

30V COMPLEMENTARY ENHANCEMENT MODE MOSFET H-BRIDGE
Product Summary

Device	BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
N-Channel	30V	25mΩ @ V _{GS} = 10V	6.0A
		40mΩ @ V _{GS} = 4.5V	4.6A
P-Channel	-30V	50mΩ @ V _{GS} = -10V	-4.2A
		80mΩ @ V _{GS} = -4.5V	-3.2A

Description

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

Applications

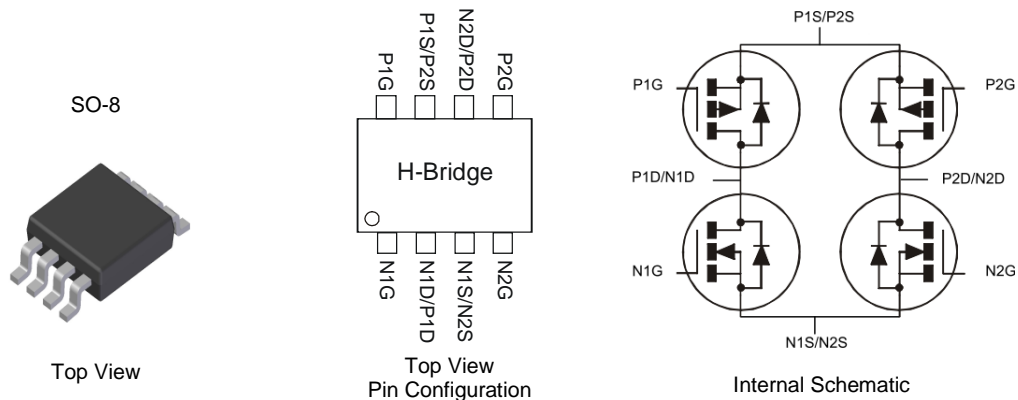
- DC Motor Control
- DC-AC Inverters

Features

- 2 x N + 2 x P Channels in A SO-8 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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMHC3025LSDQ](#))**

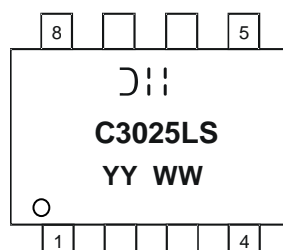
Mechanical Data

- 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)


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) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information


- $\text{D}|||$ = Manufacturer's Marking
- C3025LS = Product Type Marking Code
- YYWW = Date Code Marking
- YY = Year (ex: 18 = 2018)
- WW = Week (01 to 53)

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

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

Maximum Ratings 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 I_D	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	6.0 4.8	A
		$t < 10\text{s}$ $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D 7.8 6.1	A
Continuous Drain Current (Note 5) $V_{GS} = 4.5\text{V}$	Steady State I_D	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	4.6 3.6	A
		$t < 10\text{s}$ $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D 6.1 4.8	A
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	2.5	A	
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	60	A	

Maximum Ratings P-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 I_D	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	-4.2 -3.3	A
		$t < 10\text{s}$ $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D -5.4 -4.3	A
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	Steady State I_D	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	-3.2 -2.5	A
		$t < 10\text{s}$ $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D -4.3 -3.3	A
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	-2.5	A	
Pulsed Drain Current (10 μs 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	—		
Gate-Source Charge	Q _{gs}	—	1.8	—		
Gate-Drain Charge	Q _{gd}	—	2.4	—		
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	—		
Turn-Off Delay Time	t _{D(OFF)}	—	28.2	—		
Turn-Off Fall Time	t _F	—	13.5	—		
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

