

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)} \text{ Max}$	$I_D \text{ Max}$ $T_A = 25^\circ\text{C}$
N-Channel	60V	100m Ω @ $V_{GS} = 10\text{V}$	4.1A
		120m Ω @ $V_{GS} = 4.5\text{V}$	3.7A
P-Channel	-60V	170m Ω @ $V_{GS} = -10\text{V}$	3.1A
		250m Ω @ $V_{GS} = -4.5\text{V}$	2.6A

Description

This new generation complementary MOSFET H-Bridge features low on-resistance achievable with low gate drive.

Applications

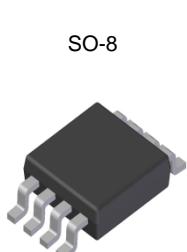
- DC Motor Control
- DC-AC Inverters

Features

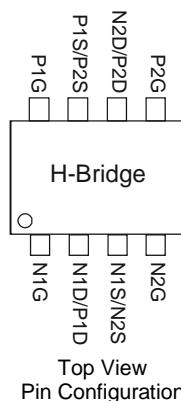
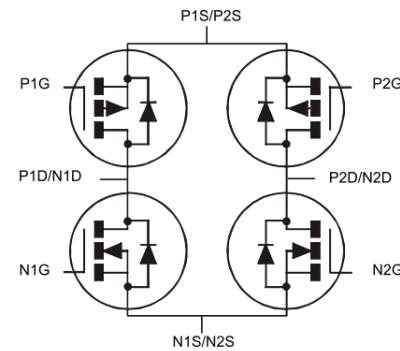
- 2 x N + 2 x P Channels in a SOIC Package
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (Approximate)



Top View


 Top View
Pin Configuration


Internal Schematic

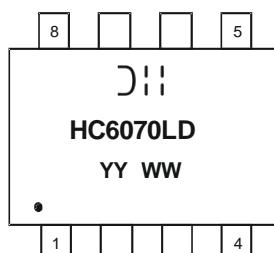
Ordering Information (Note 4)

Part Number	Case	Packaging
DMHC6070LSD-13	SO-8	2,500/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



DII = Manufacturer's Marking
 HC6070LD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 16 = 2016)
 WW = Week (01 - 53)

Maximum Ratings – N-Channel (@ $T_A = +25^\circ\text{C}$, 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) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	3.1 2.5	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	4.1 3.3	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	2.0	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	15	A
Avalanche Current (Note 6) $L = 0.1\text{mH}$			I_{AS}	12	A
Avalanche Energy (Note 6) $L = 0.1\text{mH}$			E_{AS}	8	mJ

Maximum Ratings – P-Channel (@ $T_A = +25^\circ\text{C}$, 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) $V_{GS} = -10\text{V}$	Steady State	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	I_D	-2.4 -1.9	A
	$t < 10\text{s}$	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	I_D	-3.1 -2.5	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	-2.0	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-12	A
Avalanche Current (Note 6) $L = 0.1\text{mH}$			I_{AS}	-12	A
Avalanche Energy (Note 6) $L = 0.1\text{mH}$			E_{AS}	8	mJ

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	1.6	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	75	°C/W
	$t < 10\text{s}$		45	
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	11	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(\text{TH})}$	1.0	—	3.0	V	$I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	—	60	100	$\text{m}\Omega$	$V_{GS} = 10\text{V}$, $I_D = 1.0\text{A}$
		—	70	120		$V_{GS} = 4.5\text{V}$, $I_D = 0.5\text{A}$
Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	$V_{GS} = 0\text{V}$, $I_S = 3\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{ISS}	—	731	—	pF	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	C_{OSS}	—	34	—		
Reverse Transfer Capacitance	C_{RSS}	—	23	—		
Gate resistance	R_G	—	1.3	—	Ω	$V_{DS} = 0\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Total Gate Charge	Q_G	—	5.2	—	nC	$V_{GS} = 4.5\text{V}$
Total Gate Charge	Q_G	—	11.5	—		$V_{DS} = 30\text{V}$ $V_{GS} = 10\text{V}$ $I_D = 3\text{A}$
Gate-Source Charge	Q_{GS}	—	2.1	—		
Gate-Drain Charge	Q_{GD}	—	1.5	—		
Turn-On Delay Time	$t_{D(\text{ON})}$	—	9.6	—	ns	$V_{DD} = 30\text{V}$, $V_{GS} = 10\text{V}$ $R_L \geq 50\Omega$, $R_G \geq 20\Omega$
Turn-On Rise Time	t_R	—	11	—		
Turn-Off Delay Time	$t_{D(\text{OFF})}$	—	61	—		
Turn-Off Fall Time	t_F	—	21	—		
Body Diode Reverse Recovery Time	t_{RR}	—	10.5	—	ns	$I_S = 1.0\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	4.0	—	nC	$I_S = 1.0\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	V	$V_{GS} = 0\text{V}$, $I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -60\text{V}$, $V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(\text{TH})}$	-1	—	-3	V	$V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	—	120	170	$\text{m}\Omega$	$V_{GS} = -10\text{V}$, $I_D = -1.0\text{A}$
		—	170	250		$V_{GS} = -4.5\text{V}$, $I_D = -0.5\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.8	-1.2	V	$V_{GS} = 0\text{V}$, $I_S = -2\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{ISS}	—	618	—	pF	$V_{DS} = -20\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{OSS}	—	36	—		
Reverse Transfer Capacitance	C_{RSS}	—	26	—		
Gate resistance	R_G	—	13	—	Ω	$V_{DS} = 0\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Total Gate Charge	Q_G	—	4.3	—	nC	$V_{GS} = -4.5\text{V}$
Total Gate Charge	Q_G	—	8.9	—		$V_{DS} = -30\text{V}$ $V_{GS} = -10\text{V}$ $I_D = -2\text{A}$
Gate-Source Charge	Q_{GS}	—	1.4	—		
Gate-Drain Charge	Q_{GD}	—	1.7	—		
Turn-On Delay Time	$t_{D(\text{ON})}$	—	7.6	—	ns	$V_{DD} = -30\text{V}$, $V_{GS} = -10\text{V}$ $R_L \geq 50\Omega$, $R_G \geq 20\Omega$
Turn-On Rise Time	t_R	—	11.6	—		
Turn-Off Delay Time	$t_{D(\text{OFF})}$	—	79.8	—		
Turn-Off Fall Time	t_F	—	37.8	—		
Body Diode Reverse Recovery Time	t_{RR}	—	10.8	—	ns	$I_S = -1.0\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	3.8	—	nC	$I_S = -1.0\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$

