Lead-free Green

DMC6070LFDH

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

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

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**

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.

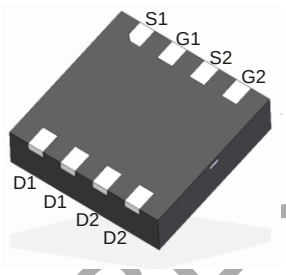
Mechanical Data

- 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)

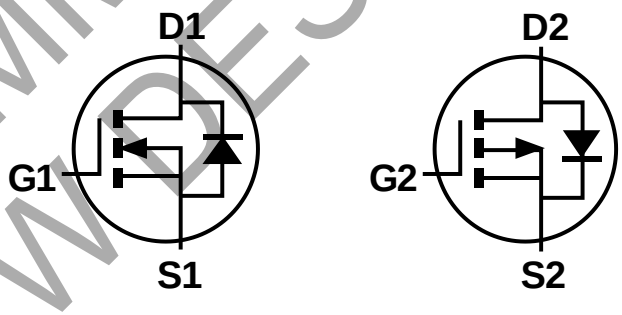
Applications

- Power Management Functions
- Analog Switch

V-DFN3030-8



Bottom View



N-Channel MOSFET

P-Channel MOSFET

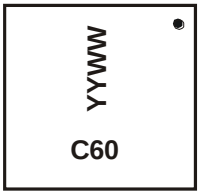
Equivalent Circuit

Ordering Information (Note 4)

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



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	$R_{\theta JA}$	91	°C/W
	t<10s		60	
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	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