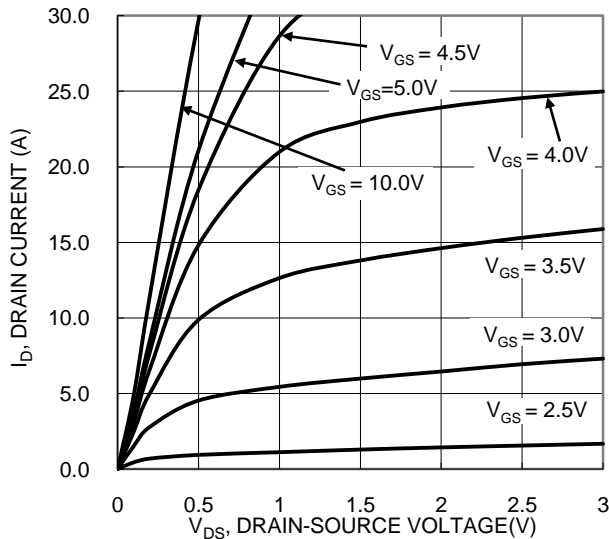


Figure 1. Typical Output Characteristic

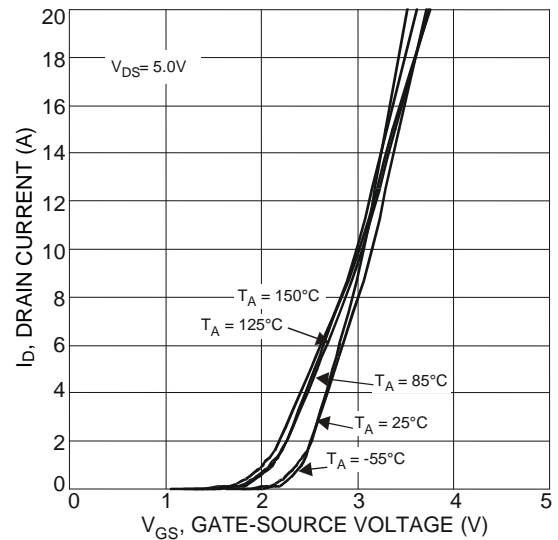


Figure 2 Typical Transfer Characteristics

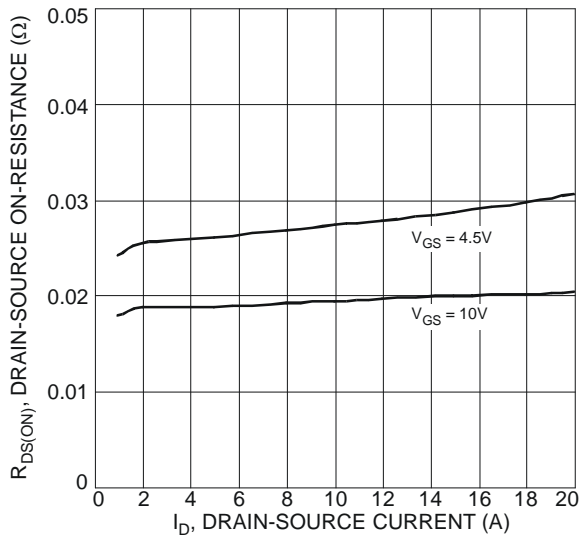


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