Notes:

5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
6. I_{AS} and EAS rating are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

Typical Performance Characteristics – N-Channel

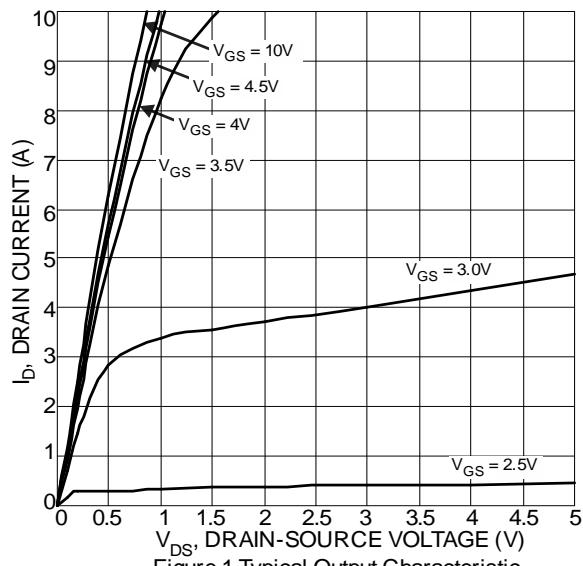


Figure 1 Typical Output Characteristic

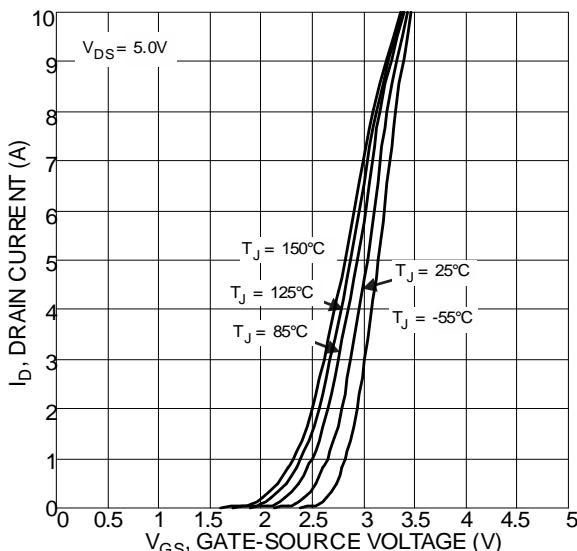


Figure 2 Typical Transfer Characteristics