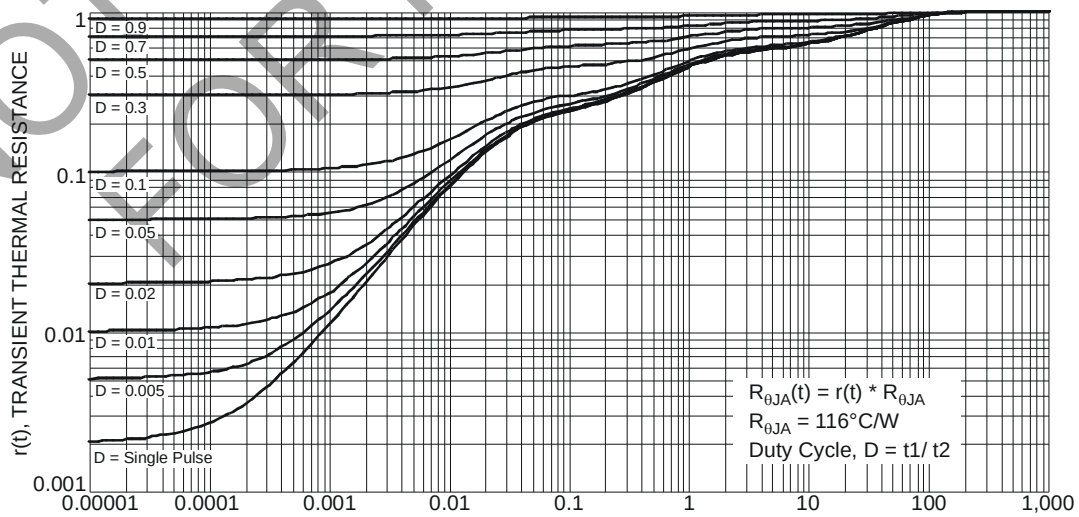


Figure 1 Transient Thermal Resistance

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

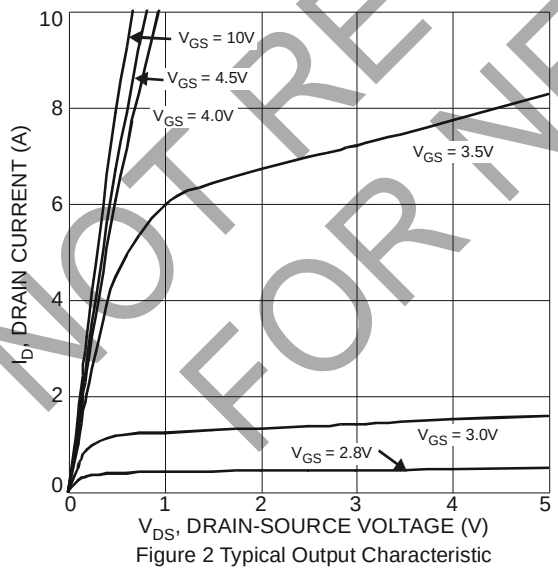


Figure 2 Typical Output Characteristic

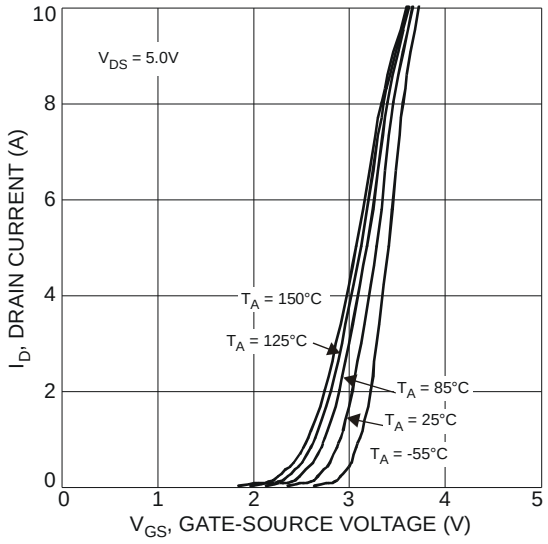


Figure 3 Typical Transfer Characteristics

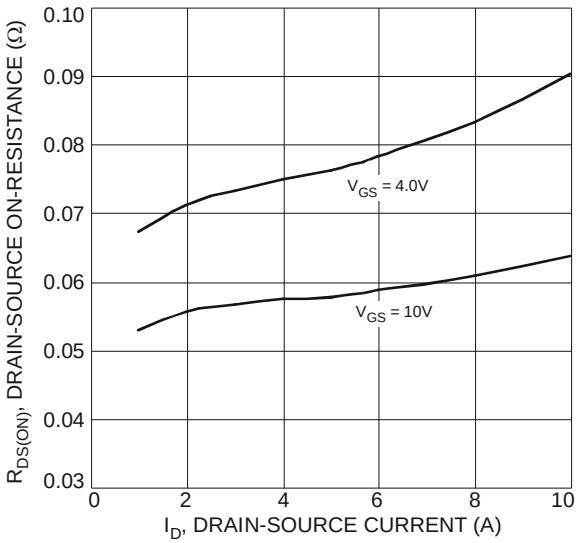


Figure 4 Typical On-Resistance vs. Drain Current and Gate Voltage

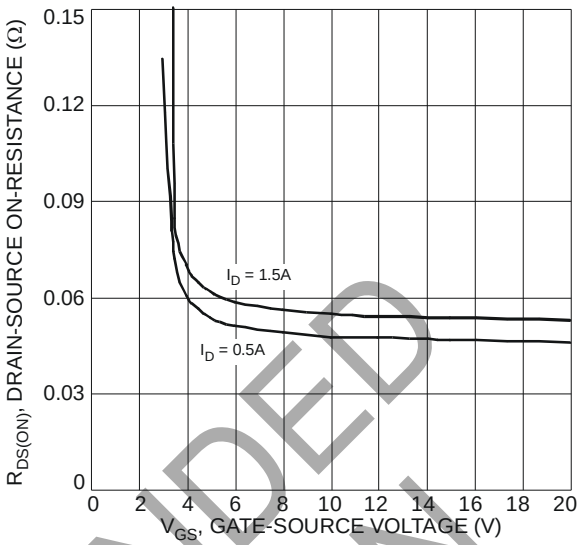


