

DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

Device	V _{(BR)DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
Q1	30V	20mΩ @ V _{GS} = 10V	8A
		32mΩ @ V _{GS} = 4.5V	6.3A
Q2	30V	11.1mΩ @ V _{GS} = 10V	10.7A
		13.8mΩ @ V _{GS} = 4.5V	9.6A

Description

This new generation 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

- Mobile Computing
- Point of Load

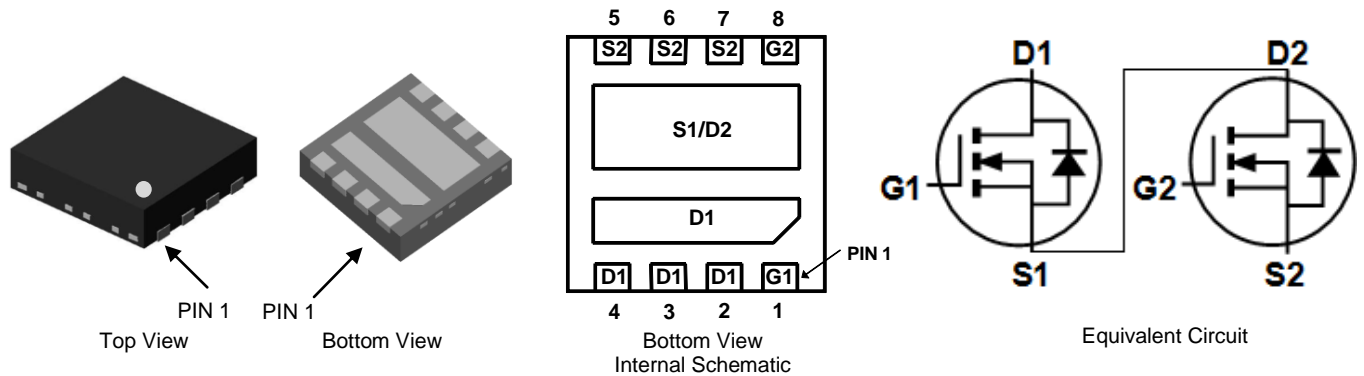
Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- Low Gate Threshold Voltage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: V-DFN3030-8 (Type K)
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe.
Solderable per MIL-STD-202, Method 208 
- Weight: 0.02 grams (Approximate)

V-DFN3030-8 (Type K)

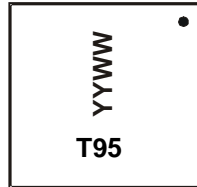


Ordering Information (Note 4)

Part Number	Case	Packaging
DMT3011LDT-7	V-DFN3030-8 (Type K)	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 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



T95 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 14 for 2014)
 WW = Week Code (01 to 53)

Maximum Ratings (Q1 N-Channel) (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	30	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 5) V _{GS} = 10V	Steady State	T _A = +25°C T _C = +25°C	I _D	8 21.5	A
Maximum Body Diode Forward Current (Note 5)			I _S	2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	55	A
Avalanche Current (L = 0.1mH)			I _{AS}	14	A
Avalanche Energy (L = 0.1mH)			E _{AS}	9.8	mJ

Maximum Ratings (Q2 N-Channel) (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	30	V
Gate-Source Voltage			V _{GSS}	+20 -16	V
Continuous Drain Current (Note 5) V _{GS} = 10V	Steady State	T _A = +25°C T _C = +25°C	I _D	10.7 28.9	A
Maximum Body Diode Forward Current (Note 5)			I _S	2	A
Pulsed Drain Current (10µs Pulse, Duty cycle = 1%)			I _{DM}	80	A
Avalanche Current (L = 0.1mH)			I _{AS}	18	A
Avalanche Energy (L = 0.1mH)			E _{AS}	16.2	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	65	°C/W
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	1.9	W
Thermal Resistance, Junction to Case (Note 5)	Steady State	R _{θJC}	9	°C/W
Total Power Dissipation (Note 5)	T _C = +25°C	P _D	13.9	W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.

Electrical Characteristics (Q1 N-Channel) (@T_A = +25°C, unless otherwise specified.)

