

Product Summary

Device	V _{(BR)DSS}	R _{DSON} 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_{DSON}), yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

Applications

- Mobile Computing
- Point of Load

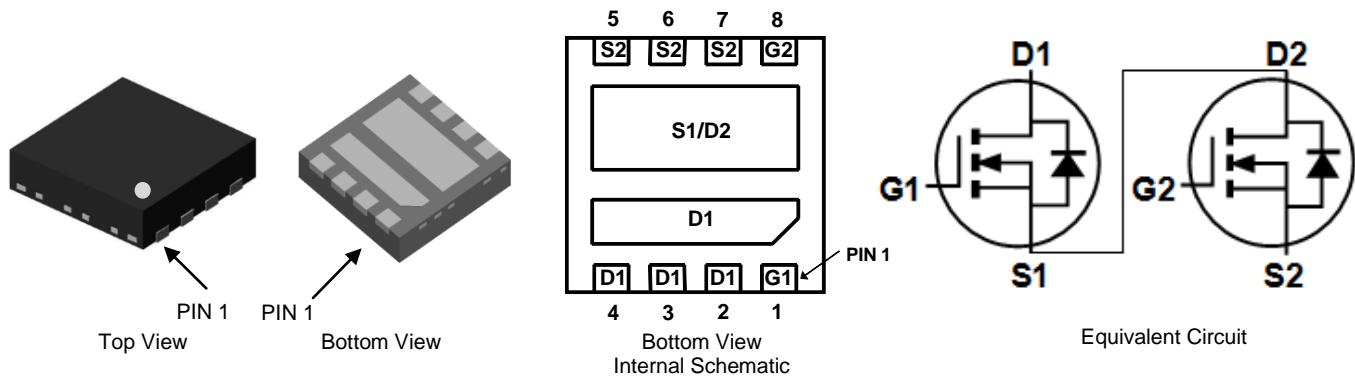
Features

- 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 e4
- Weight: 0.02 grams (Approximate)

V-DFN3030-8 (Type K)



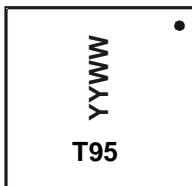
Ordering Information (Note 4)

Part Number	Case	Packaging
DMT3011LDT-7	V-DFN3030-8 (Type K)	3,000/Tape & Reel

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- 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) (@ $T_A = +25^\circ\text{C}$, 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) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_C = +25^\circ\text{C}$	I_D	8 21.5	A
Maximum Body Diode Forward Current (Note 5)			I_S	2	A
Pulsed Drain Current (10 μs 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) (@ $T_A = +25^\circ\text{C}$, 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) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_C = +25^\circ\text{C}$	I_D	10.7 28.9	A
Maximum Body Diode Forward Current (Note 5)			I_S	2	A
Pulsed Drain Current (10 μs 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	$R_{\theta JA}$	65	$^\circ\text{C}/\text{W}$
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	1.9	W
Thermal Resistance, Junction to Case (Note 5)	Steady State	$R_{\theta JC}$	9	$^\circ\text{C}/\text{W}$
Total Power Dissipation (Note 5)	$T_C = +25^\circ\text{C}$	P_D	13.9	W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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

Electrical Characteristics (Q1 N-Channel) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

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

Electrical Characteristics (Q2 N-Channel) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