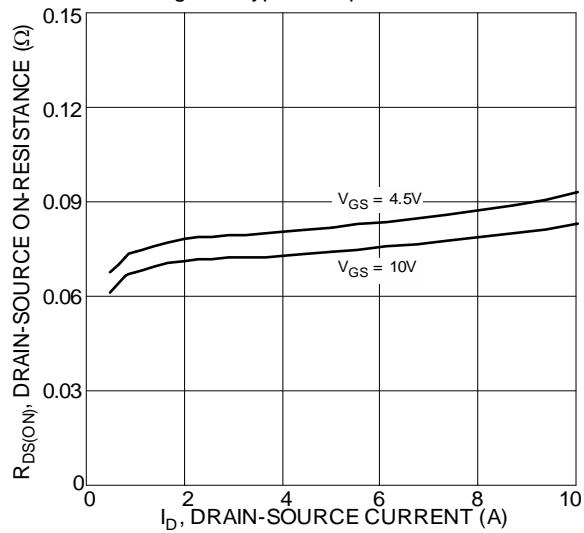


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

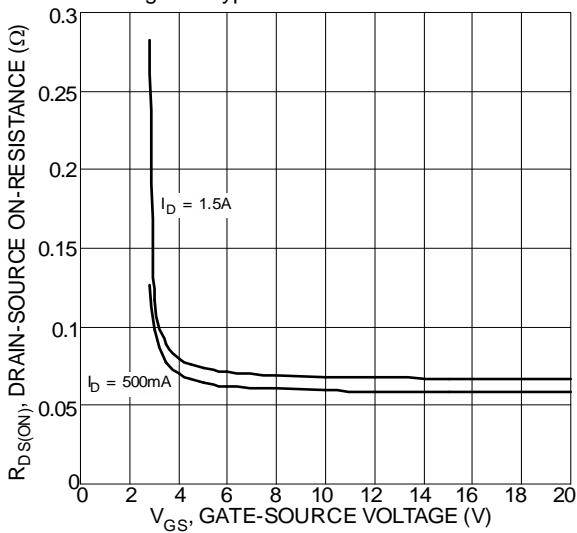


Figure 4 Typical Drain-Source On-Resistance
vs. Gate-Source Voltage

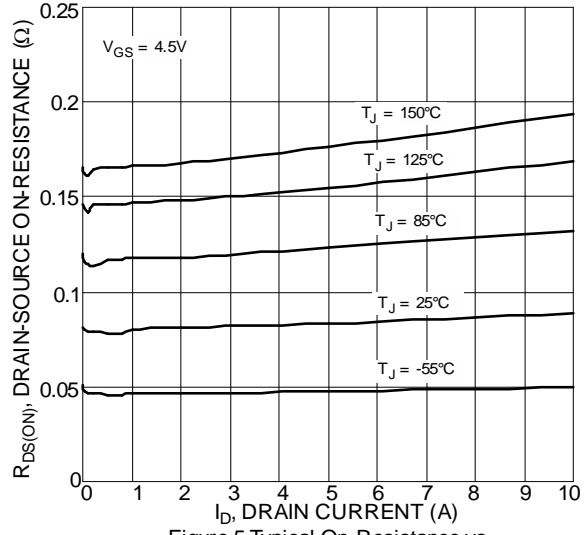


Figure 5 Typical On-Resistance vs.
Drain Current and Temperature

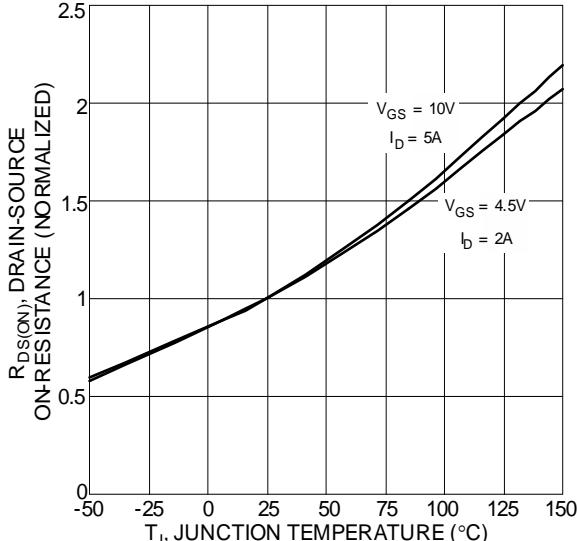