Figure 5 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

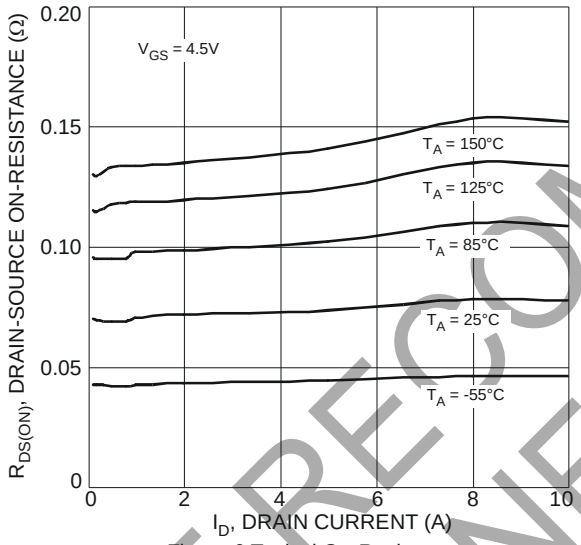


Figure 6 Typical On-Resistance vs. Drain Current and Temperature

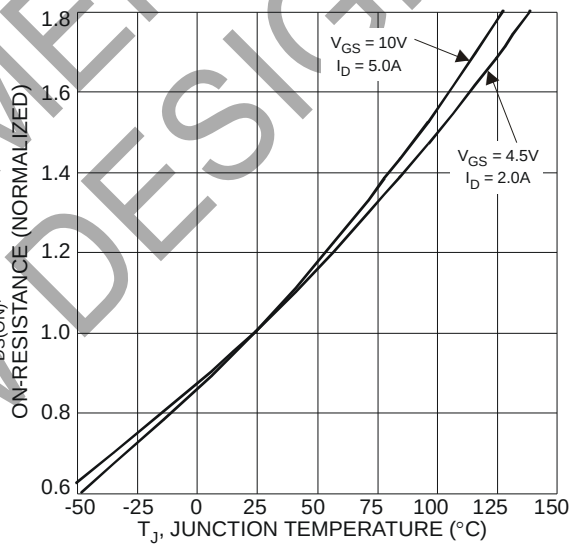


Figure 7 On-Resistance Variation with Temperature

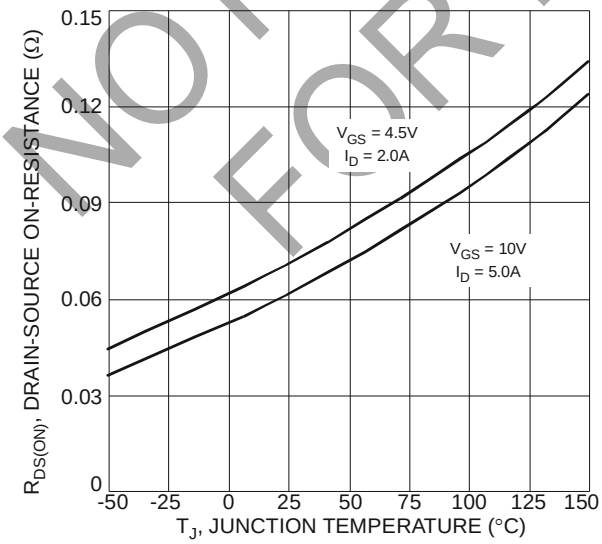


Figure 8 On-Resistance Variation with Temperature

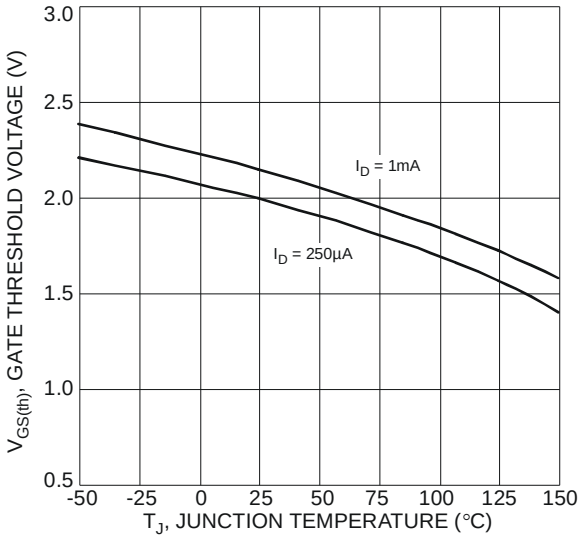


