

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max $T_A = +25^\circ\text{C}$
Q1	60V	85 m Ω @ $V_{GS} = 10\text{V}$	3.1A
		120 m Ω @ $V_{GS} = 4.5\text{V}$	2.7A
Q2	-60V	150 m Ω @ $V_{GS} = -10\text{V}$	-2.4A
		250 m Ω @ $V_{GS} = -4.5\text{V}$	-1.8A

Description

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

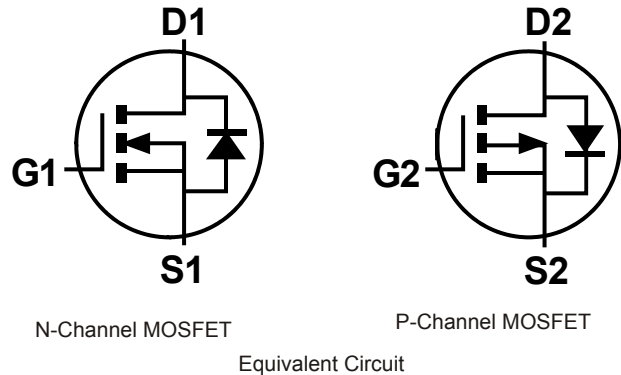
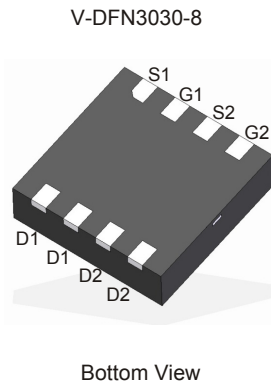
- Power Management Functions
- Analog Switch

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: V-DFN3030-8
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Weight: 0.02 grams (approximate)

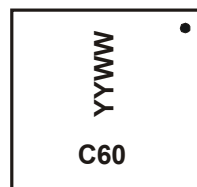


Ordering Information (Note 4)

Part Number	Case	Packaging
DMC6070LFDH-7	V-DFN3030-8	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



C60 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 12 for 2012)
 WW = Week Code (01 ~ 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	60	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 5) V _{GS} = 10V	Steady State	T _A = +25°C T _A = +70°C	I _D	3.1 2.5	A
	t < 10s	T _A = +25°C T _A = +70°C	I _D	3.9 3.1	A
Maximum Body Diode Forward Current (Note 5)			I _S	2	A
Pulsed Drain Current (10μs pulse, Duty cycle = 1%)			I _{DM}	15	A

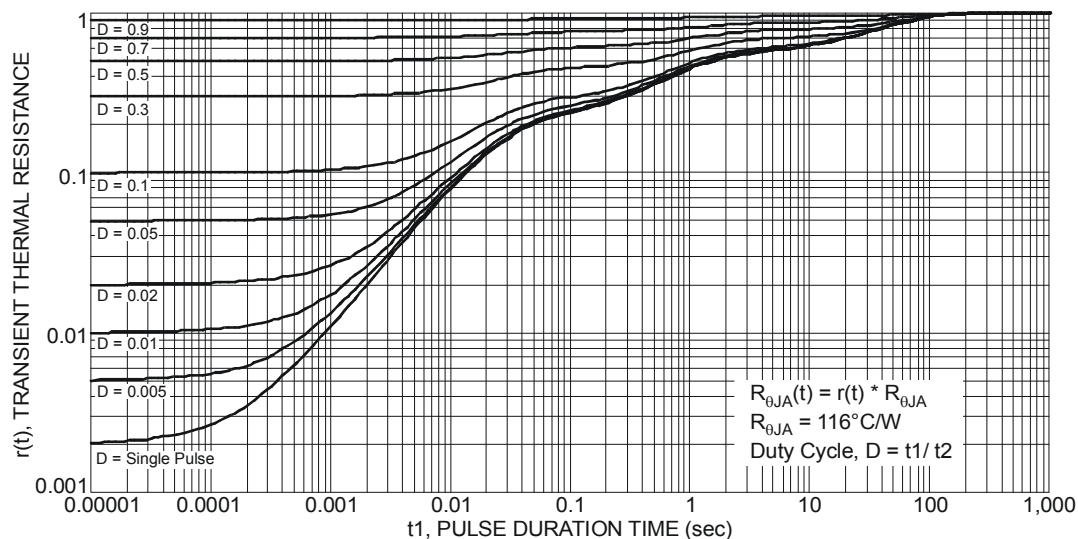
Maximum Ratings Q2 P-CHANNEL (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-60	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 5) V _{GS} = -10V	Steady State	T _A = +25°C T _A = +70°C	I _D	-2.4 -1.9	A
	t < 10s	T _A = +25°C T _A = +70°C	I _D	-2.9 -2.3	A
Maximum Body Diode Forward Current (Note 5)			I _S	-2	A
Pulsed Drain Current (10μs pulse, Duty cycle = 1%)			I _{DM}	-12	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P _D	1.4	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R _{θJA}	91	°C/W
	t < 10s		60	
Thermal Resistance, Junction to Case (Note 5)		R _{θJC}	32	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