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

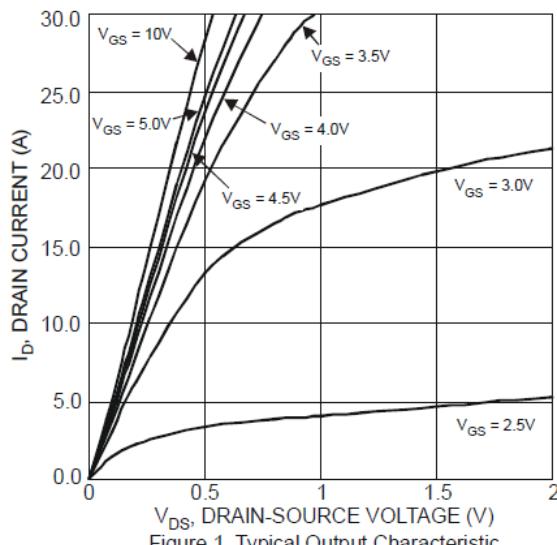


Figure 1 Typical Output Characteristic

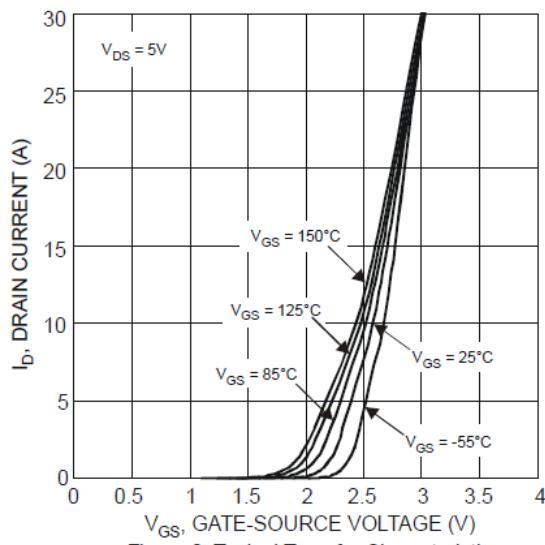


Figure 2 Typical Transfer Characteristic

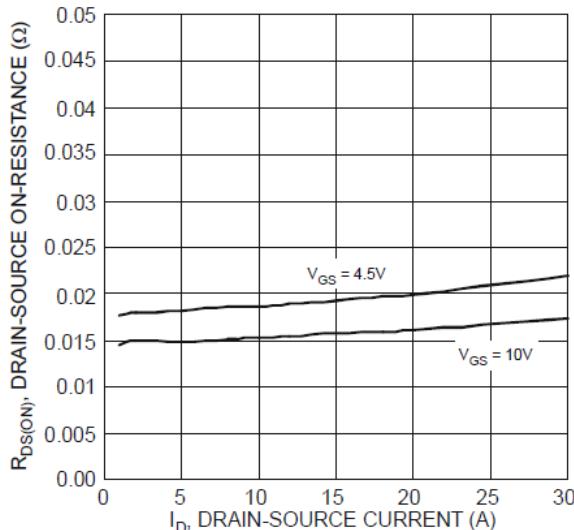


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

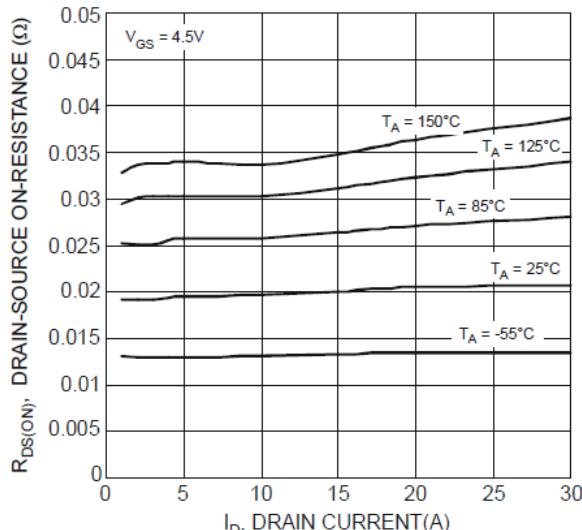


Figure 4 Typical On-Resistance vs.