Figure 9 Gate Threshold Variation vs. Ambient Temperature

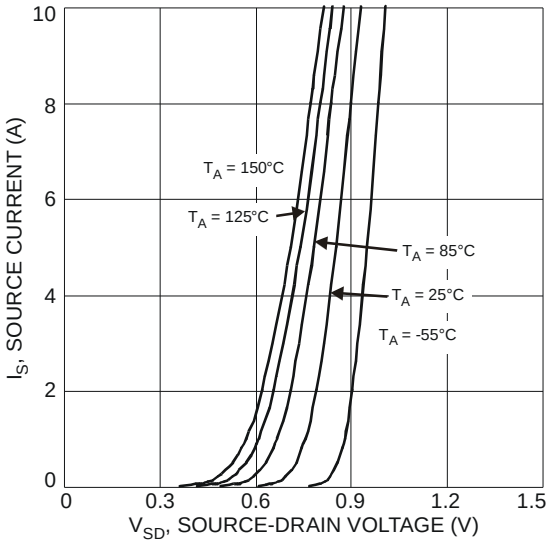


Figure 10 Diode Forward Voltage vs. Current

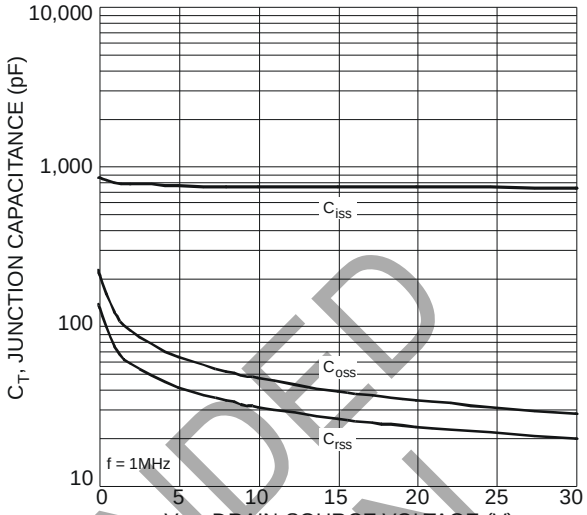


Figure 11 Typical Junction Capacitance

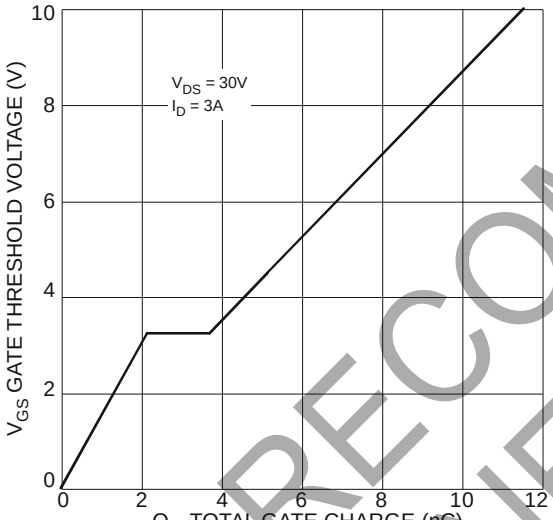


Figure 12 Gate Charge

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

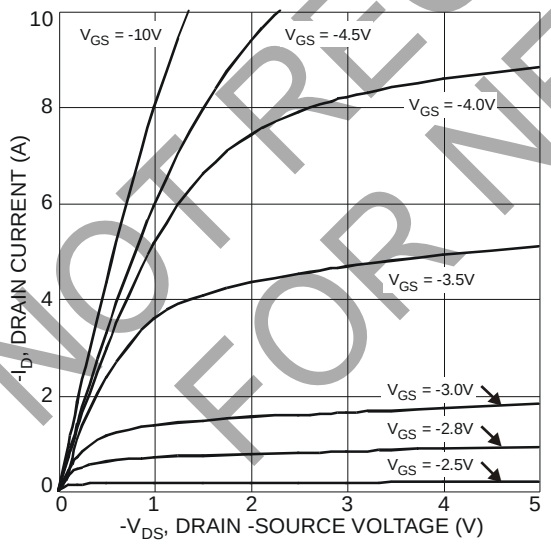


Figure 13 Typical Output Characteristics