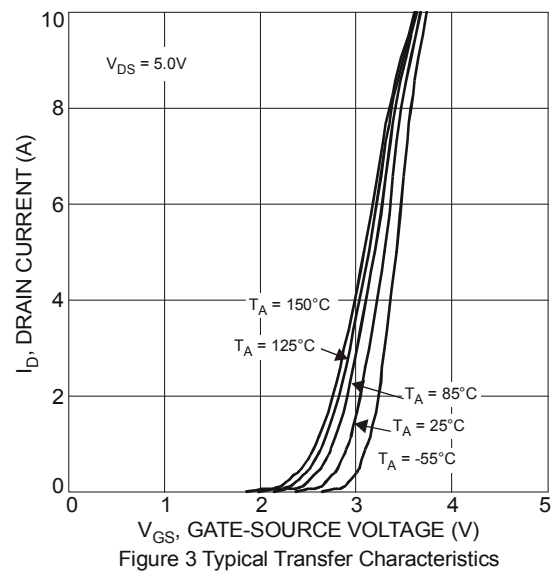
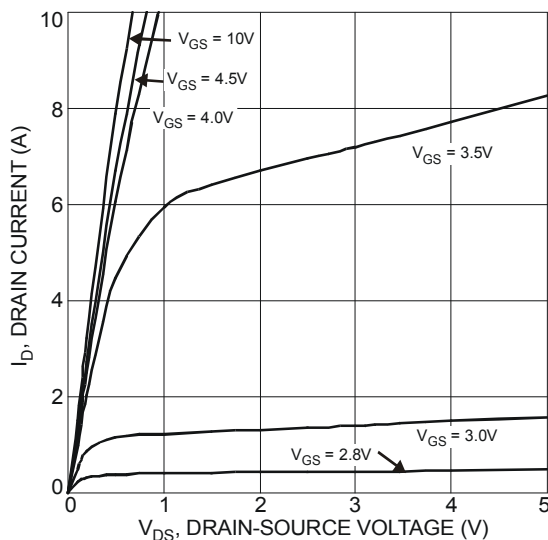
Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate



Electrical Characteristics N-CHANNEL – Q1 (@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}	60	–	–	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	–	–	1	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	–	–	±100	nA	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)}	–	60	85	mΩ	V _{GS} = 10V, I _D = 1.5A
			72	120		V _{GS} = 4.5V, I _D = 0.5A
Forward Transfer Admittance	Y _{fs}	–	3.7	–	S	V _{DS} = 5V, I _D = 1.5A
Diode Forward Voltage	V _{SD}	–	0.7	1.2	V	V _{GS} = 0V, I _S = 3A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iss}	–	731	–	pF	V _{DS} = 20V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	–	34	–	pF	
Reverse Transfer Capacitance	C _{rss}	–	23	–	pF	
Gate Resistance	R _g	–	1.3	–	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 10V)	Q _g	–	11.5	–	nC	V _{DS} = 30V, I _D = 3A
Total Gate Charge (V _{GS} = 4.5V)	Q _g	–	5.2	–	nC	
Gate-Source Charge	Q _{gs}	–	2.1	–	nC	
Gate-Drain Charge	Q _{gd}	–	1.5	–	nC	
Turn-On Delay Time	t _{D(on)}	–	9.6	–	ns	V _{GS} = 10V, V _{DS} = 30V, R _G = 50Ω, R _L = 20V
Turn-On Rise Time	t _r	–	11	–	ns	
Turn-Off Delay Time	t _{D(off)}	–	61	–	ns	
Turn-Off Fall Time	t _f	–	21	–	ns	