Drain Current and Temperature

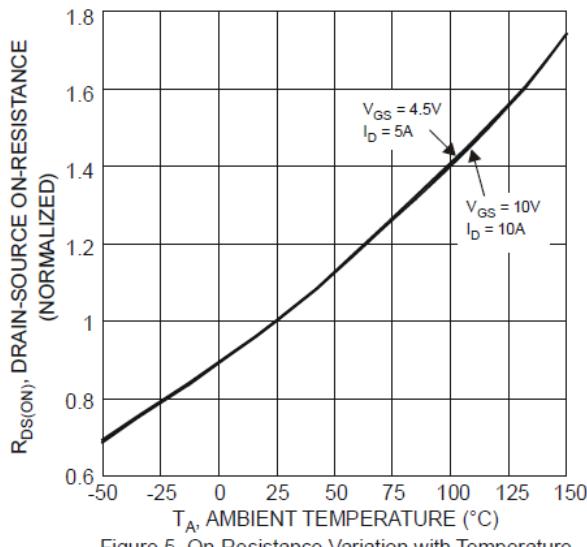


Figure 5 On-Resistance Variation with Temperature

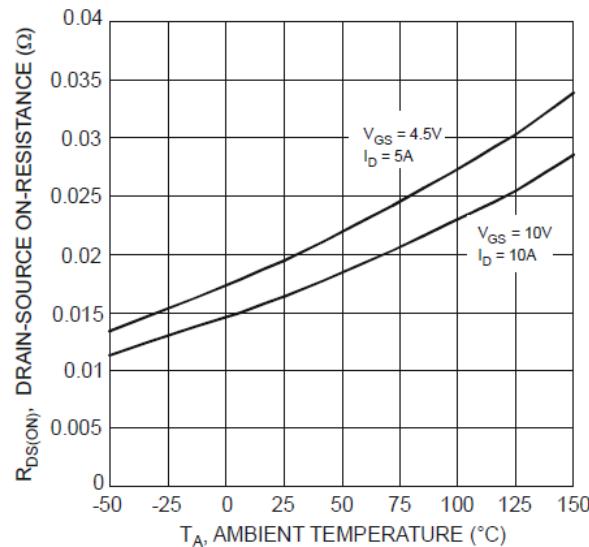


Figure 6 On-Resistance Variation with Temperature

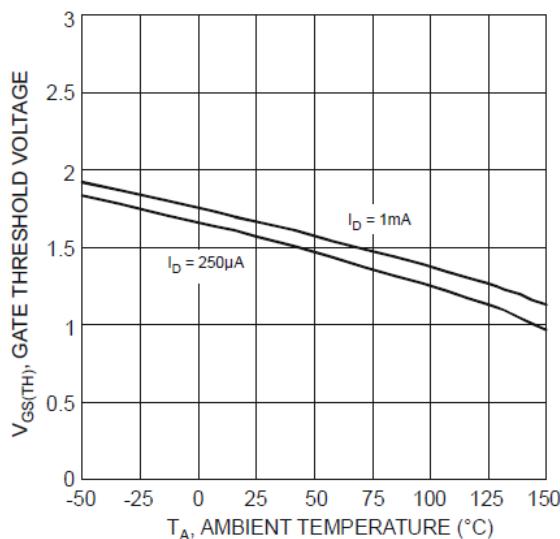


Figure 7 Gate Threshold Variation vs. Ambient Temperature

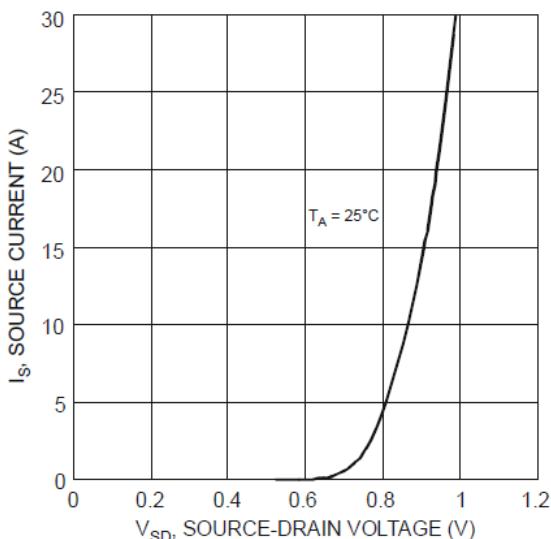