Figure 6 On-Resistance Variation with Temperature

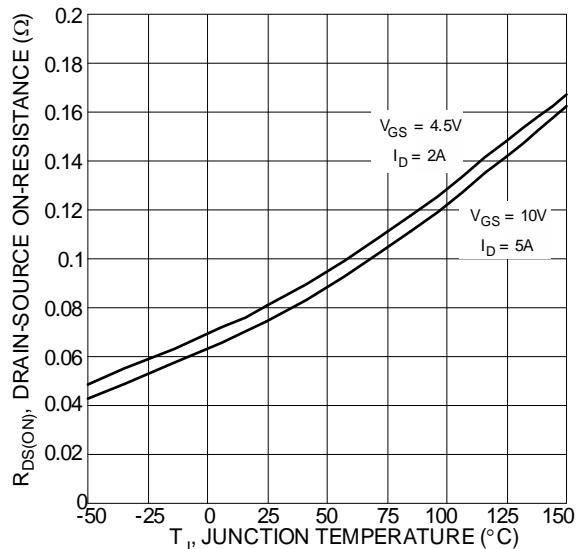


Figure 7 On-Resistance Variation with Temperature

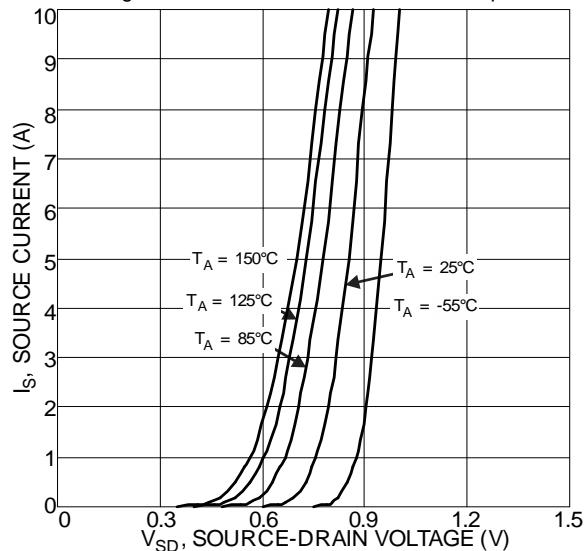


Figure 9 Diode Forward Voltage vs. Current

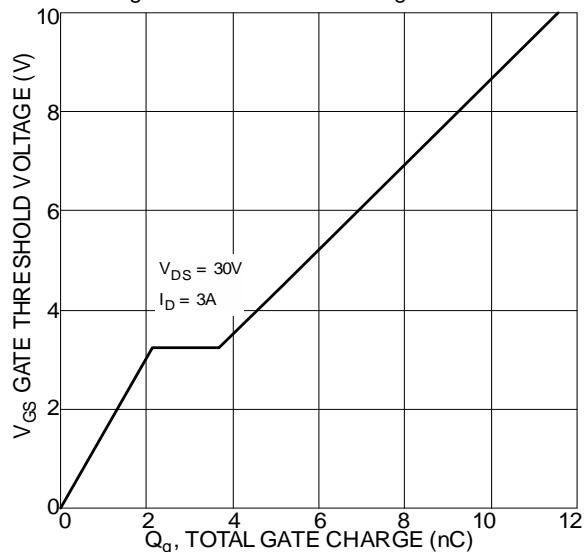


Figure 11 Gate Charge

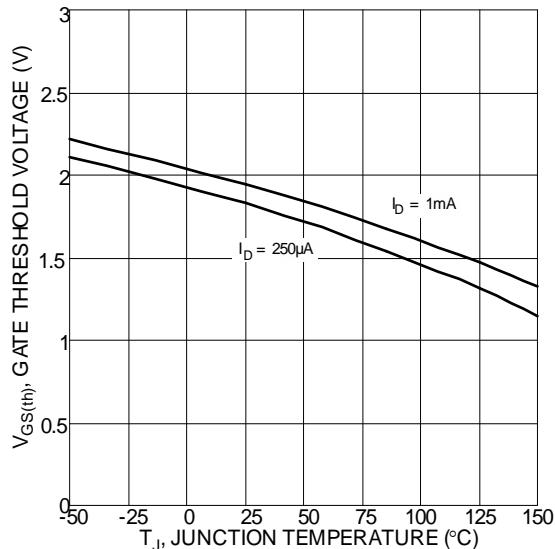


Figure 8 Gate Threshold Variation vs. Ambient Temperature