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



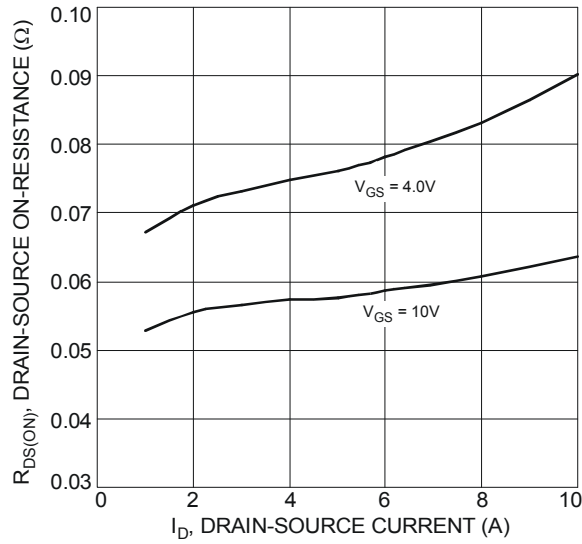


Figure 4 Typical On-Resistance vs. Drain Current and Gate Voltage

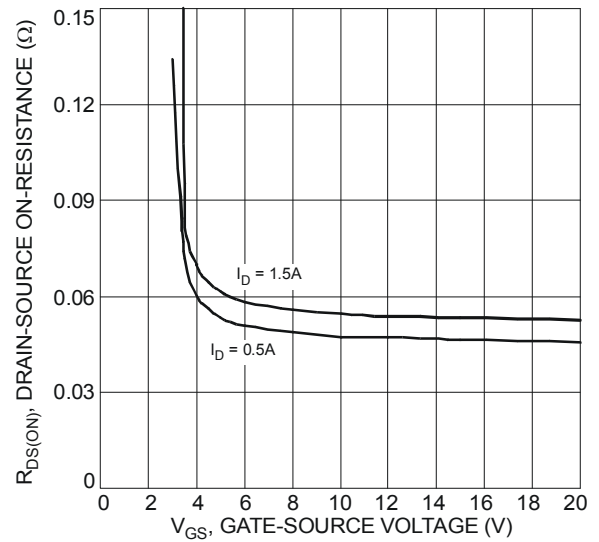


Figure 5 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

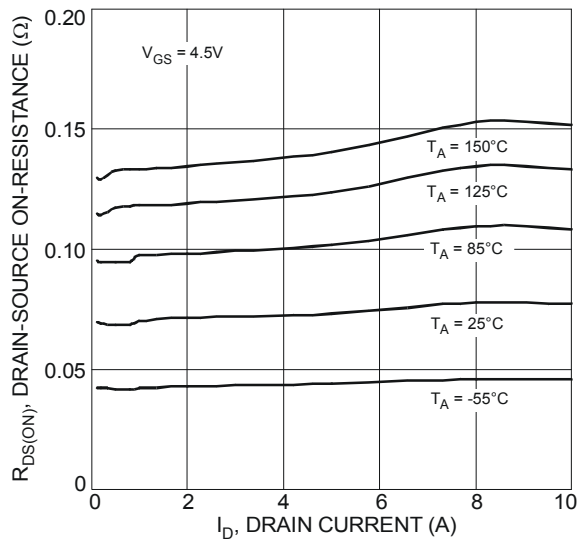


Figure 6 Typical On-Resistance vs. Drain Current and Temperature

