30V COMPLEMENTARY ENHANCEMENT MODE MOSFET H-BRIDGE

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
N-Channel	30V	25mΩ @ V_{GS} = 10V	6.0
		40mΩ @ V_{GS} = 4.5V	4.6
P-Channel	-30V	50mΩ @ V_{GS} = -10V	-4.2
		80mΩ @ V_{GS} = -4.5V	-3.2

Description

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

Applications

- DC Motor control
- DC-AC Inverters

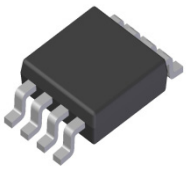
Features

- 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

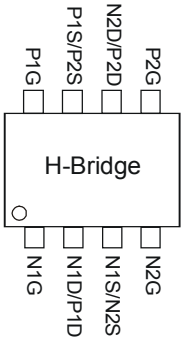
Mechanical Data

- 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: 0.008 grams (approximate)

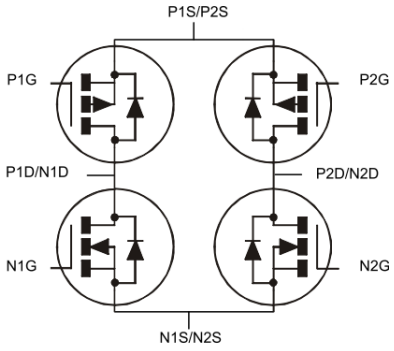
SO-8



Top View



Top View
Pin Configuration



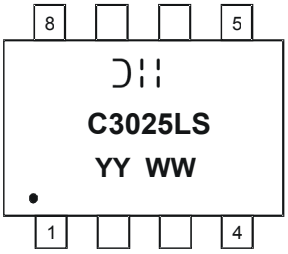
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMHC3025LSD-13	SO-8	2500/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



= Manufacturer's Marking
C3025LS = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 09 = 2009)
WW = Week (01 - 53)

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	1.5	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	83	°C/W
	t < 10s		50	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	14.5	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

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

Characteristic			Symbol	Value	Units
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_A = +70°C	I_D	6.0 4.8	A
	t < 10s	T_A = +25°C T_A = +70°C	I_D	7.8 6.1	A
Continuous Drain Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	4.6 3.6	A
	t < 10s	T_A = +25°C T_A = +70°C	I_D	6.1 4.8	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	2.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	60	A

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

Characteristic			Symbol	Value	Units
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_A = +70°C	I_D	-4.2 -3.3	A
	t < 10s	T_A = +25°C T_A = +70°C	I_D	-5.4 -4.3	A
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.2 -2.5	A
	t < 10s	T_A = +25°C T_A = +70°C	I_D	-4.3 -3.3	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	-2.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	-30	A

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

Electrical Characteristics 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}	—	—	0.5	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±1	μA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	1	—	2	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	19	25	mΩ	V_{GS} = 10V, I_D = 5A
		—	26	40		V_{GS} = 4.5V, I_D = 4A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	4	—	S	V_{DS} = 5V, I_D = 5A
Diode Forward Voltage	V_{SD}	—	0.70	1.2	V	V_{GS} = 0V, I_S = 1.7A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	590	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	122	—		
Reverse Transfer Capacitance	C_{rss}	—	58	—		
Gate resistance	R_g	—	1.5	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	5.4	—	nC	V_{DS} = 15V, I_D = 7.8A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	11.7	—		
Gate-Source Charge	Q_{gs}	—	1.8	—		
Gate-Drain Charge	Q_{gd}	—	2.1	—		
Turn-On Delay Time	$t_{D(on)}$	—	11.2	—	ns	V_{DD} = 15V, V_{GS} = 4.5V, R_L = 2.4Ω, R_G = 1Ω,
Turn-On Rise Time	t_r	—	15	—		
Turn-Off Delay Time	$t_{D(off)}$	—	17.5	—		
Turn-Off Fall Time	t_f	—	8.7	—		
Reverse Recovery Time	t_{rr}	—	18.3	—	ns	I_F = 12A, di/dt = 500A/μs
Reverse Recovery Charge	Q_{rr}	—	12	—	nC	