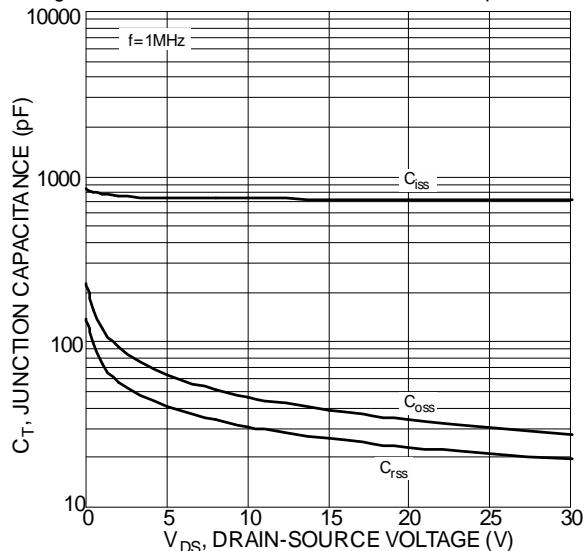


Figure 10 Typical Junction Capacitance

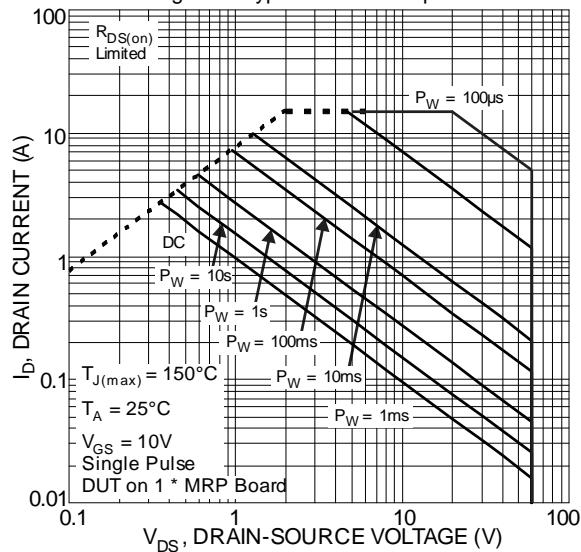


Figure 12 SOA, Safe Operation Area

Typical Performance Characteristics – P-Channel

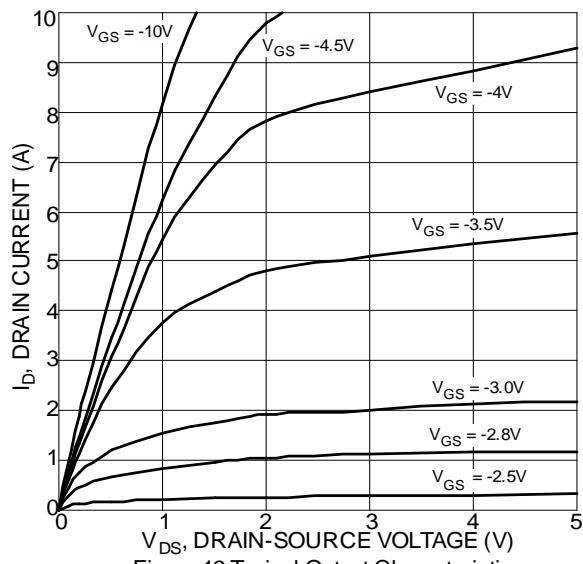


Figure 13 Typical Output Characteristic

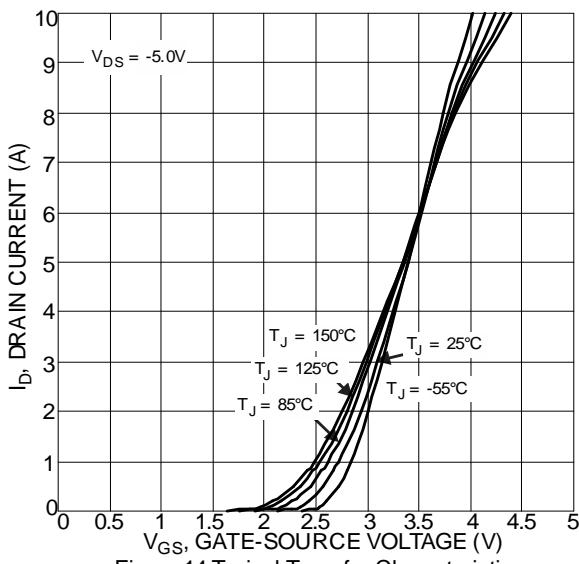


