Layout

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

X3-DSN1010-3



Dimensions	Value (in mm)
G	0.200
X	0.410
X1	0.810
X2	0.200
Y	0.305
Y1	0.810

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