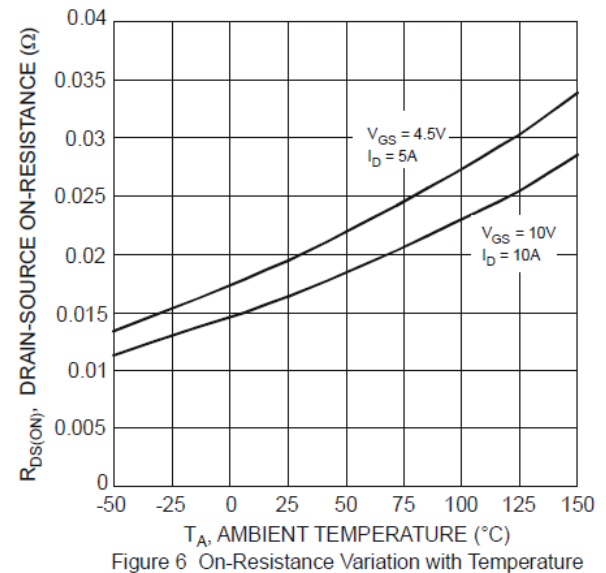
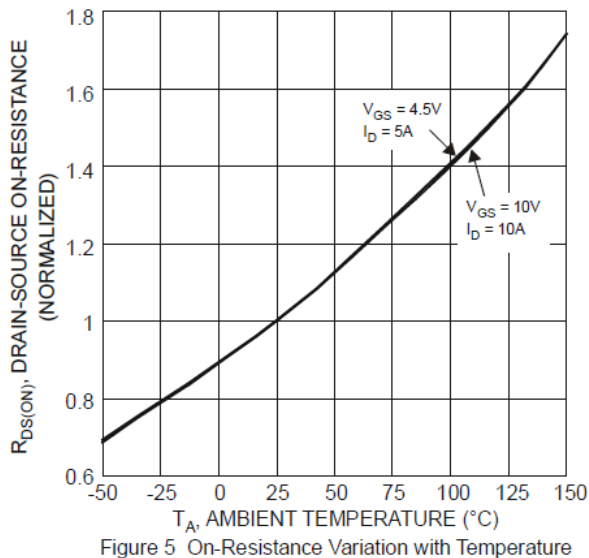
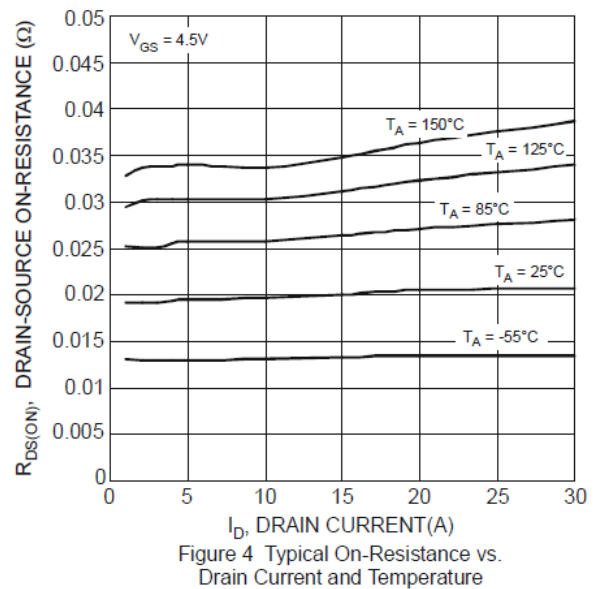
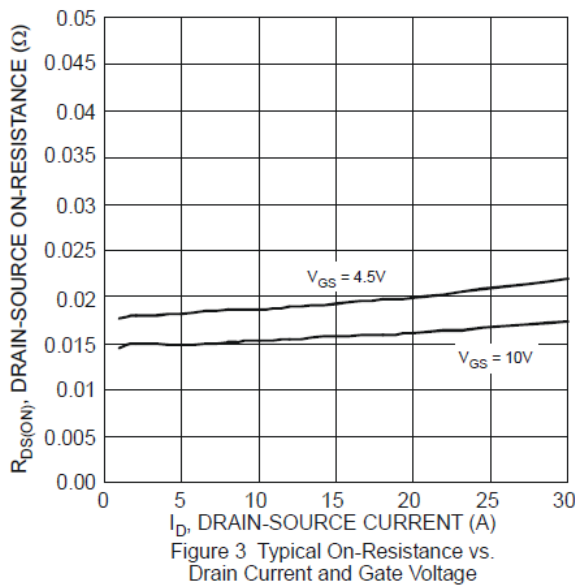
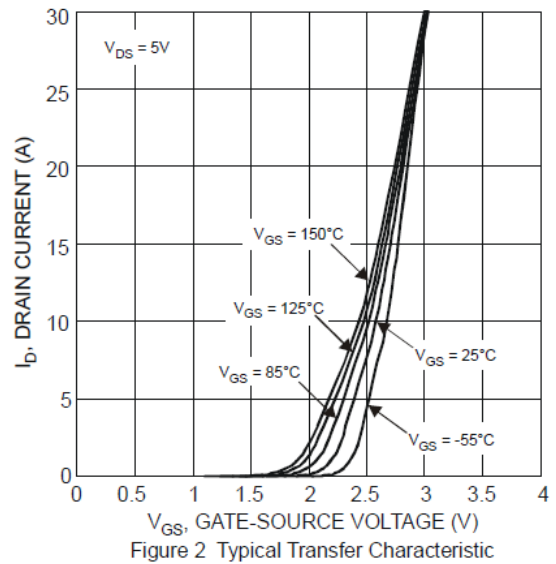
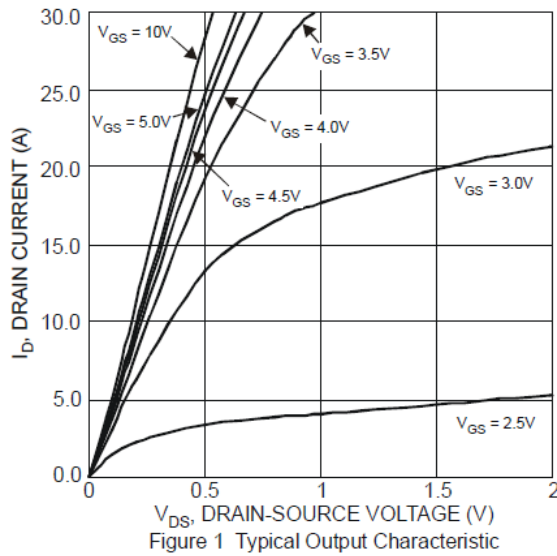
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	30	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(TH)}	1	—	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	20	mΩ	V _{GS} = 10V, I _D = 6A
		—	—	32		V _{GS} = 4.5V, I _D = 5A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 6A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iss}	—	641	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	66	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	50	—	pF	
Gate Resistance	R _g	—	2.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 10V)	Q _g	—	13.2	—	nC	V _{DS} = 15V, I _D = 10A
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	6	—	nC	
Gate-Source Charge	Q _{gs}	—	1.7	—	nC	
Gate-Drain Charge	Q _{gd}	—	2.2	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	3.3	—	nS	V _{GS} = 10V, V _{DS} = 15V, R _G = 6Ω, I _D = 1A
Turn-On Rise Time	t _r	—	4.4	—	nS	
Turn-Off Delay Time	t _{D(OFF)}	—	22.3	—	nS	
Turn-Off Fall Time	t _f	—	5.3	—	nS	I _F = 11A, di/dt = 100A/μs
Reverse Recovery Time	t _{RR}	—	11.4	—	nS	
Reverse Recovery Charge	Q _{RR}	—	8.2	—	nC	