Figure 14 Typical Transfer Characteristics

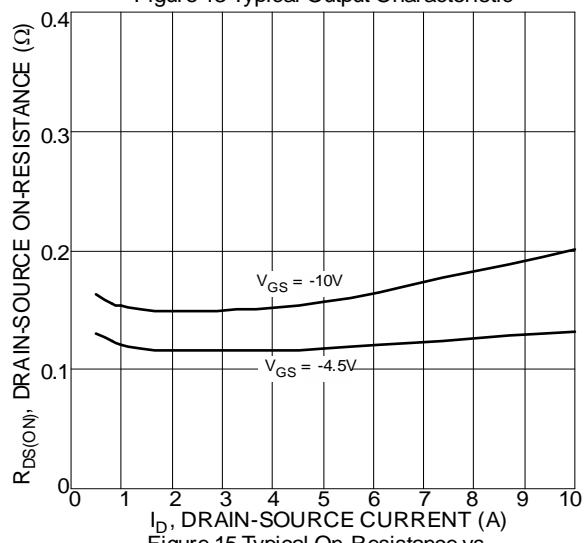


Figure 15 Typical On-Resistance vs.
Drain Current and Gate Voltage

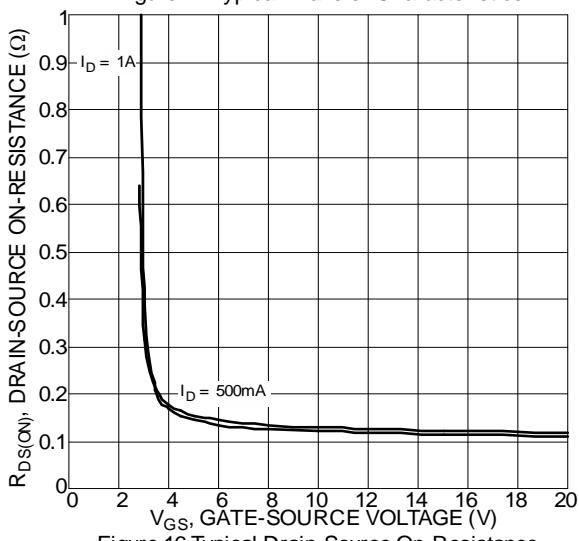


Figure 16 Typical Drain-Source On-Resistance
vs. Gate-Source Voltage

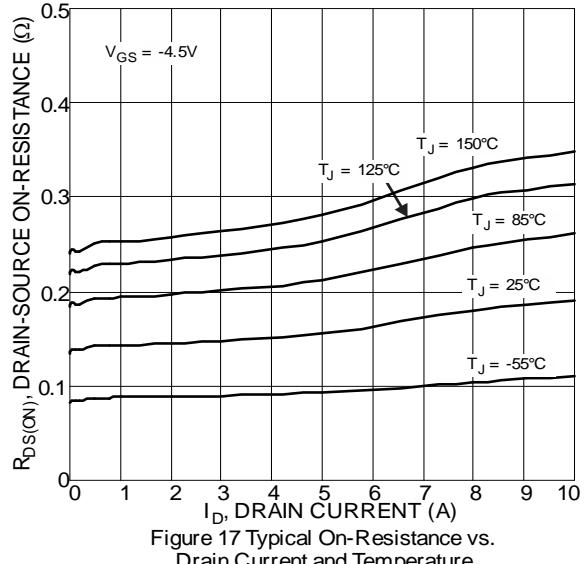


Figure 17 Typical On-Resistance vs.
Drain Current and Temperature