Electrical Characteristics P-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}	—	—	-0.5	μA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±1	μA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	-1	—	-2	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	43	50	mΩ	V_{GS} = -10V, I_D = -5A
		—	68	80		V_{GS} = -4.5V, I_D = -4A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	3.5	—	S	V_{DS} = -5V, I_D = -5A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1.7A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	631	—	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	137	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	70	—	pF	
Gate resistance	R_g	—	10.8	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	5.5	—	nC	V_{DS} = -15V, I_D = -6A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	11.4	—	nC	
Gate-Source Charge	Q_{gs}	—	1.8	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.4	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	7.5	—	ns	V_{DD} = -15V, V_{GS} = -10V, R_G = 6Ω, I_D = -1A
Turn-On Rise Time	t_r	—	4.9	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	28.2	—	ns	
Turn-Off Fall Time	t_f	—	13.5	—	ns	
Reverse Recovery Time	t_{rr}	—	15.1	—	ns	I_F = 12A, di/dt = 500A/μs
Reverse Recovery Charge	Q_{rr}	—	15.3	—	nC	

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

Typical Characteristics - N-CHANNEL

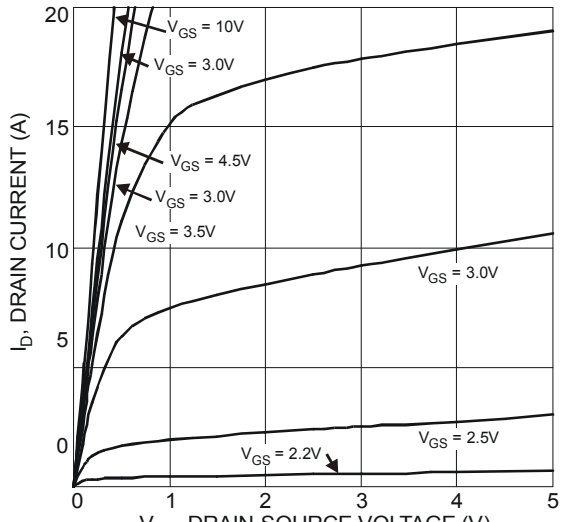


Figure 1 Typical Output Characteristic

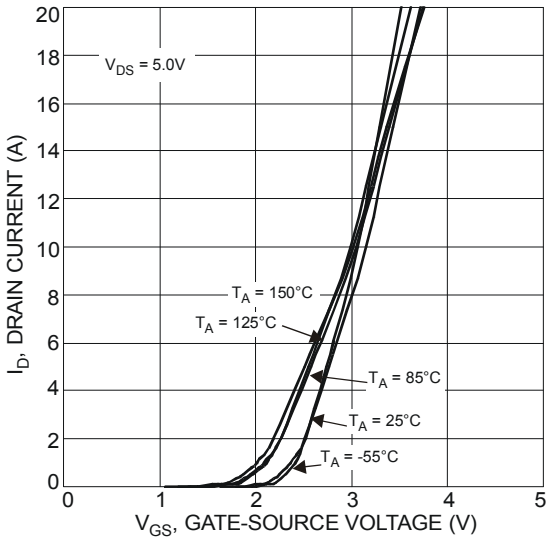


Figure 2 Typical Transfer Characteristics

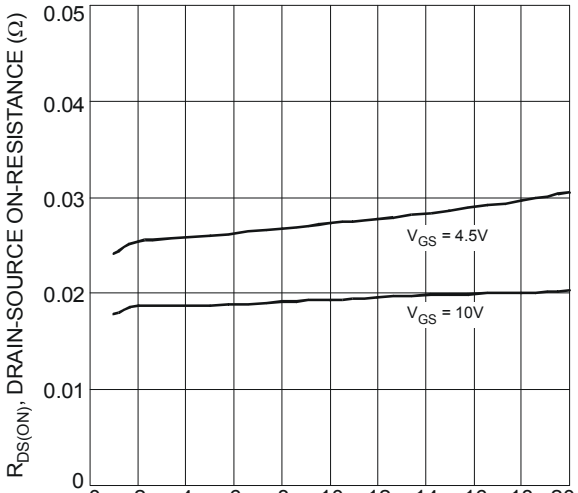


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

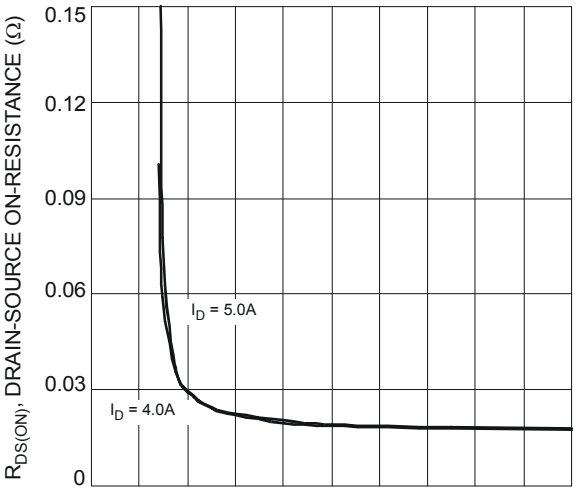


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

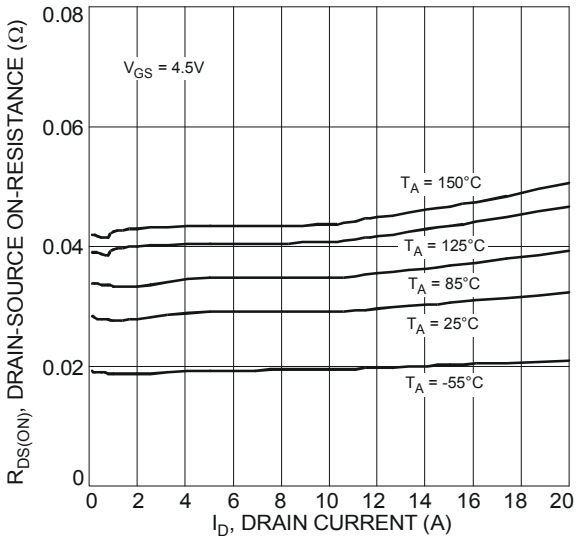


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

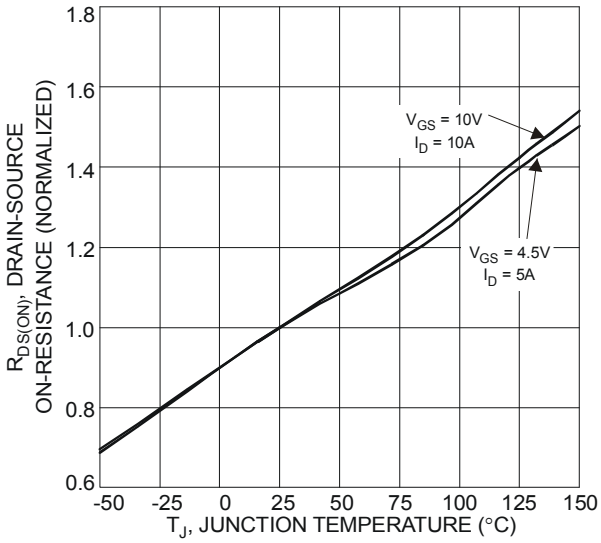


Figure 6 On-Resistance Variation with Temperature

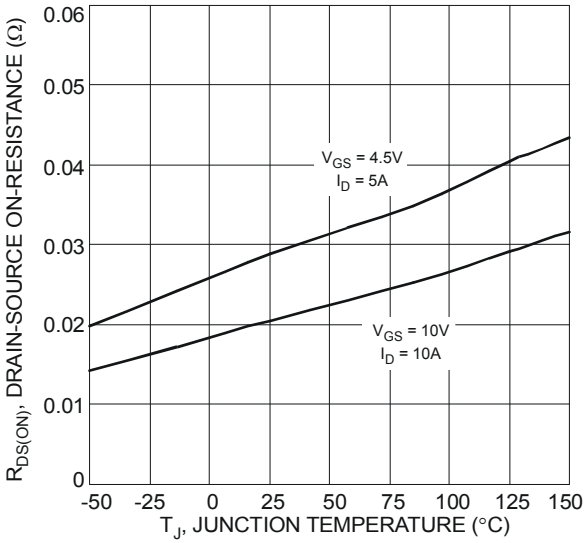