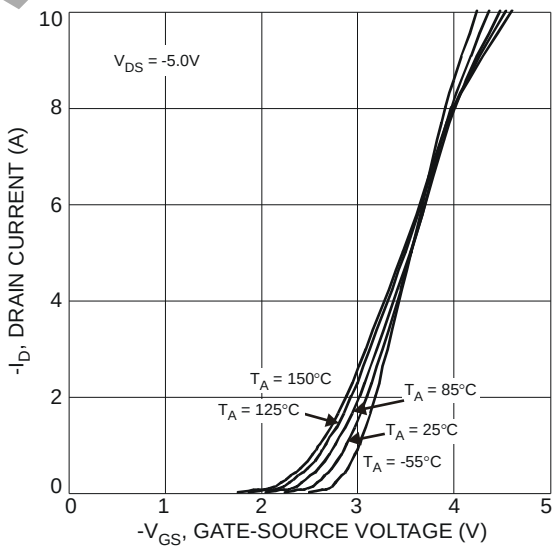


Figure 14 Typical Transfer Characteristics

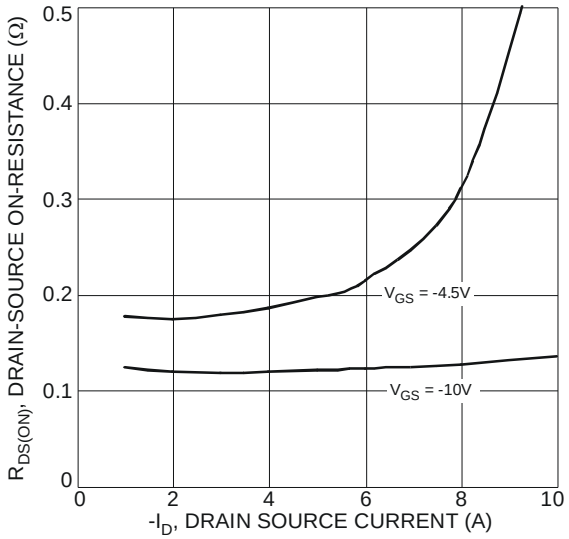


Figure 15 Typical On-Resistance vs. Drain Current and Gate Voltage

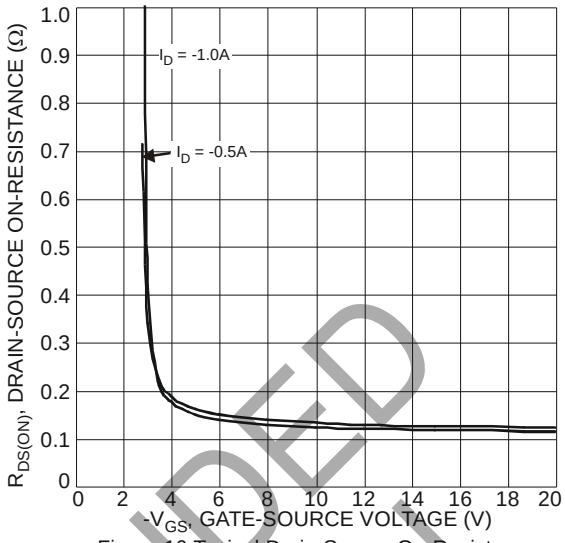


Figure 16 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

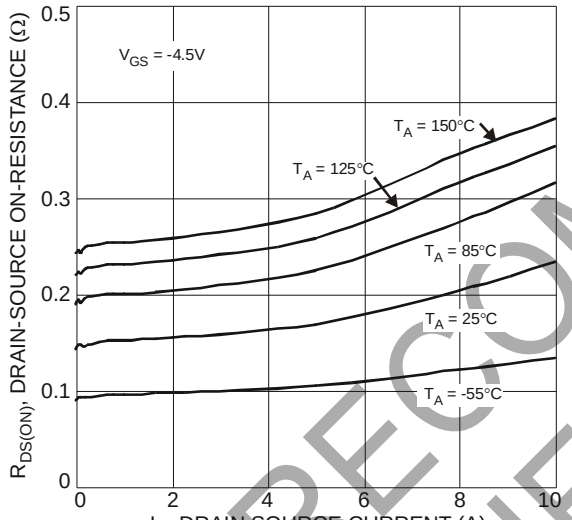


Figure 17 Typical On-Resistance vs. Drain Current and Temperature

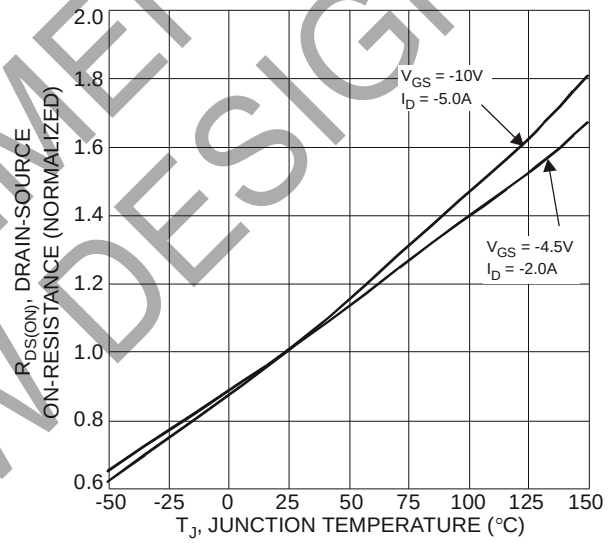