Figure 8 Diode Forward Voltage vs. Current

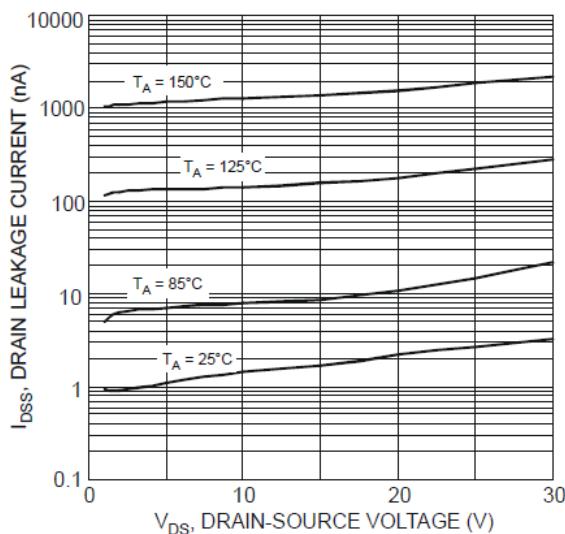


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

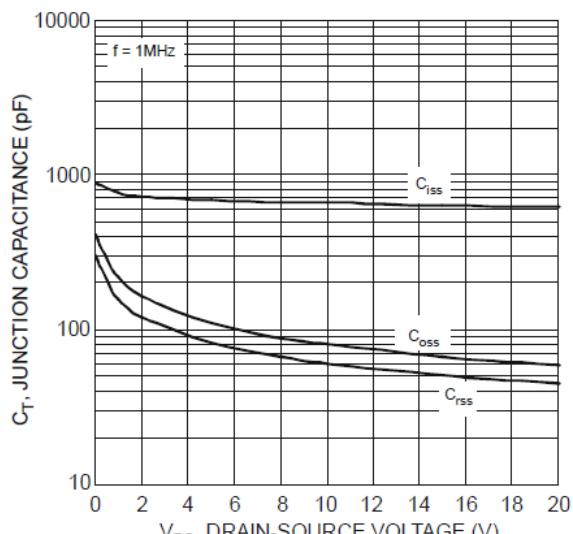


Figure 10 Typical Junction Capacitance

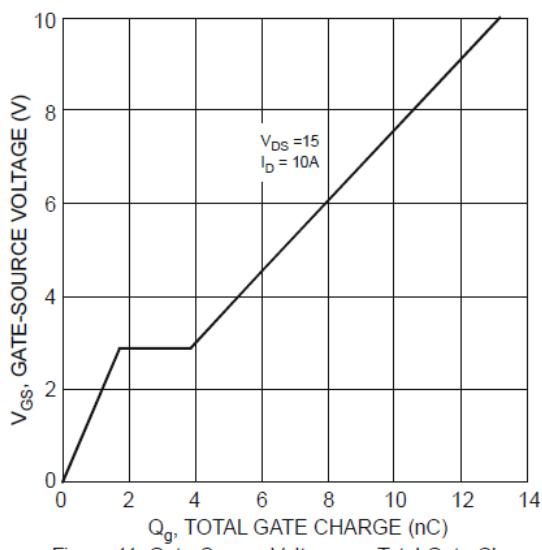
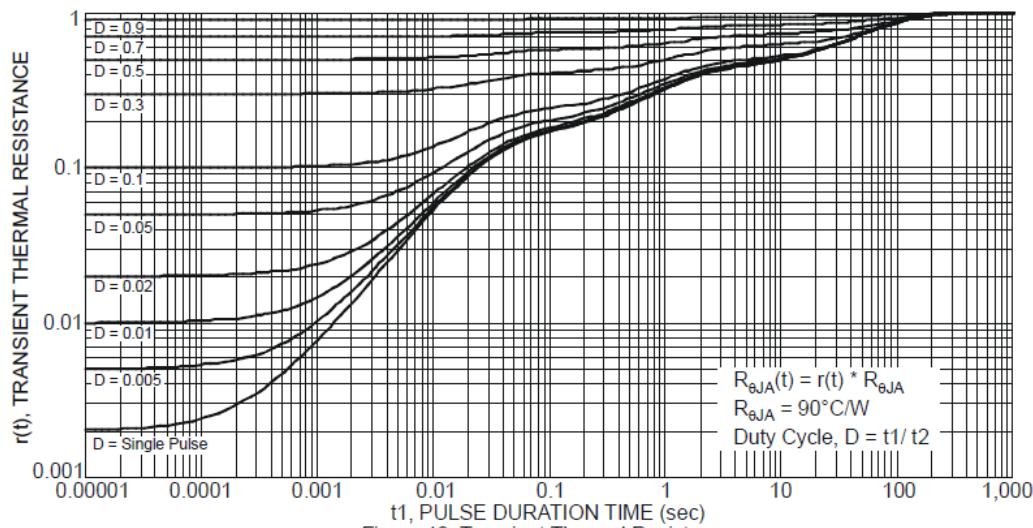


Figure 11 Gate-Source Voltage vs. Total Gate Charge



Typical Characteristics (Q2 N-Channel)