Electrical Characteristics (Q2 N-Channel) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	30	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = 24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = +20V, V _{DS} = 0V V _{GS} = -16V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(TH)}	1	—	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	11.1	mΩ	V _{GS} = 10V, I _D = 9A
		—	—	13.8		V _{GS} = 4.5V, I _D = 7A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 9A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iss}	—	748	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	447	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	43	—	pF	
Gate Resistance	R _g	—	1.0	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 10V)	Q _g	—	13.8	—	nC	V _{DS} = 15V, I _D = 14.4A
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	6.4	—	nC	
Gate-Source Charge	Q _{gs}	—	2.2	—	nC	
Gate-Drain Charge	Q _{gd}	—	2.2	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	3.5	—	ns	V _{GS} = 10V, V _{DS} = 15V, R _G = 1Ω, I _D = 10A
Turn-On Rise Time	t _r	—	5.0	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	8.6	—	ns	
Turn-Off Fall Time	t _f	—	1.4	—	ns	I _F = 10A, di/dt = 100A/μs
Reverse Recovery Time	t _{RR}	—	18	—	ns	
Reverse Recovery Charge	Q _{RR}	—	7.7	—	nC	

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

Typical Characteristics (Q1 N-Channel)



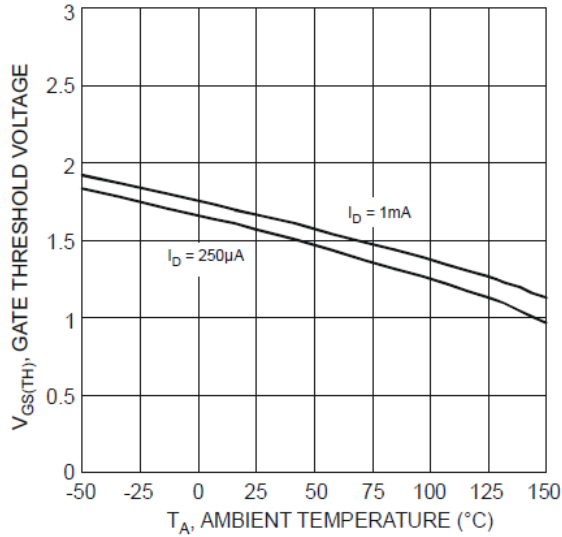


Figure 7 Gate Threshold Variation vs. Ambient Temperature

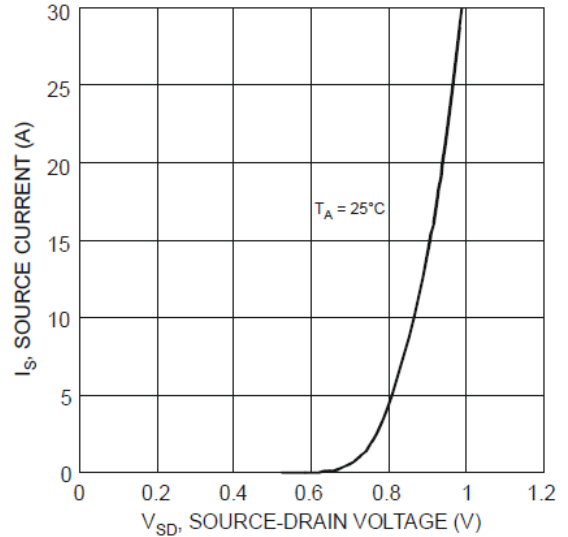


Figure 8 Diode Forward Voltage vs. Current

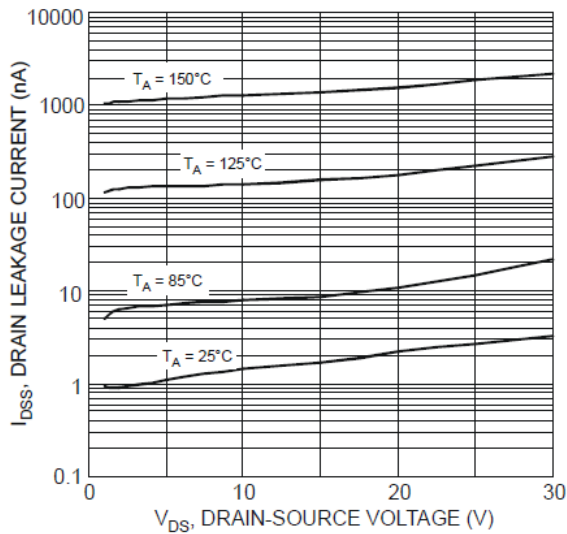


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

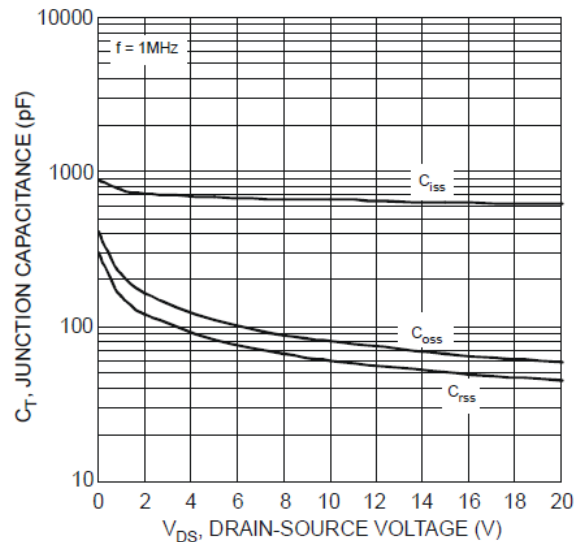


Figure 10 Typical Junction Capacitance

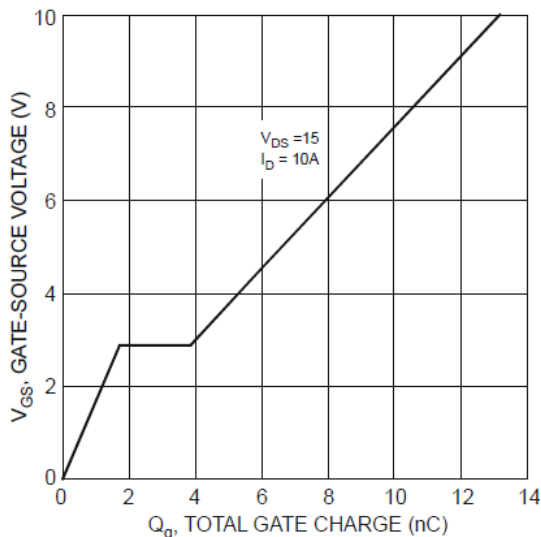


Figure 11 Gate-Source Voltage vs. Total Gate Charge

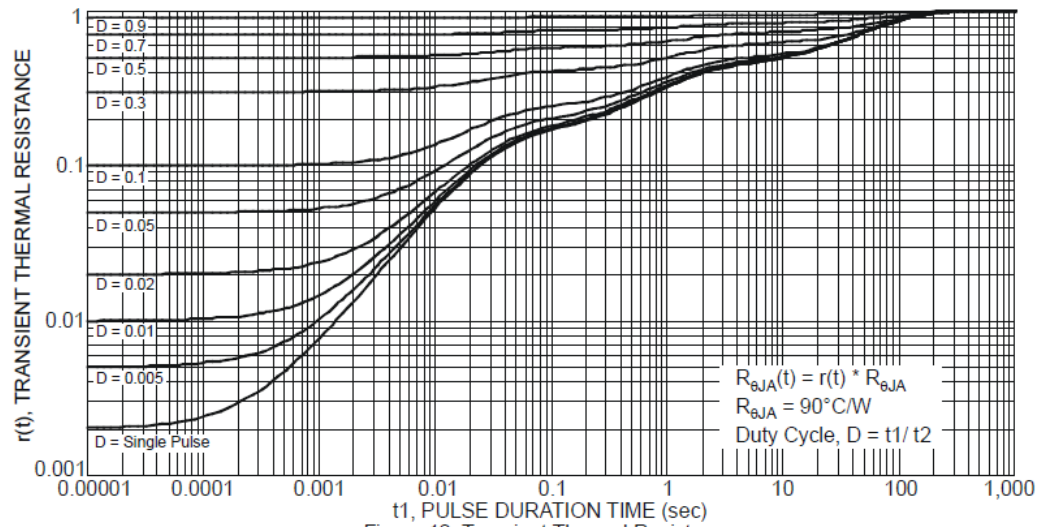


Figure 12 Transient Thermal Resistance

Typical Characteristics (Q2 N-Channel)