Figure 18 On-Resistance Variation with Temperature

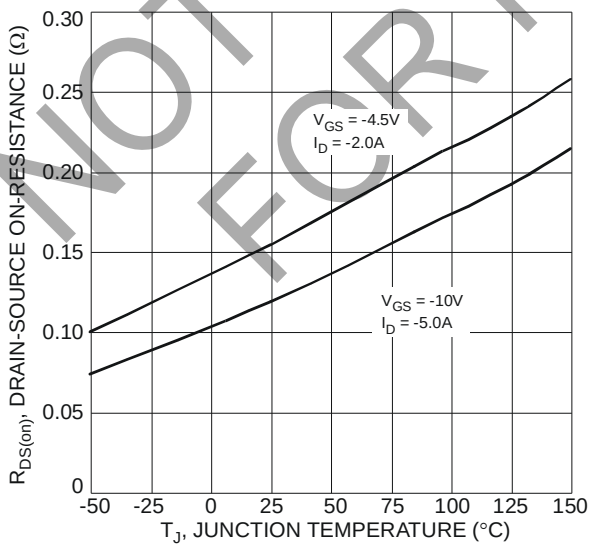


Figure 19 On-Resistance Variation with Temperature

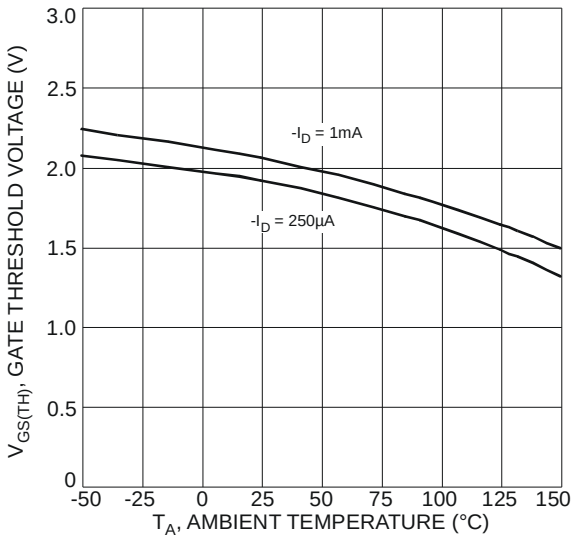


Figure 20 Gate Threshold Variation vs. Ambient Temperature

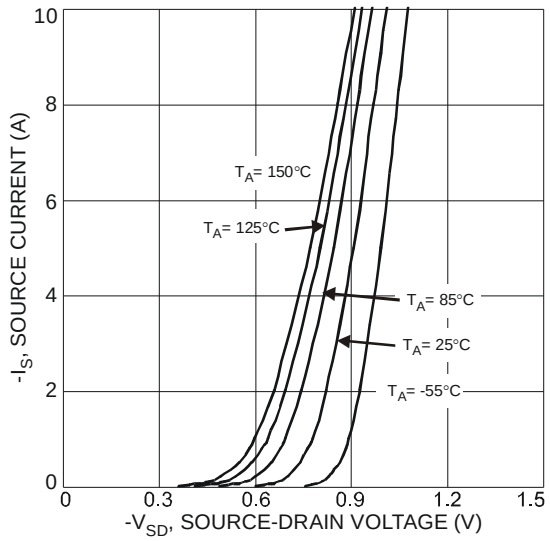


Figure 21 Diode Forward Voltage vs. Current

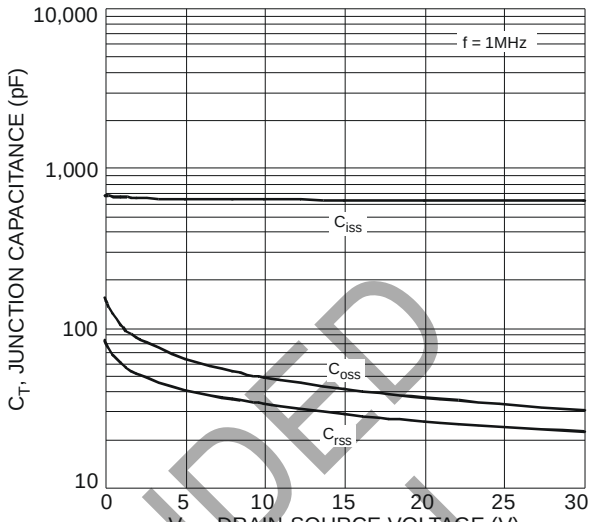


Figure 22 Typical Junction Capacitance