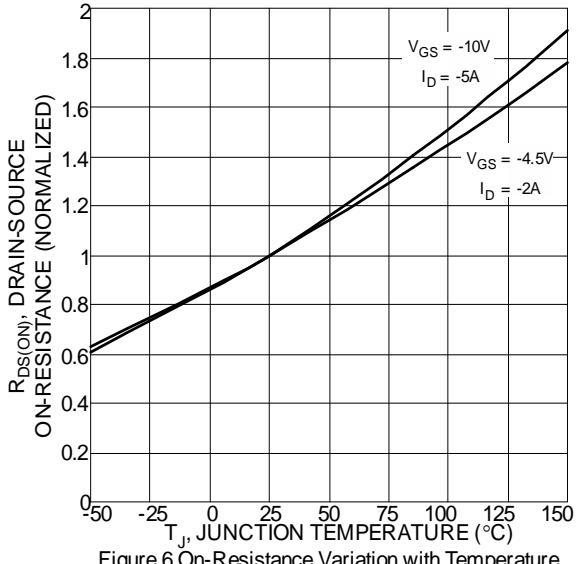
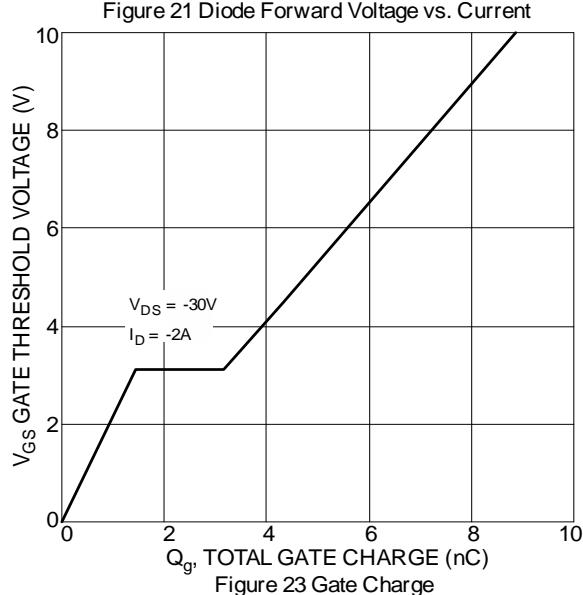
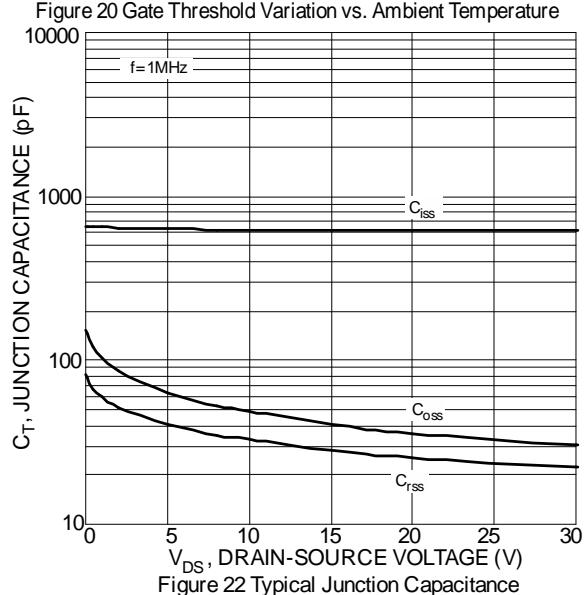
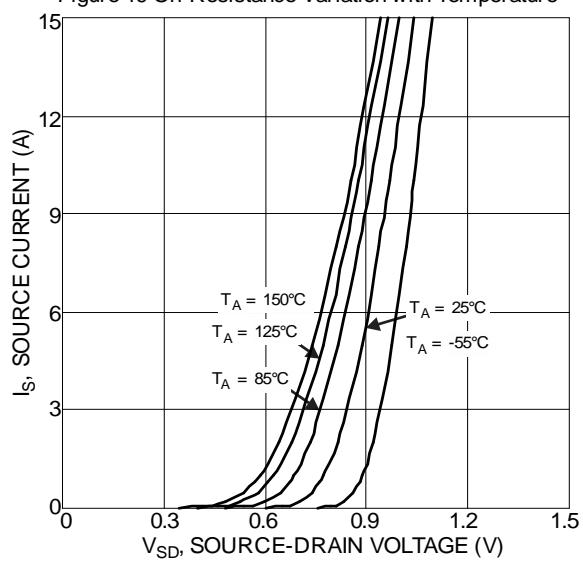
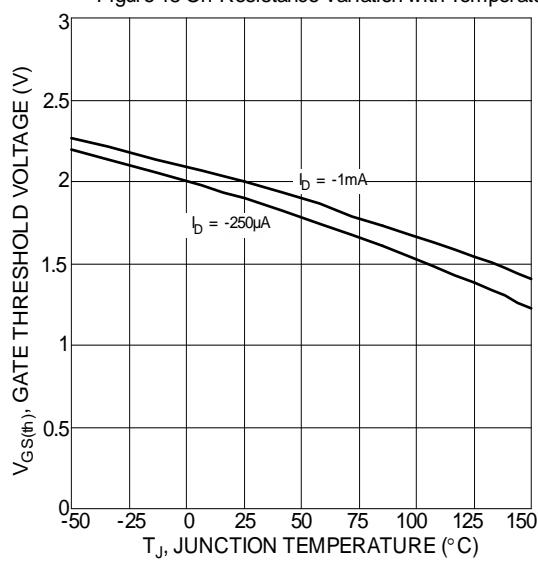
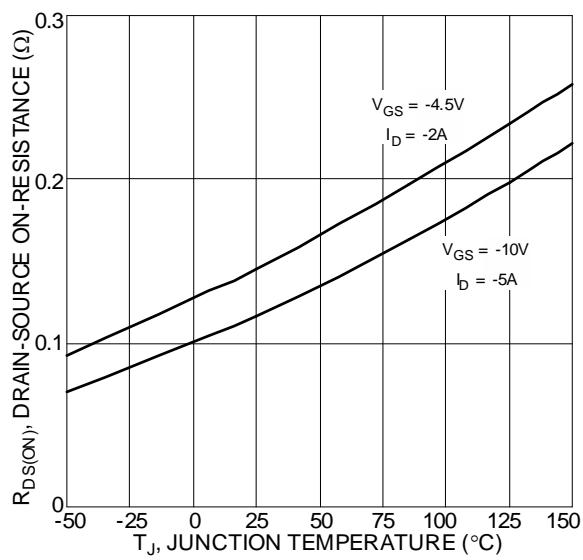
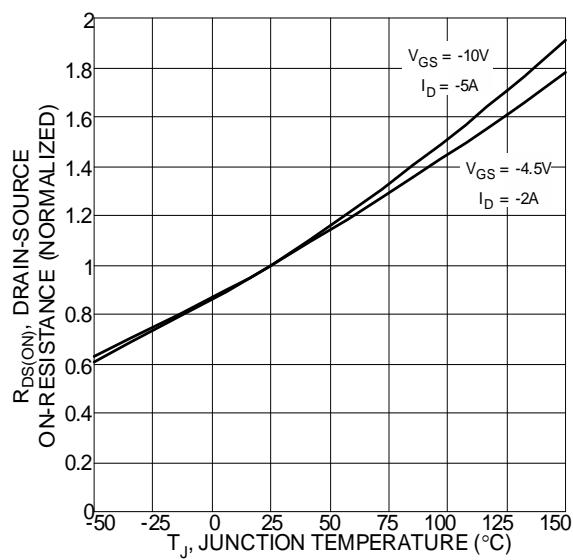
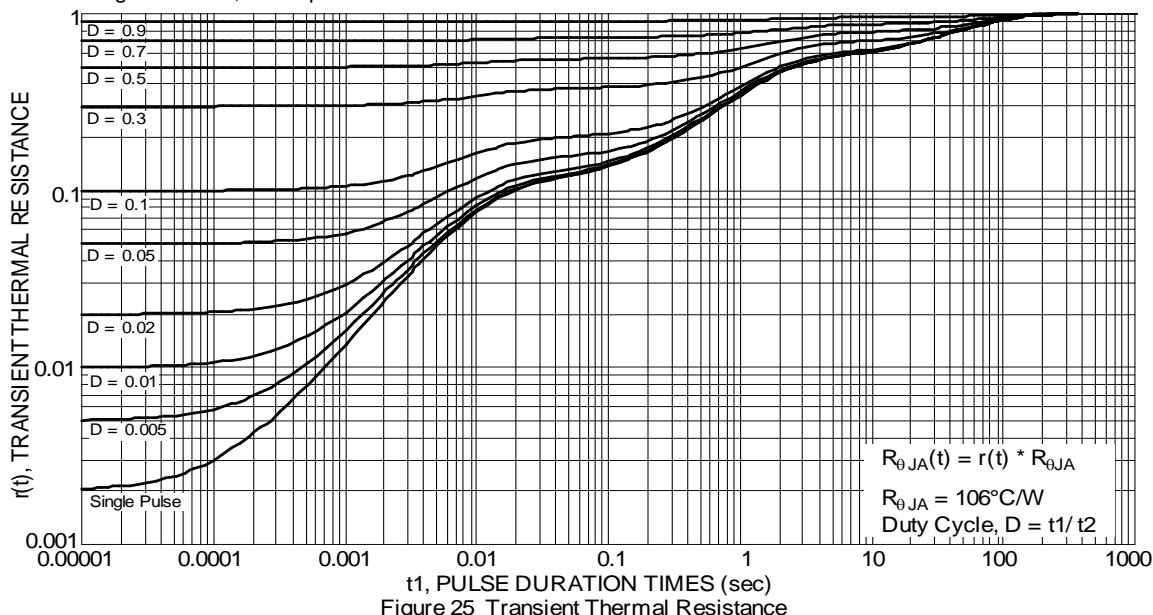
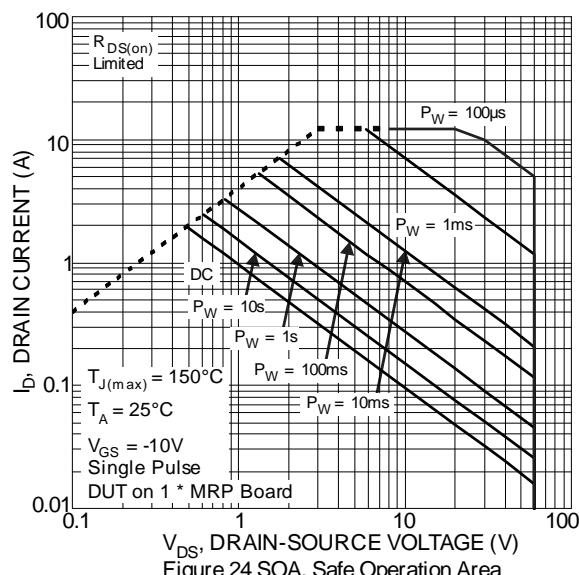