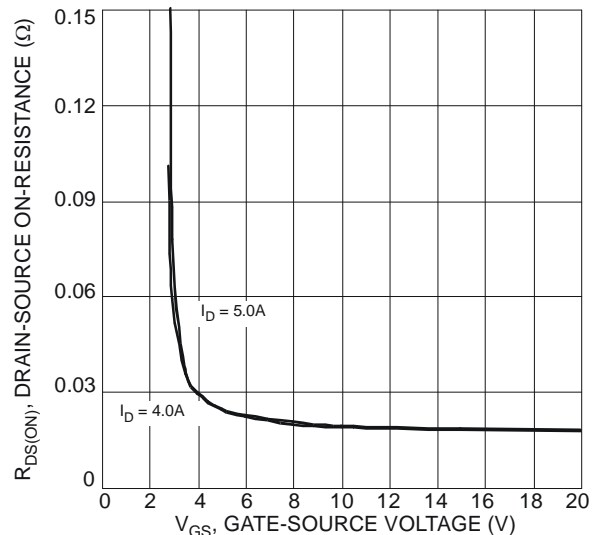


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

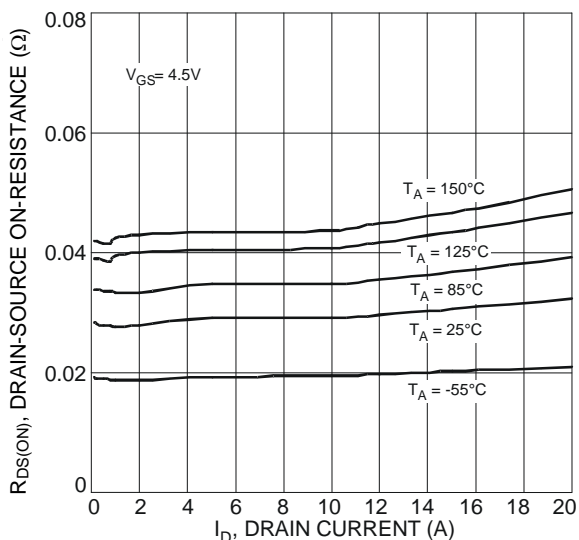


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

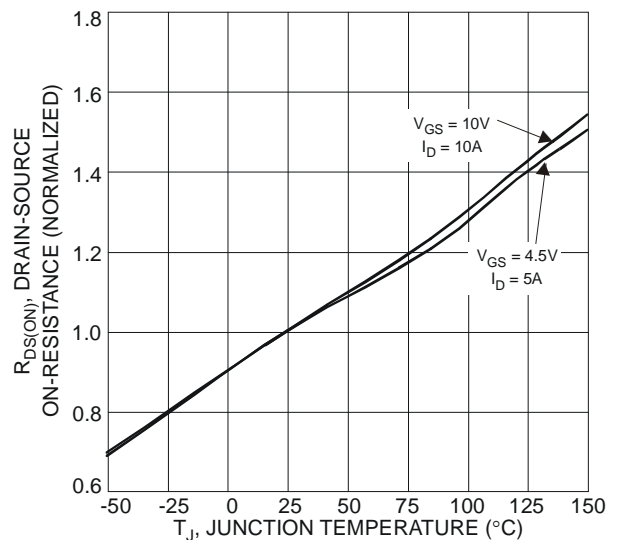
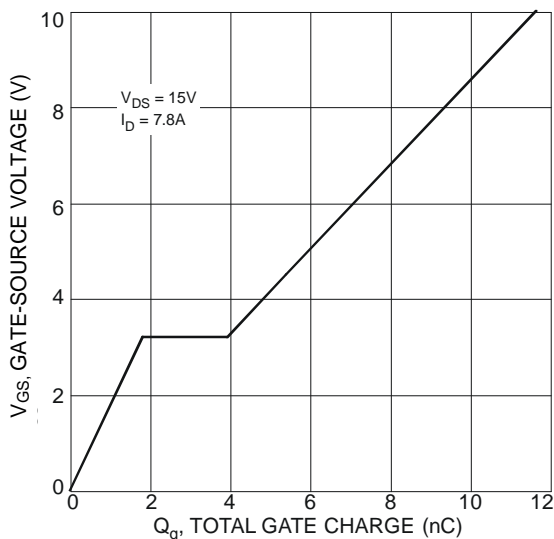