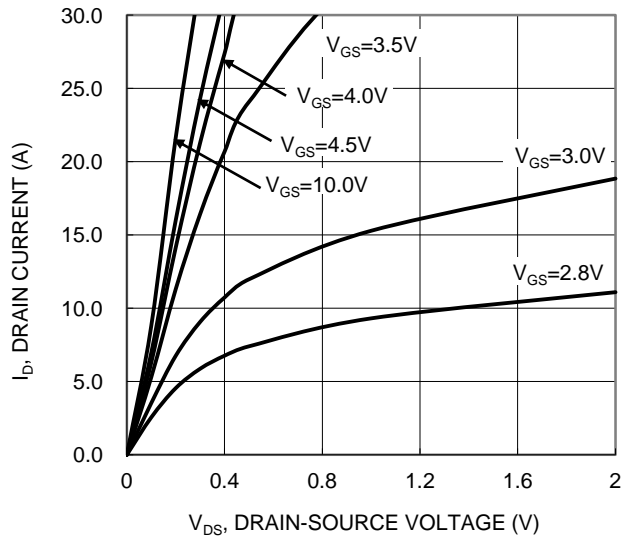


Figure 13. Typical Output Characteristic

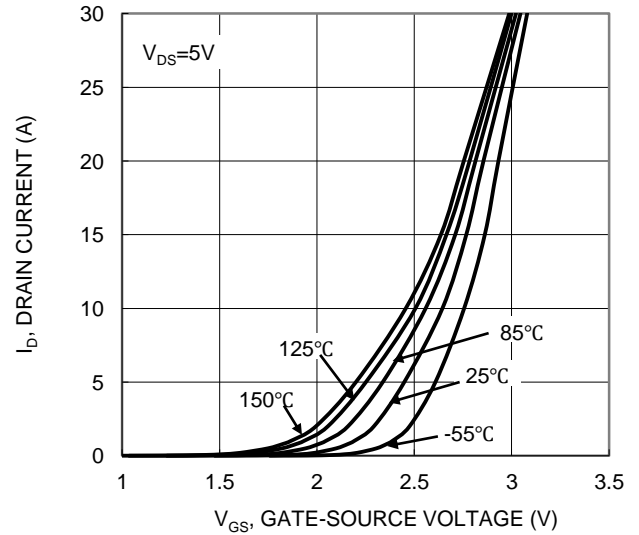


Figure 14. Typical Transfer Characteristic

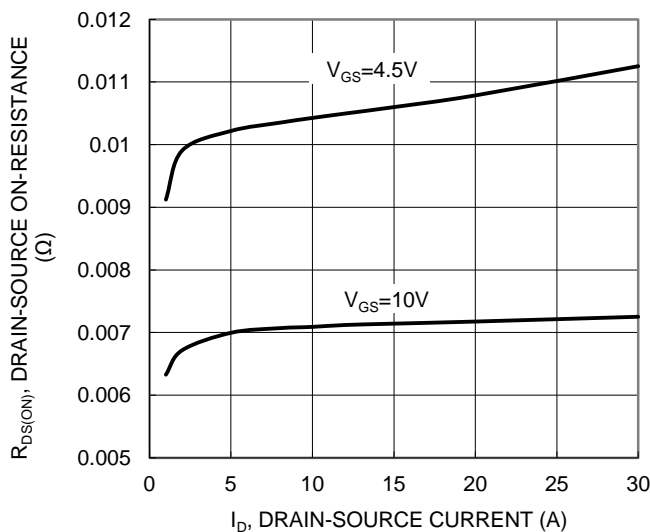


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