Figure 7 On-Resistance Variation with Temperature

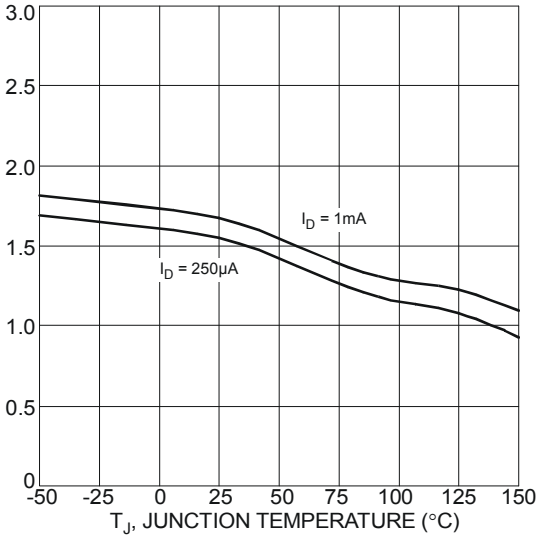


Figure 8 Gate Threshold Variation vs. Ambient Temperature

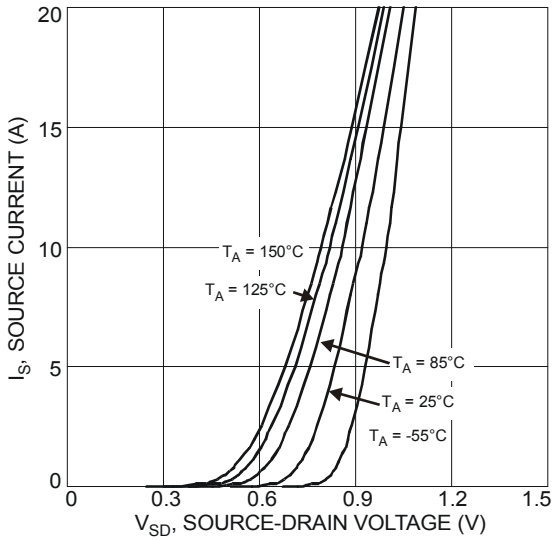


Figure 9 Diode Forward Voltage vs. Current

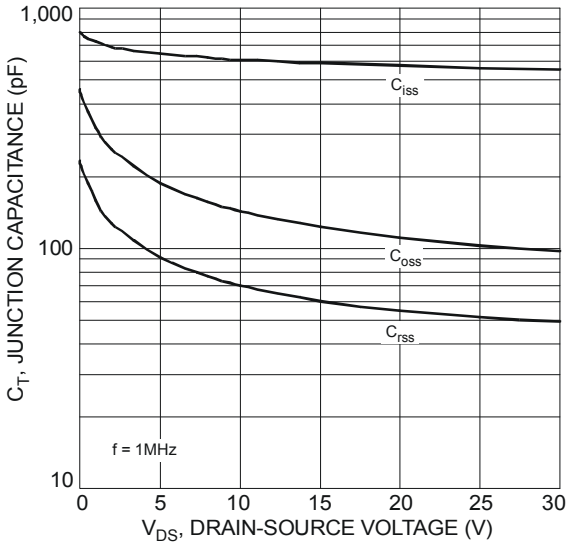


Figure 10 Typical Junction Capacitance

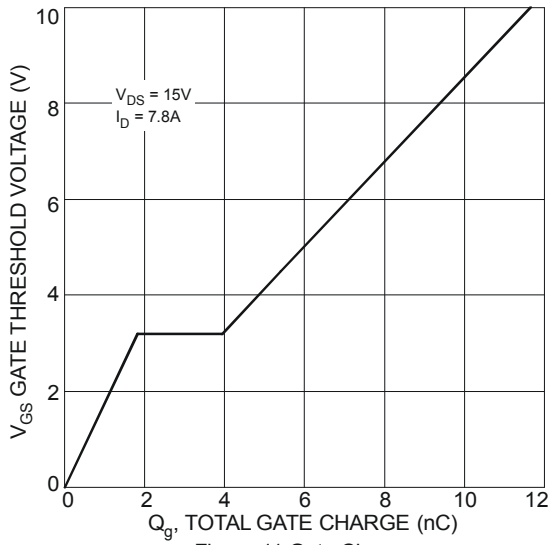


Figure 11 Gate Charge

Typical Characteristics - P-CHANNEL

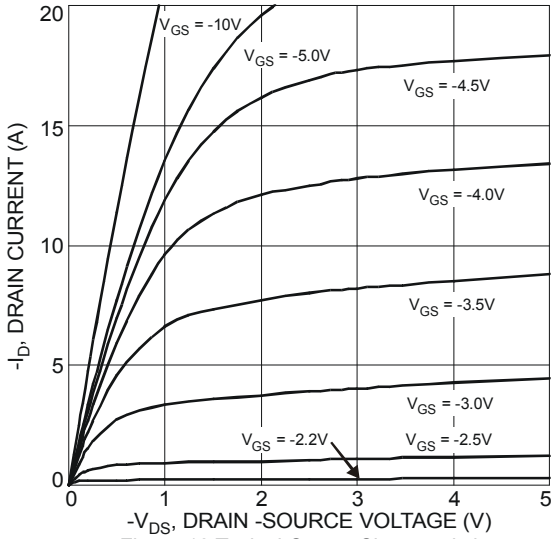


Figure 12 Typical Output Characteristics

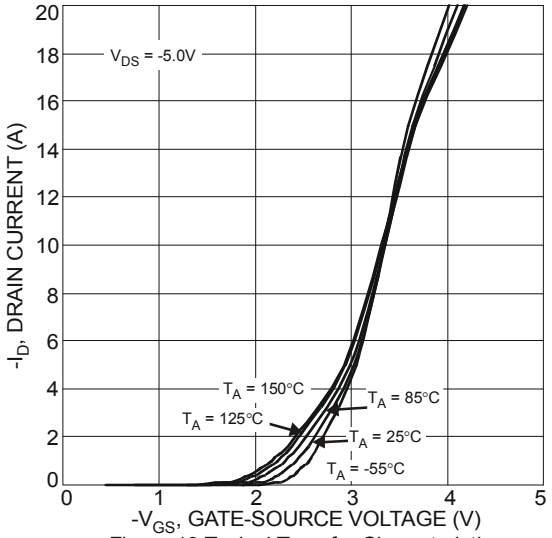


Figure 13 Typical Transfer Characteristics

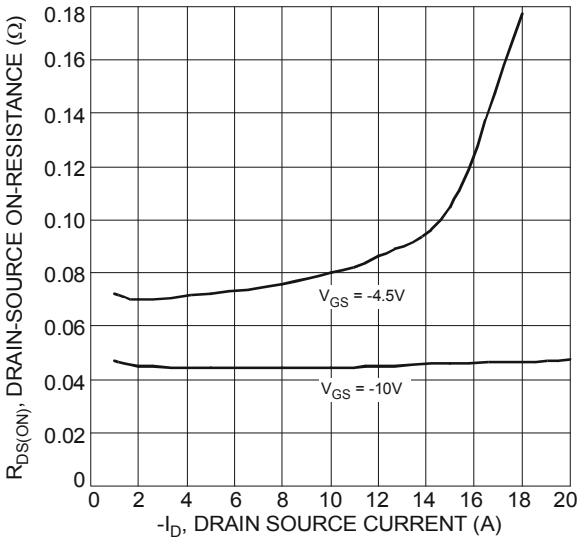