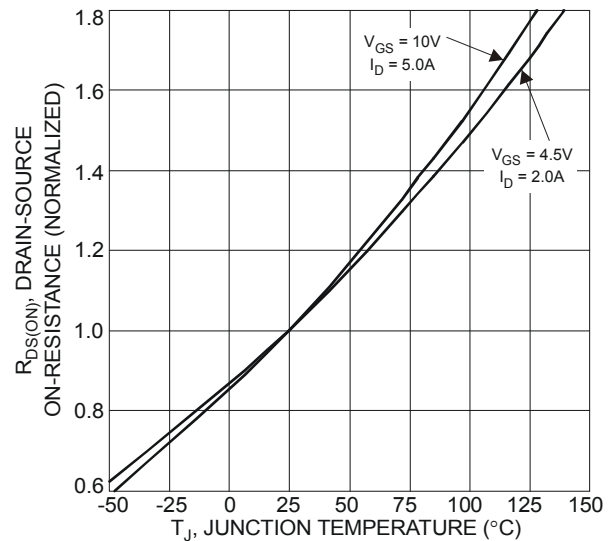


Figure 7 On-Resistance Variation with Temperature

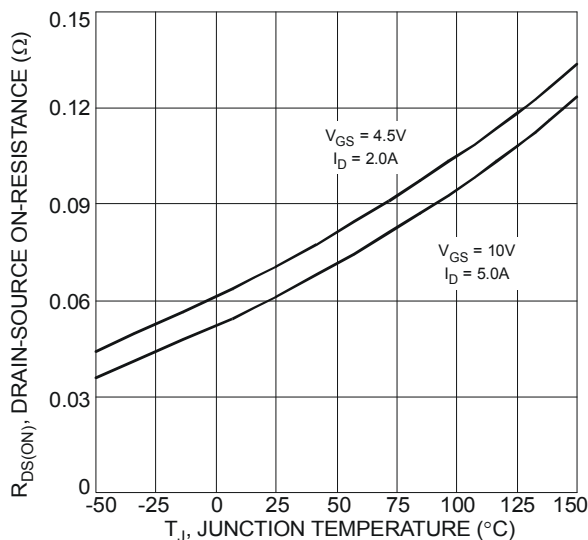


Figure 8 On-Resistance Variation with Temperature

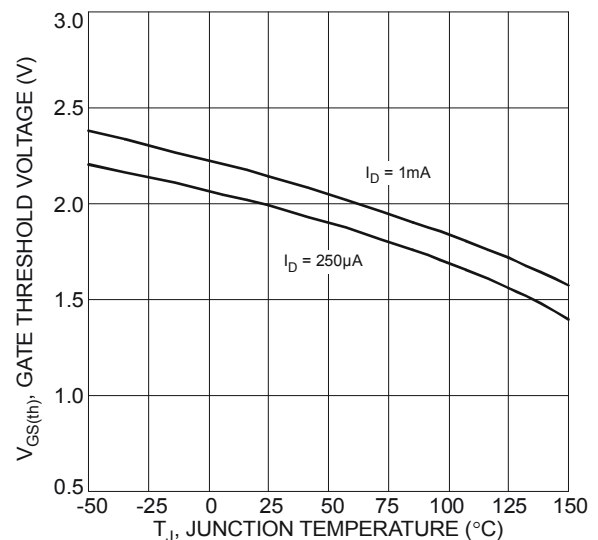
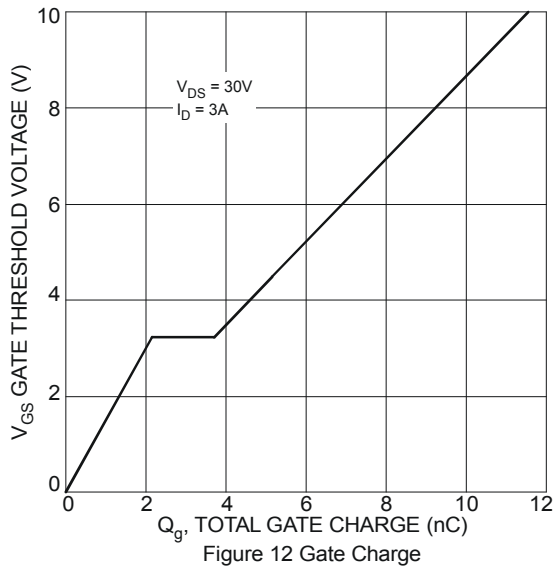
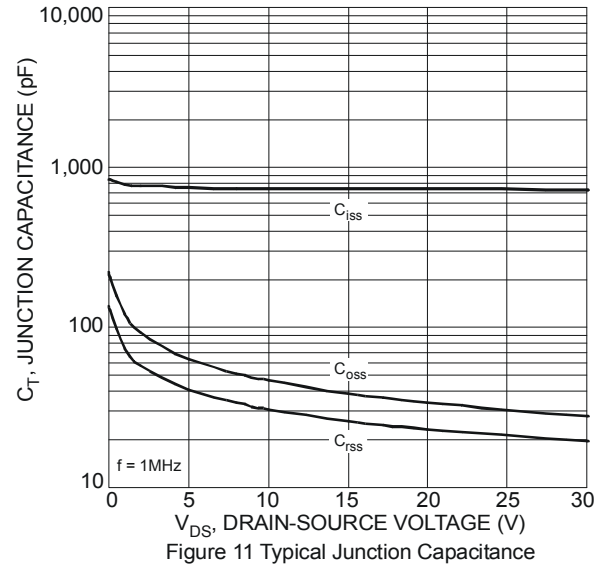
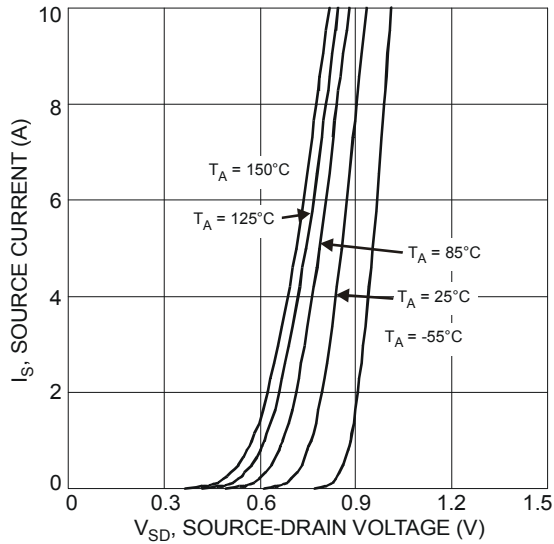