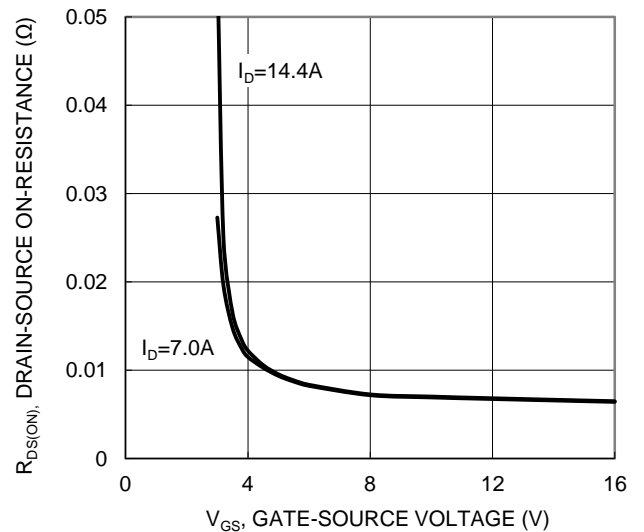


Figure 16. Typical Transfer Characteristic

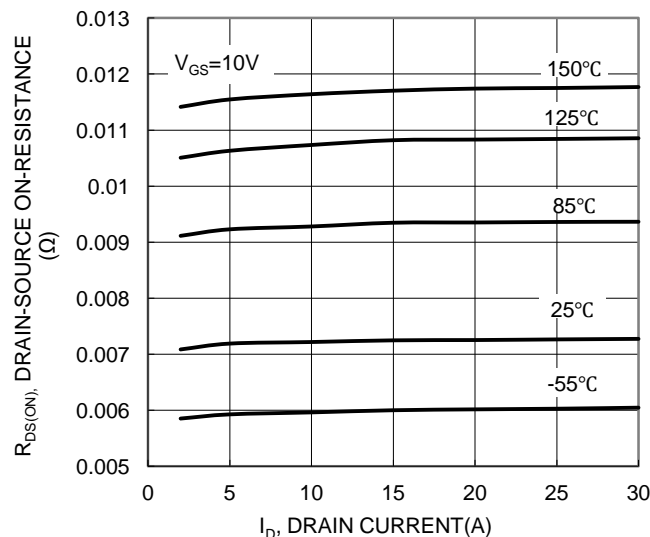


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

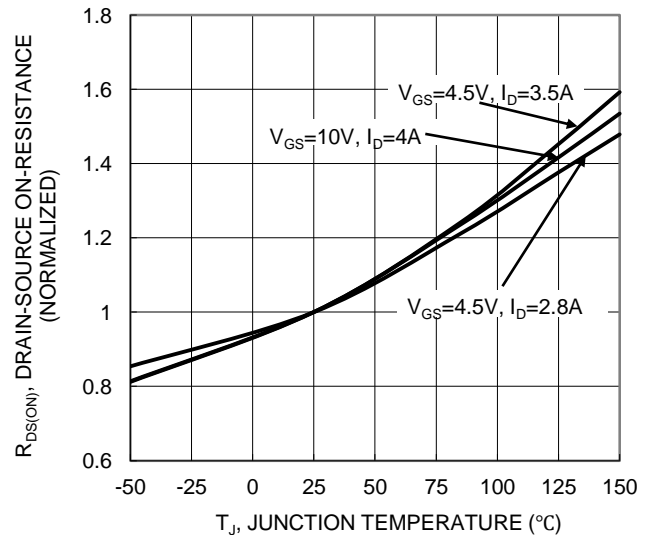