Figure 14 Typical On-Resistance vs. Drain Current and Gate Voltage

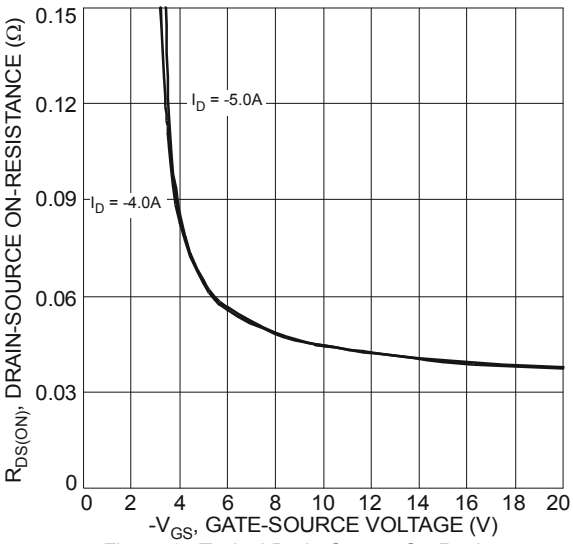


Figure 15 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

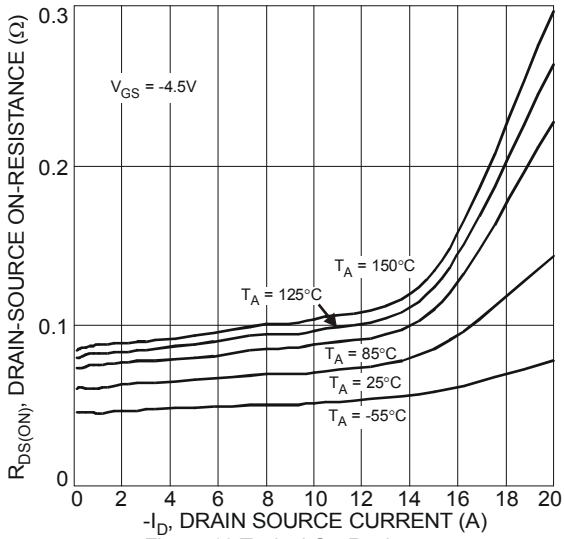


Figure 16 Typical On-Resistance vs. Drain Current and Temperature

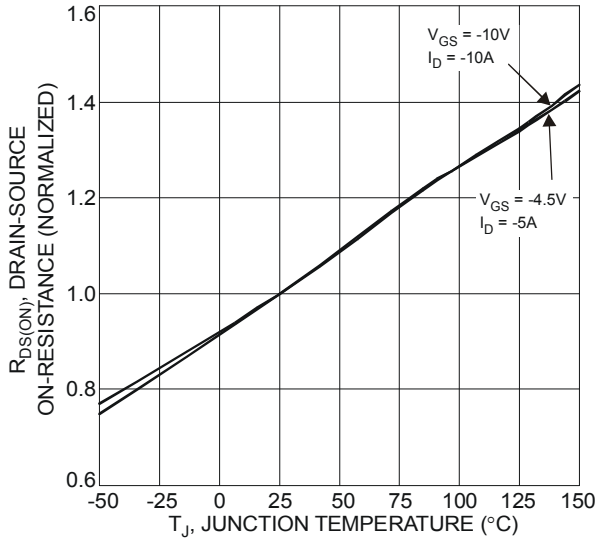


Figure 17 On-Resistance Variation with Temperature

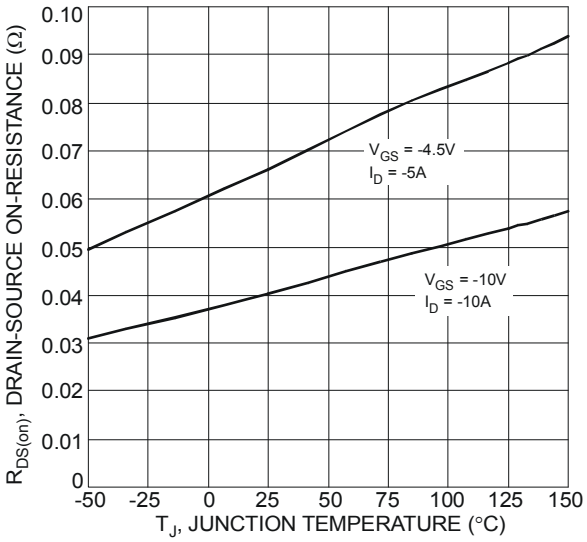


Figure 18 On-Resistance Variation with Temperature

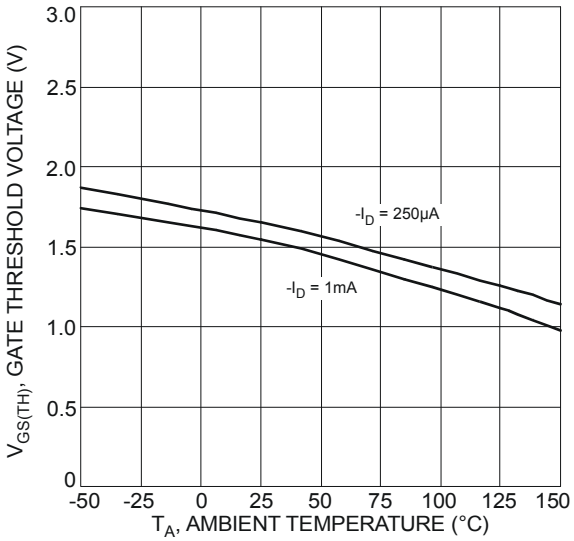


Figure 19 Gate Threshold Variation vs. Ambient Temperature

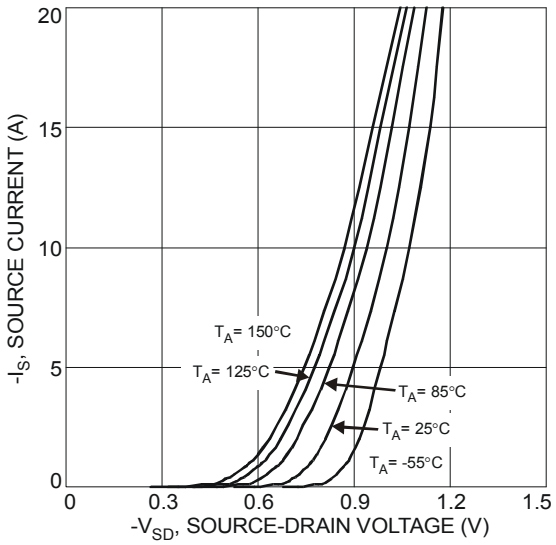


Figure 20 Diode Forward Voltage vs. Current