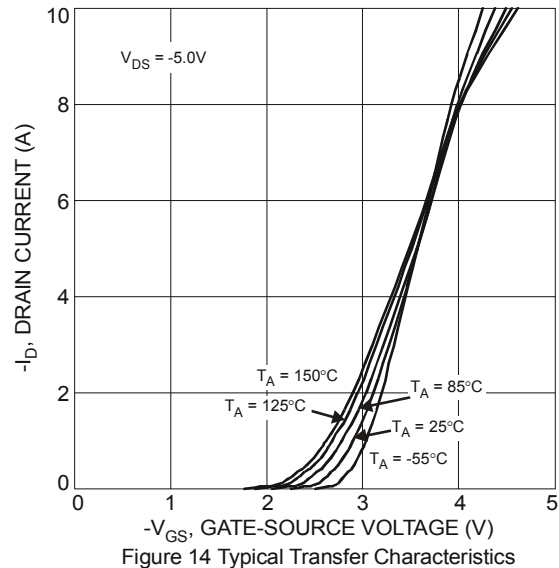
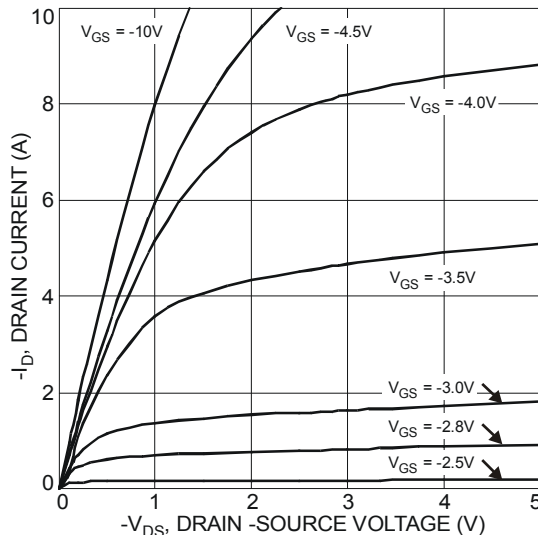
Figure 9 Gate Threshold Variation vs. Ambient Temperature



Electrical Characteristics P-CHANNEL – Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	–	–	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	–	–	-1	μA	V _{DS} = -60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	–	–	±100	nA	V _{GS} = ±16V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	-1	–	-3	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(on)}	–	115	150	mΩ	V _{GS} = -10V, I _D = -1A
			170	250		V _{GS} = -4.5V, I _D = -0.5A
Forward Transfer Admittance	Y _{fs}	–	2.8	–	S	V _{DS} = -5V, I _D = -1A
Diode Forward Voltage	V _{SD}	–	-0.7	-1.2	V	V _{GS} = 0V, I _S = -2A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	–	612	–	pF	V _{DS} = -20V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	–	36	–	pF	
Reverse Transfer Capacitance	C _{rss}	–	26	–	pF	
Gate Resistance	R _g	–	13	–	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -10V)	Q _g	–	8.9	–	nC	V _{DS} = -30V, I _D = -2A
Total Gate Charge (V _{GS} = -4.5V)	Q _g	–	4.3	–	nC	
Gate-Source Charge	Q _{gs}	–	1.4	–	nC	
Gate-Drain Charge	Q _{gd}	–	1.7	–	nC	
Turn-On Delay Time	t _{D(on)}	–	7.6	–	ns	V _{GS} = -10V, V _{DS} = -30V, R _G = 50Ω, I _D = -1A
Turn-On Rise Time	t _r	–	11.6	–	ns	
Turn-Off Delay Time	t _{D(off)}	–	79.8	–	ns	
Turn-Off Fall Time	t _f	–	37.8	–	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect
9. Guaranteed by design. Not subject to production testing