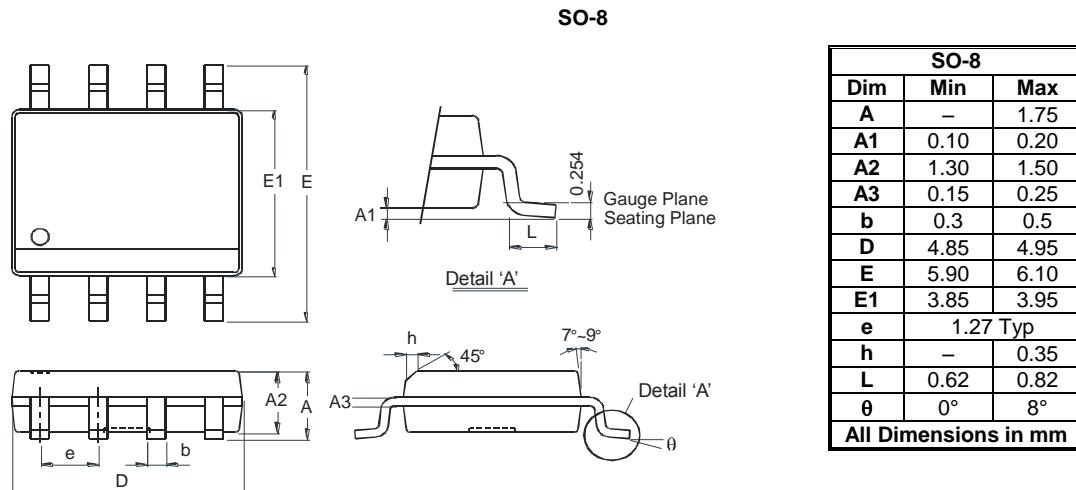
Figure 6 On-Resistance Variation with Temperature





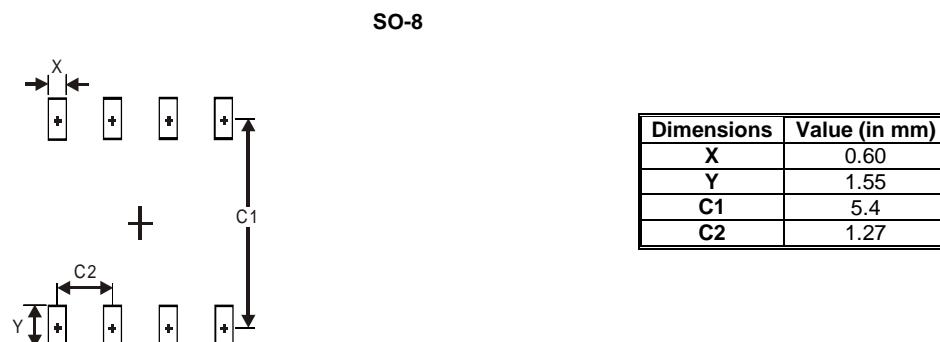
Package Outline Dimensions

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



Suggested Pad Layout

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