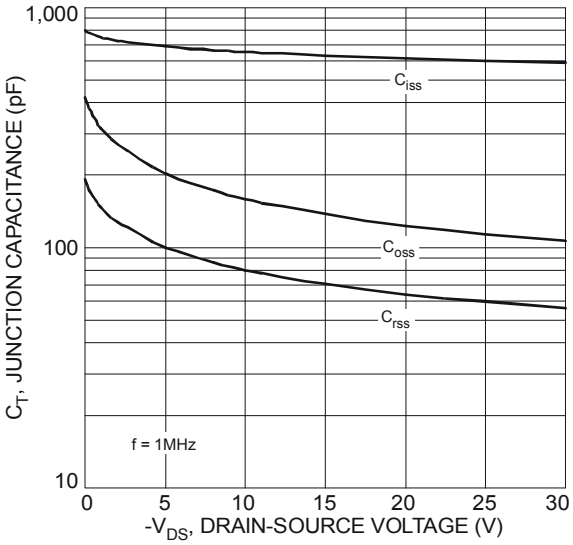


Figure 21 Typical Junction Capacitance

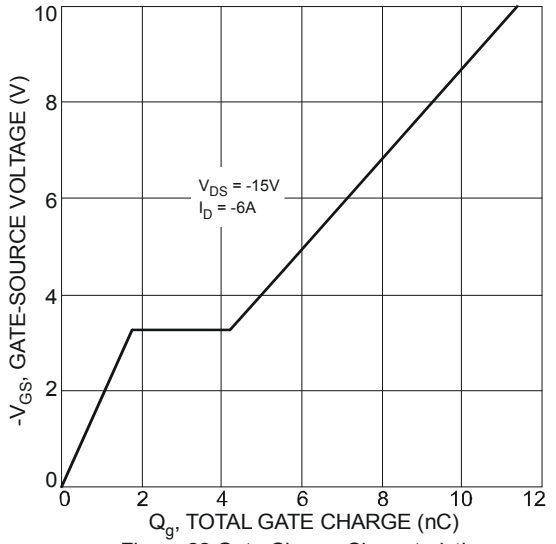
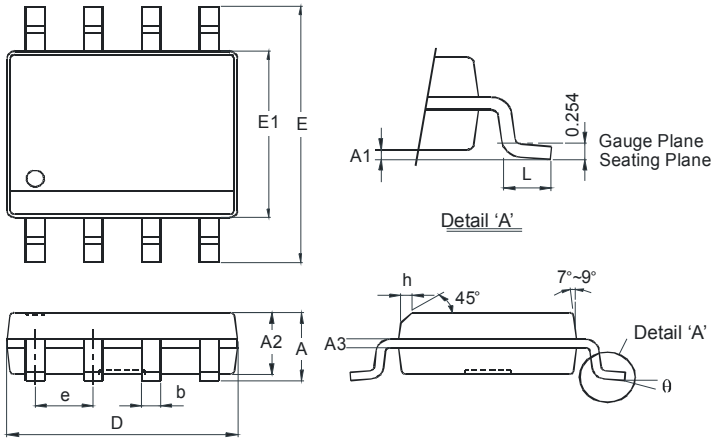


Figure 22 Gate-Charge Characteristics

Package Outline Dimensions

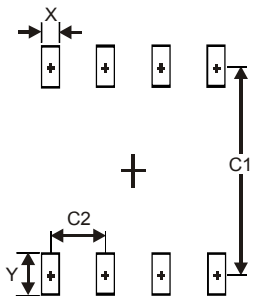
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SO-8		
Dim	**Min**	**Max**
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°
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)
X	0.60
Y	1.55
C1	5.4
C2	1.27

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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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