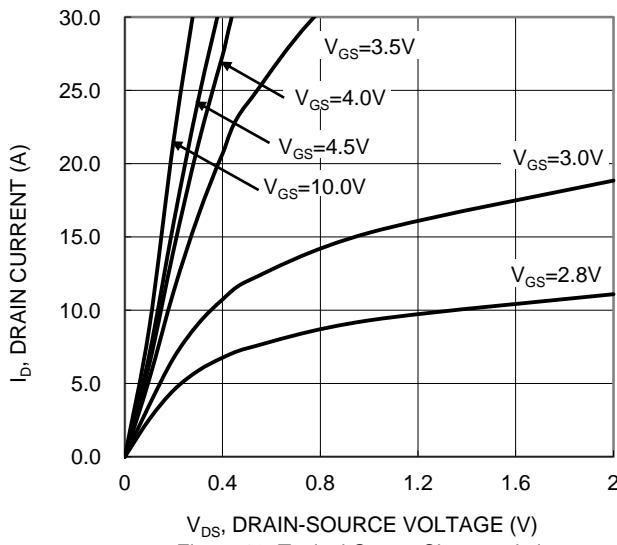


Figure 13. Typical Output Characteristic

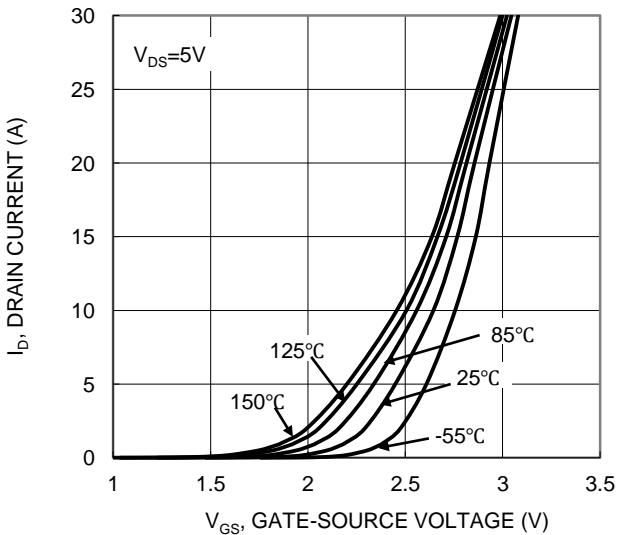


Figure 14. Typical Transfer Characteristic

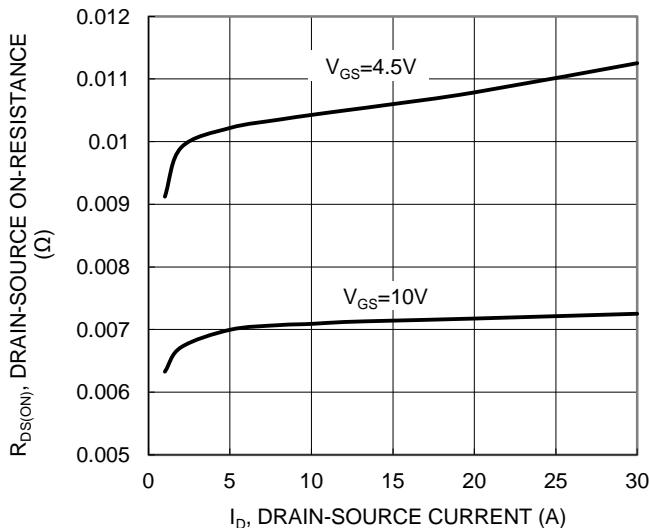


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

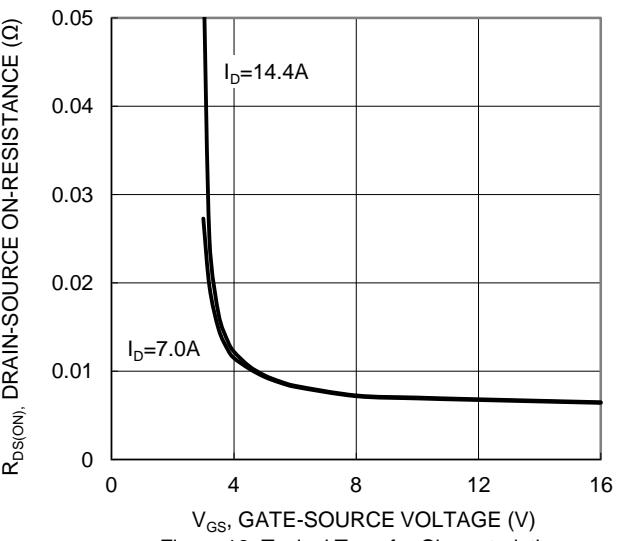


Figure 16. Typical Transfer Characteristic

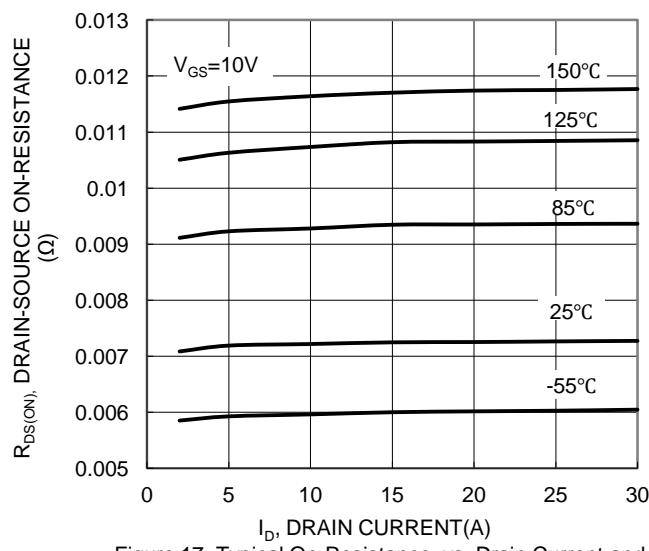