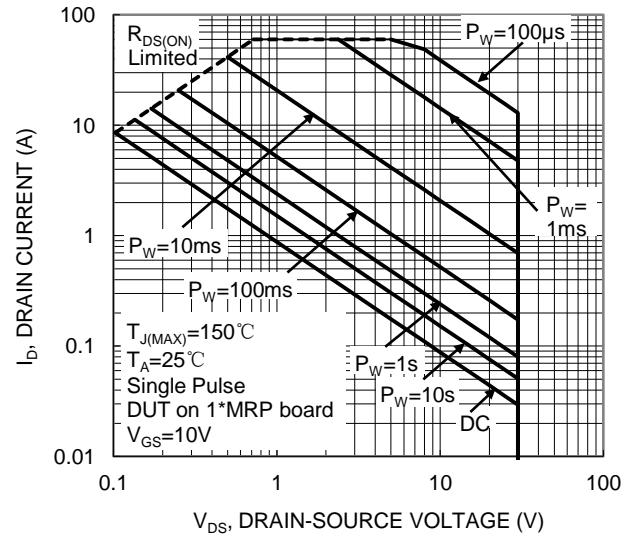
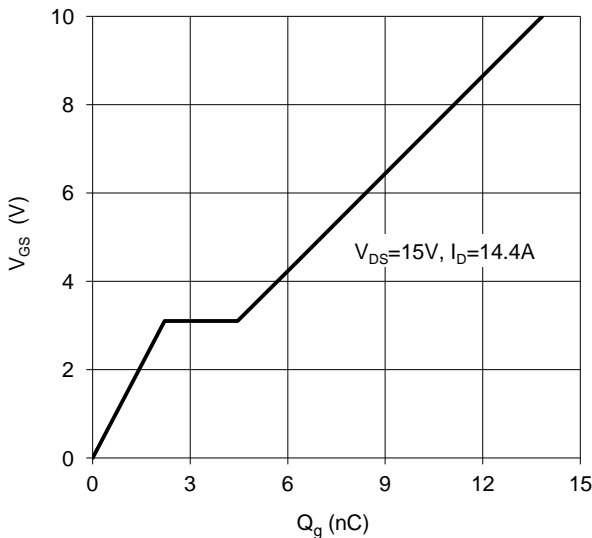
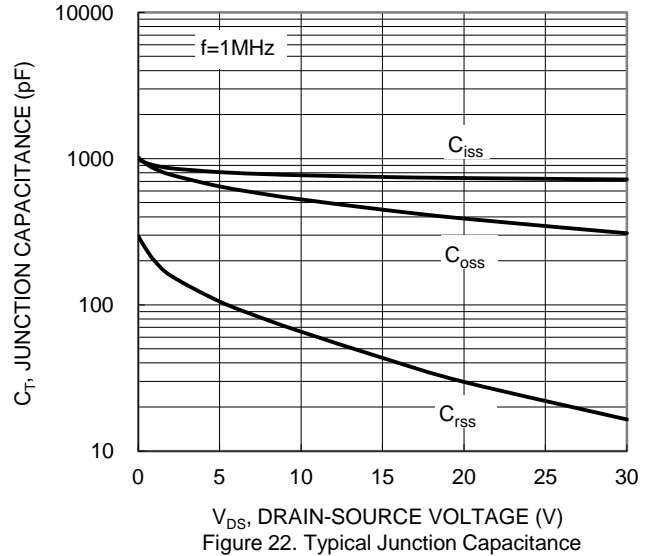
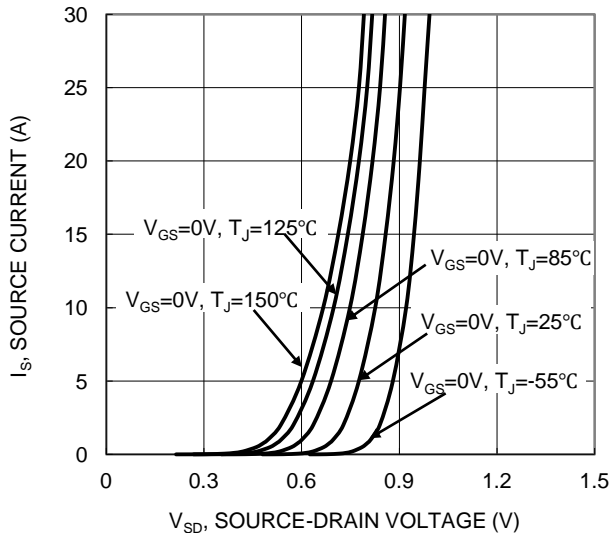
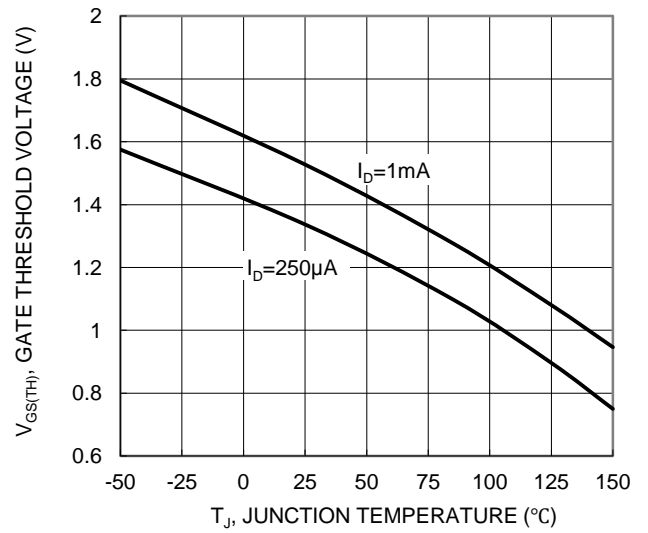
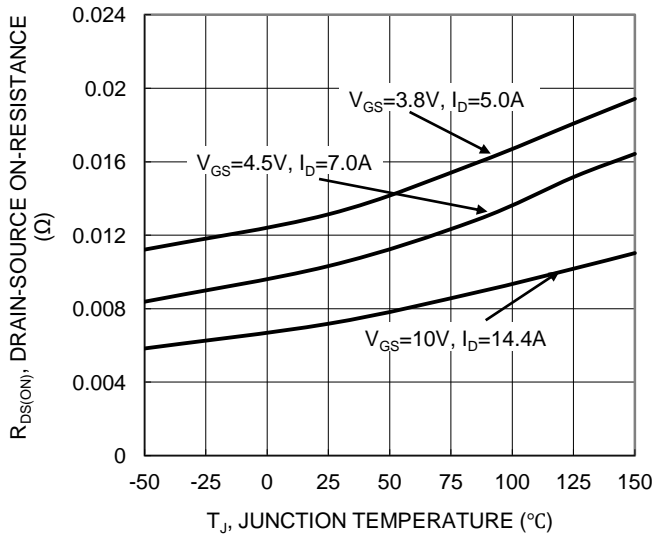