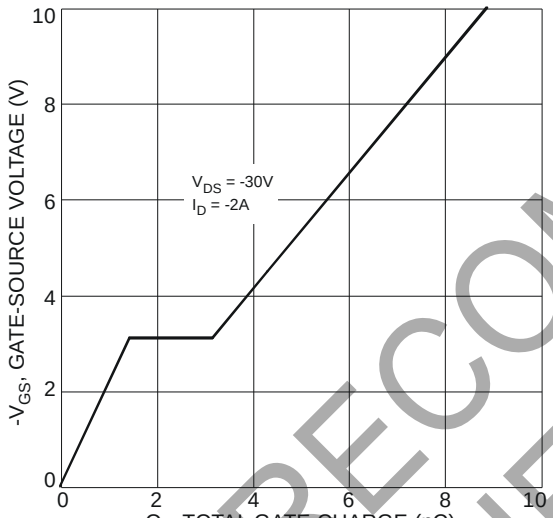
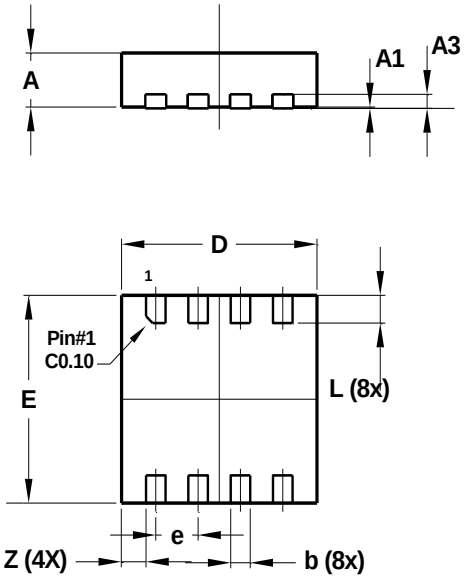


Figure 23 Gate-Charge Characteristics

Package Outline Dimensions

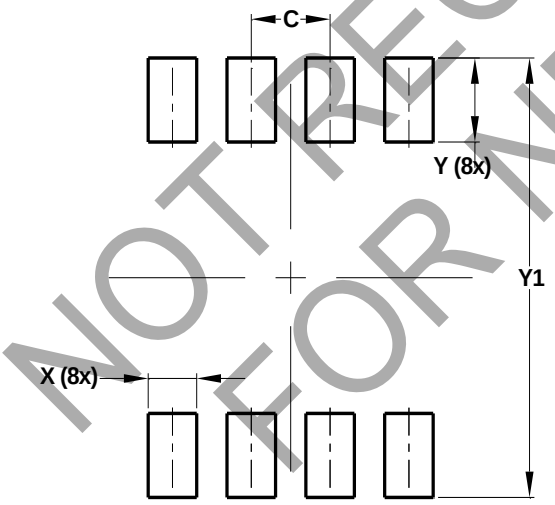
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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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.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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