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

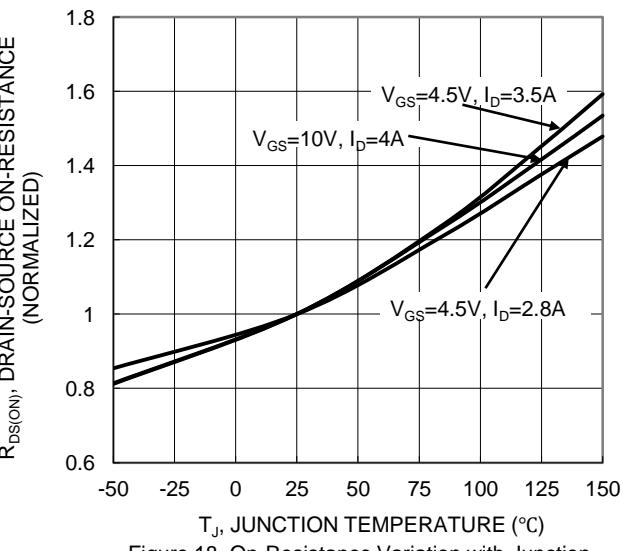
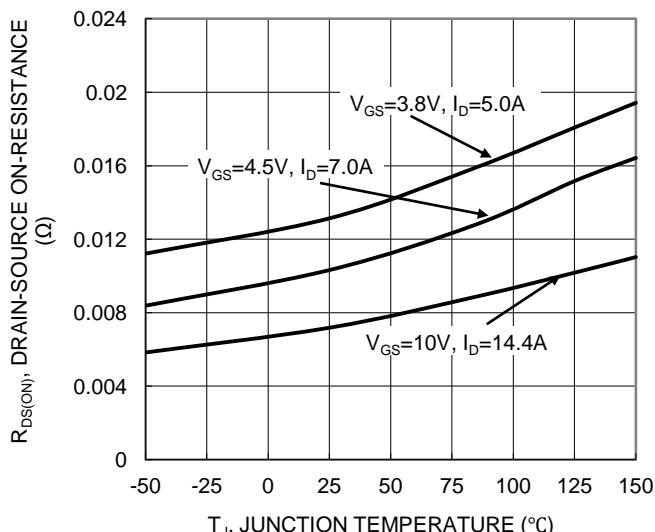
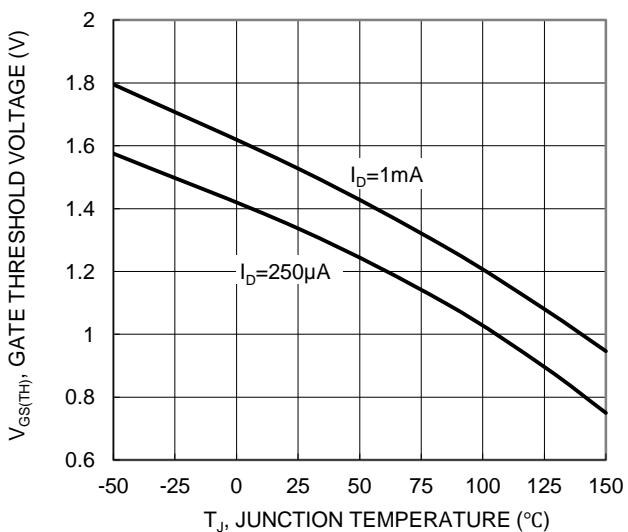


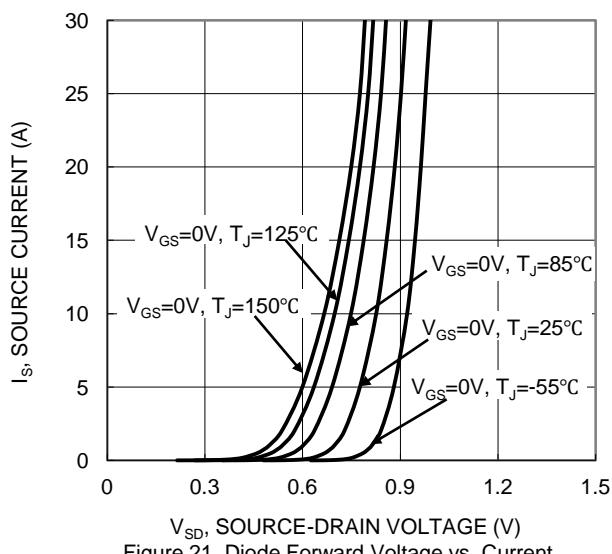
Figure 18. On-Resistance Variation with Junction Temperature



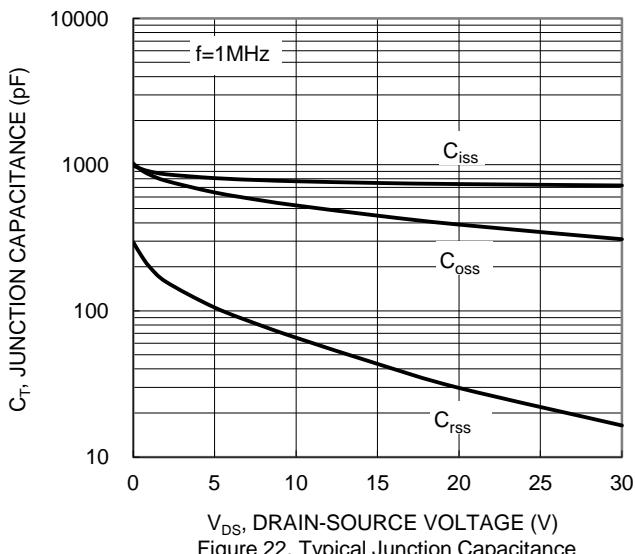
$V_{GS} = 3.8V, I_D = 5.0A$
 $V_{GS} = 4.5V, I_D = 7.0A$
 $V_{GS} = 10V, I_D = 14.4A$