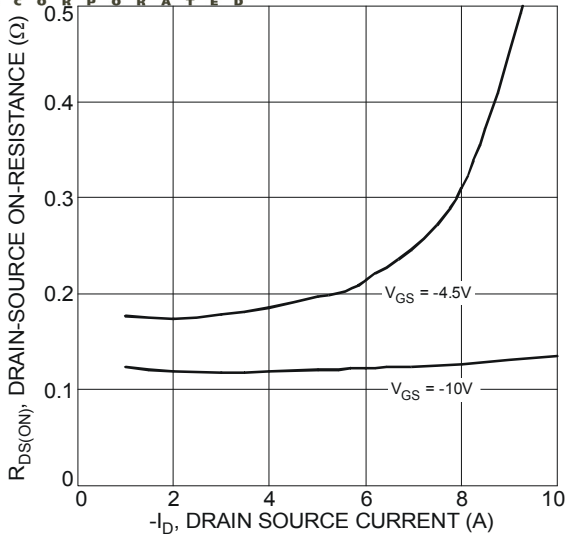


Figure 15 Typical On-Resistance vs. Drain Current and Gate Voltage

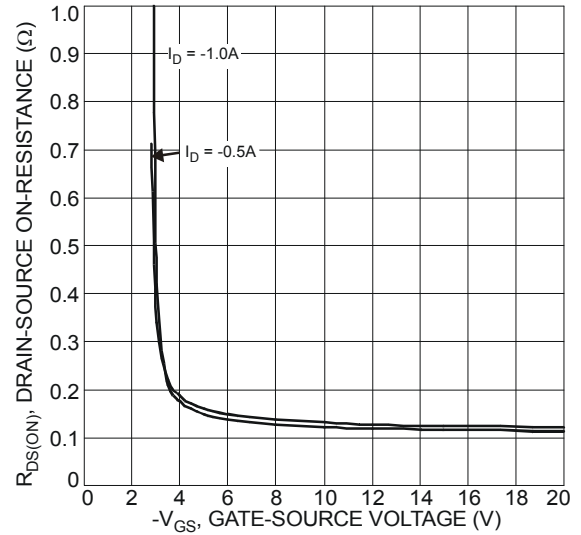


Figure 16 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

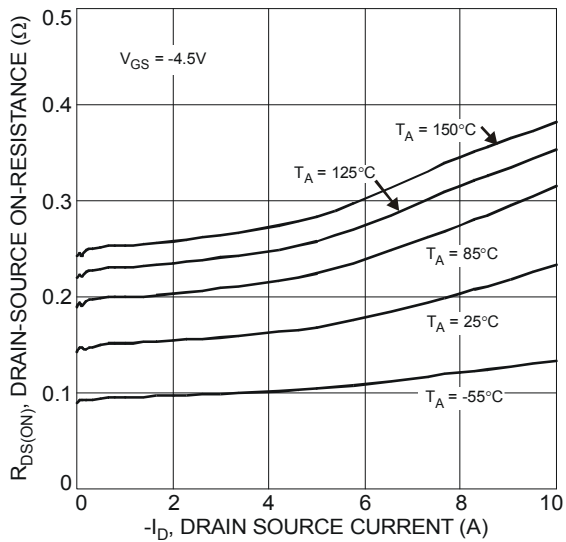


Figure 17 Typical On-Resistance vs. Drain Current and Temperature

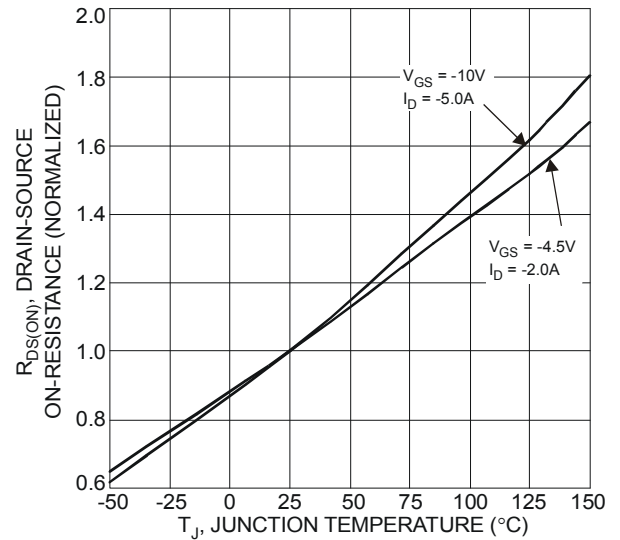


Figure 18 On-Resistance Variation with Temperature

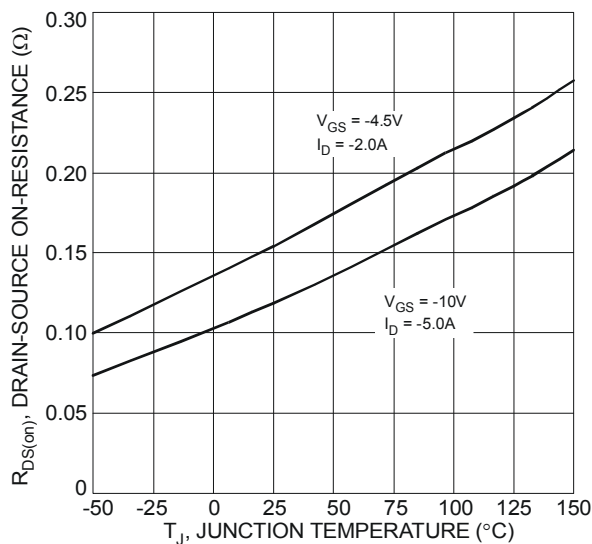