Figure 18. On-Resistance Variation with Junction Temperature



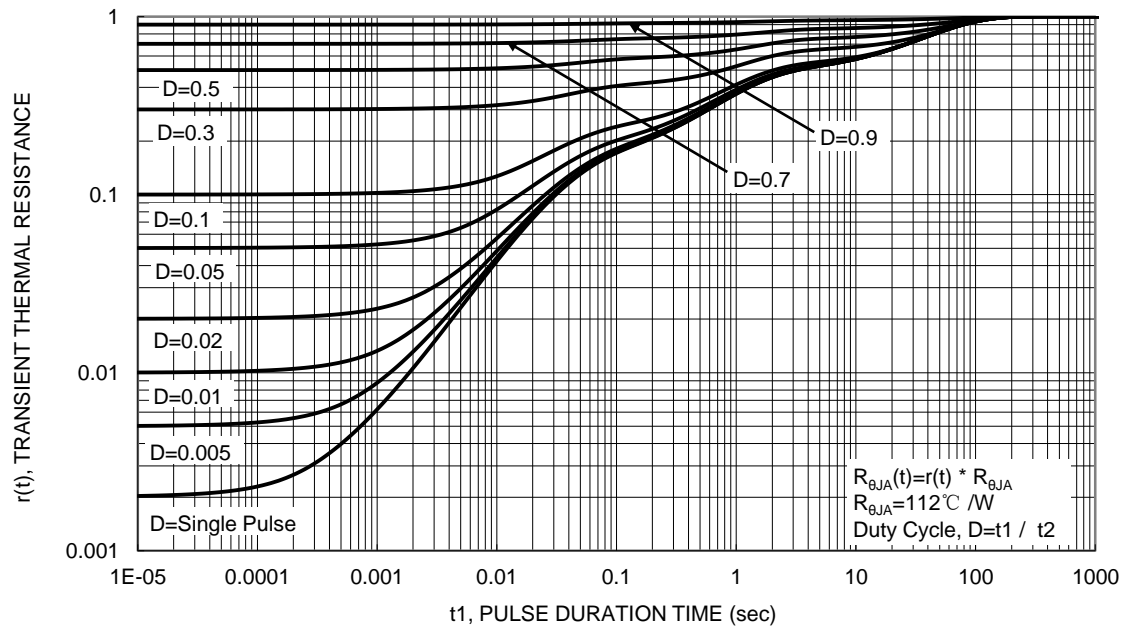
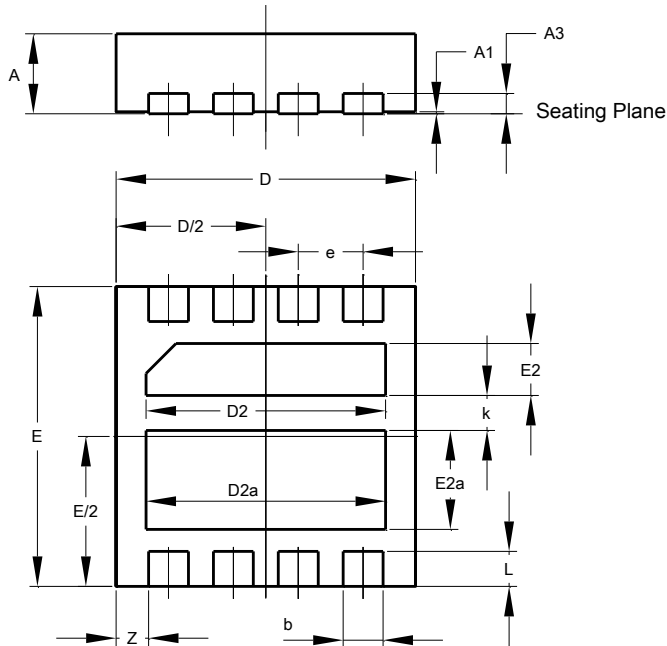


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

V-DFN3030-8 (Type K)

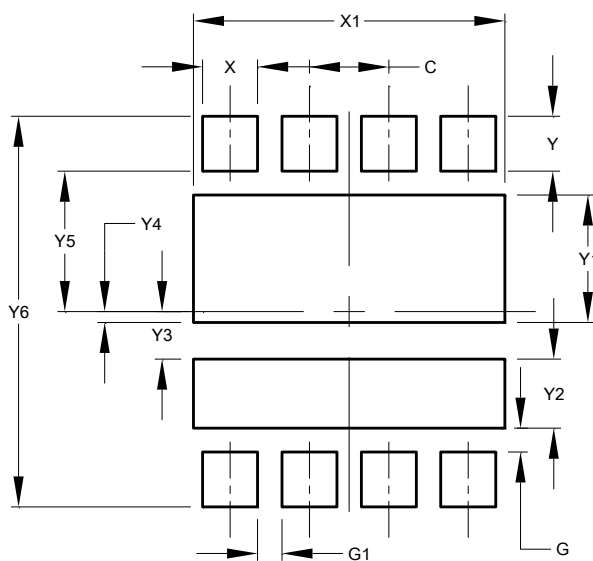


V-DFN3030-8 (Type K)			
Dim	Min	Max	Typ
A	0.77	0.85	0.80
A1	0	0.05	0.02
A3	0.20BSC		
b	0.35	0.45	0.40
D	2.95	3.050	3.00
D2	2.30	2.50	2.40
D2a	2.30	2.50	2.40
E	2.95	3.050	3.00
E2	0.42	0.62	0.52
E2a	0.89	1.09	0.99
e	0.65BSC		
k	-	-	0.35
L	0.30	0.40	0.35
z	0.325BSC		
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

V-DFN3030-8 (Type K)



Dimensions	Value (in mm)
C	0.650
G	0.195
G1	0.200
X	0.450
X1	2.550
Y	0.450
Y1	1.044
Y2	0.566
Y3	0.389
Y4	0.089
Y5	1.150
Y6	3.200

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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