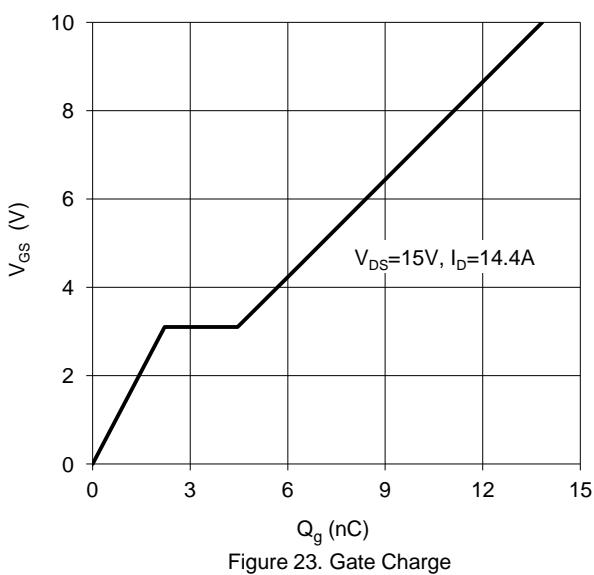
$I_D = 1mA$
 $I_D = 250\mu A$



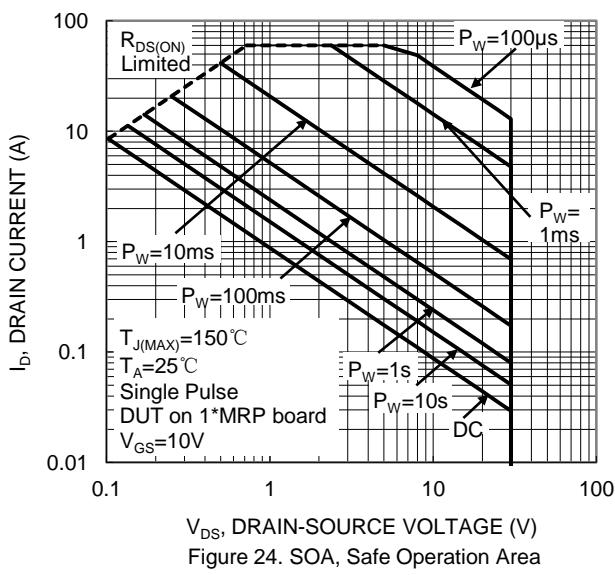
$V_{GS} = 0V, T_J = 125^\circ C$
 $V_{GS} = 0V, T_J = 150^\circ C$
 $V_{GS} = 0V, T_J = 25^\circ C$
 $V_{GS} = 0V, T_J = -55^\circ C$



$f = 1MHz$
 C_{iss}
 C_{oss}
 C_{rss}



$V_{DS} = 15V, I_D = 14.4A$



$R_{DS(on)} \text{ Limited}$
 $P_w = 100\mu s$
 $P_w = 1ms$
 $P_w = 10ms$
 $P_w = 100ms$
 $T_{J(MAX)} = 150^\circ C$
 $T_A = 25^\circ C$
 Single Pulse
 $\text{DUT on 1*MRP board}$
 $V_{GS} = 10V$