Figure 19 On-Resistance Variation with Temperature

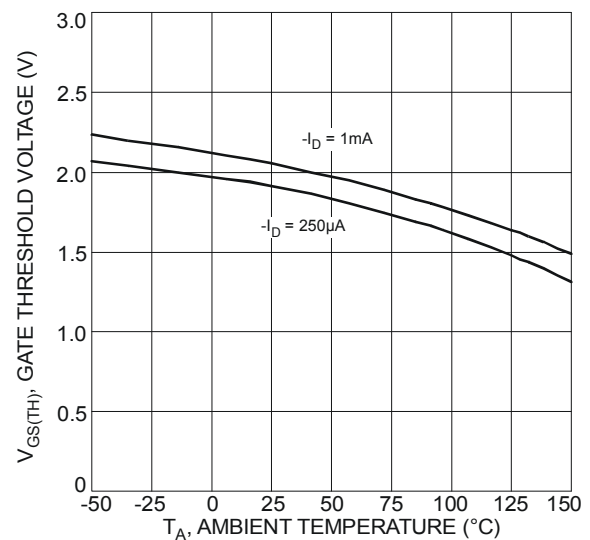


Figure 20 Gate Threshold Variation vs. Ambient Temperature

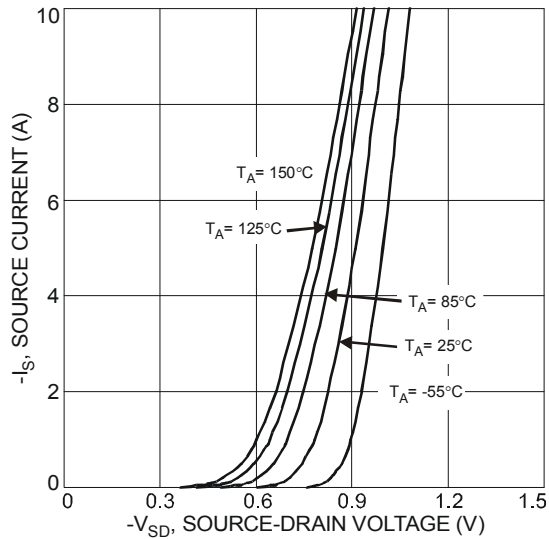


Figure 21 Diode Forward Voltage vs. Current

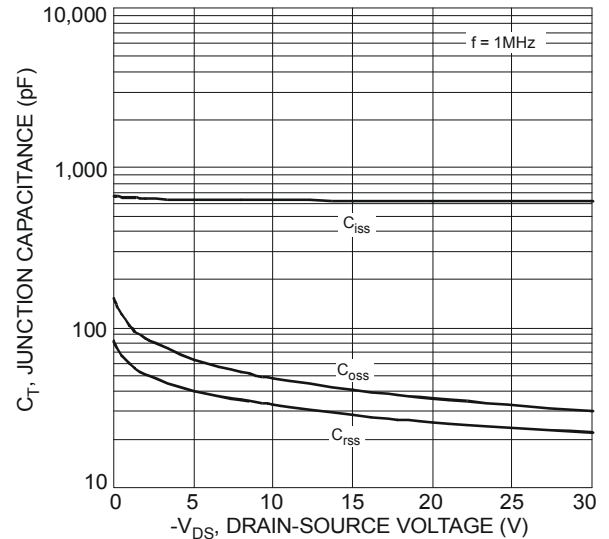


Figure 22 Typical Junction Capacitance

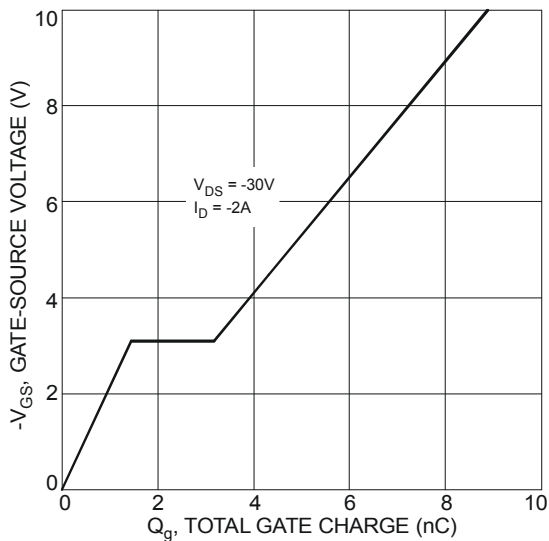
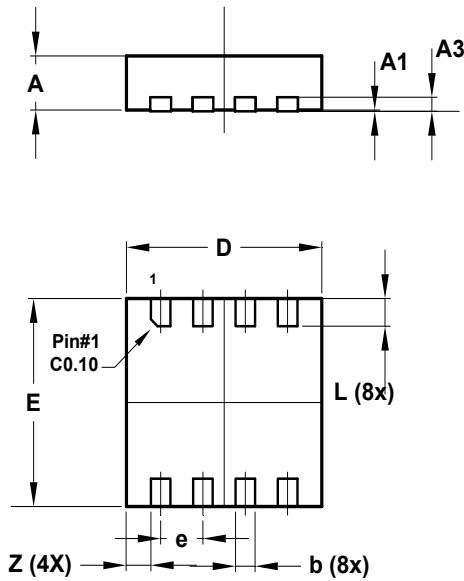


Figure 23 Gate-Charge Characteristics

Package Outline Dimensions

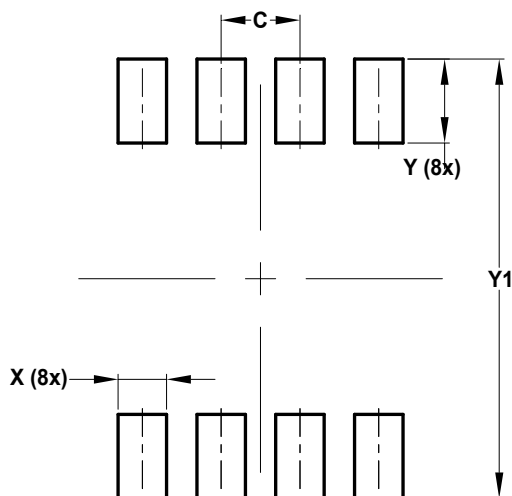
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



V-DFN3030-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	—	—	0.203
b	0.25	0.35	0.30
D	2.95	3.05	3.00
E	2.95	3.05	3.00
e	—	—	0.65
L	0.55	0.65	0.60
Z	—	—	0.375
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
C	0.650
X	0.400
Y	0.850
Y1	3.400

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