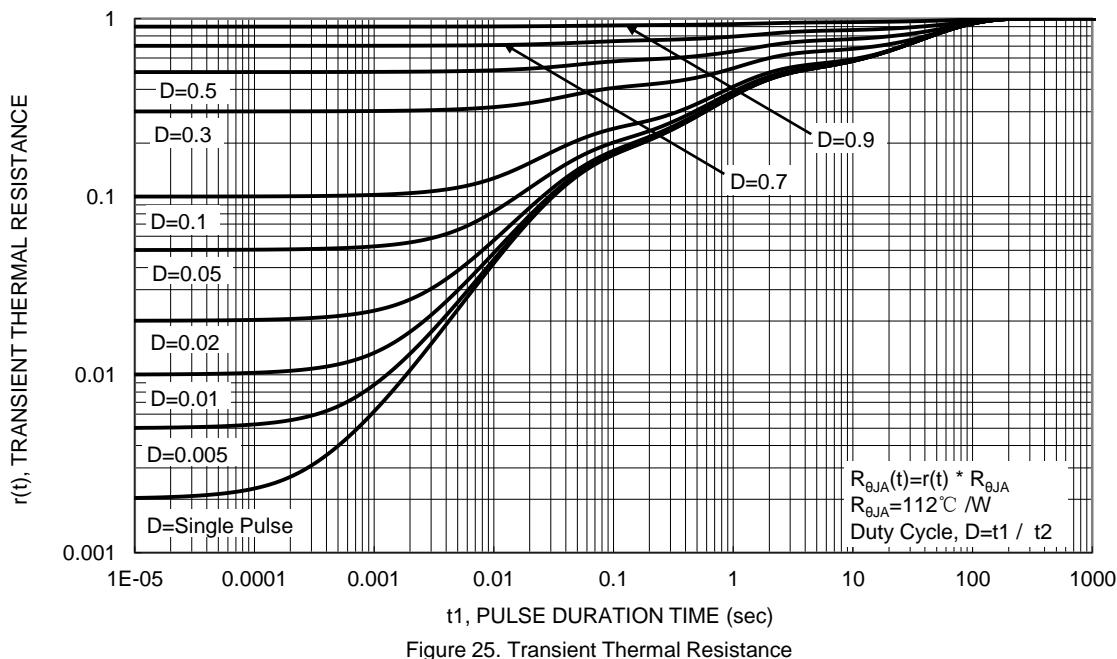
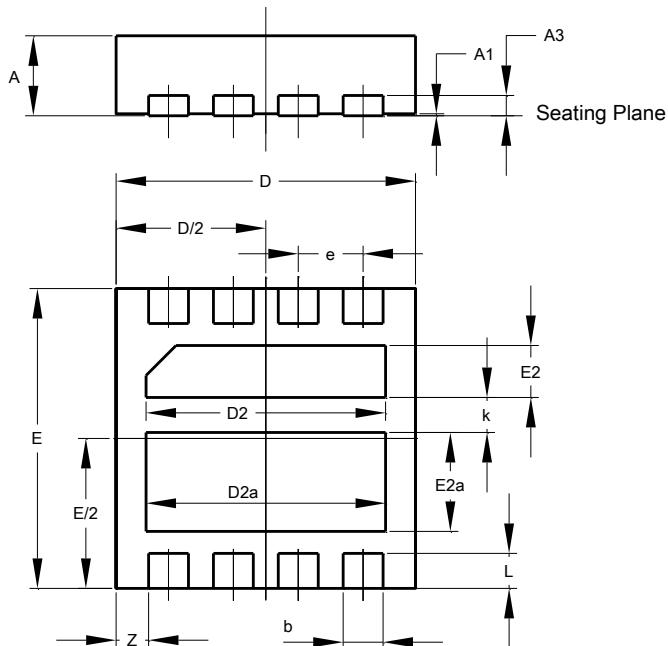


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

V-DFN3030-8 (Type K)

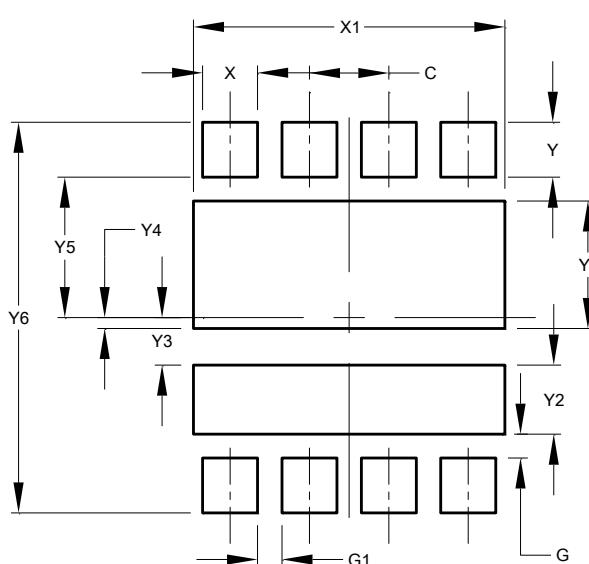


V-DFN3030-8 (Type K)			
Dim	Min	Max	Typ
A	0.77	0.85	0.80
A1	0	0.05	0.02
A3	0.20BSC		
b	0.35	0.45	0.40
D	2.95	3.050	3.00
D2	2.30	2.50	2.40
D2a	2.30	2.50	2.40
E	2.95	3.050	3.00
E2	0.42	0.62	0.52
E2a	0.89	1.09	0.99
e	0.65BSC		
k	-	-	0.35
L	0.30	0.40	0.35
z	0.325BSC		
All Dimensions in mm			

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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