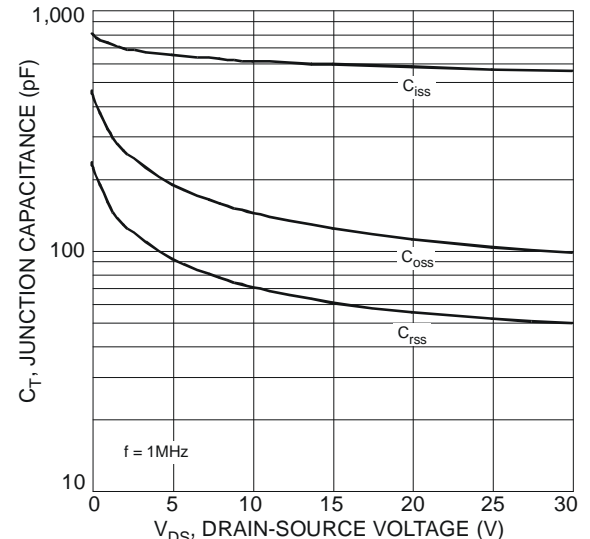
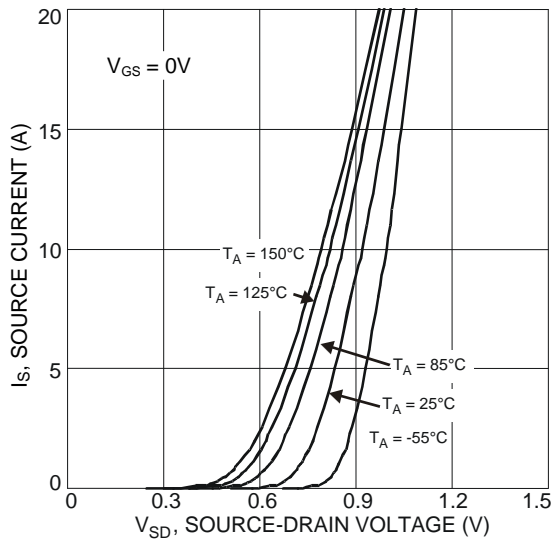
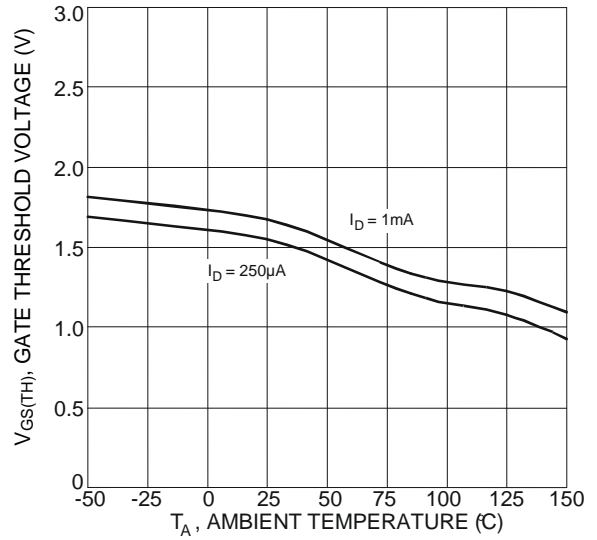
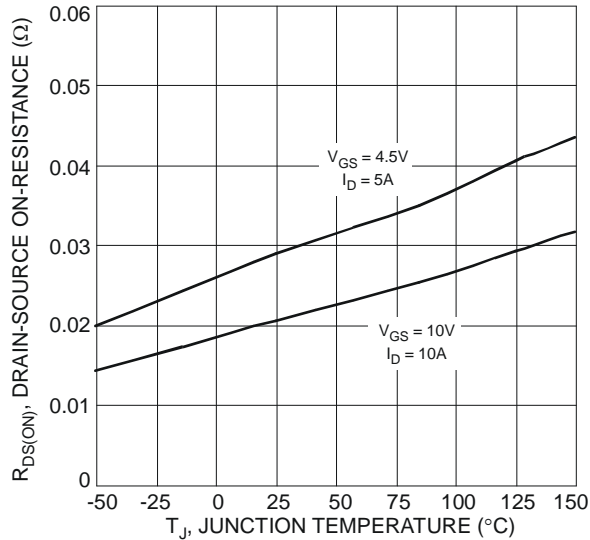


Figure 6 On-Resistance Variation with Temperature



Typical Characteristics - P-CHANNEL

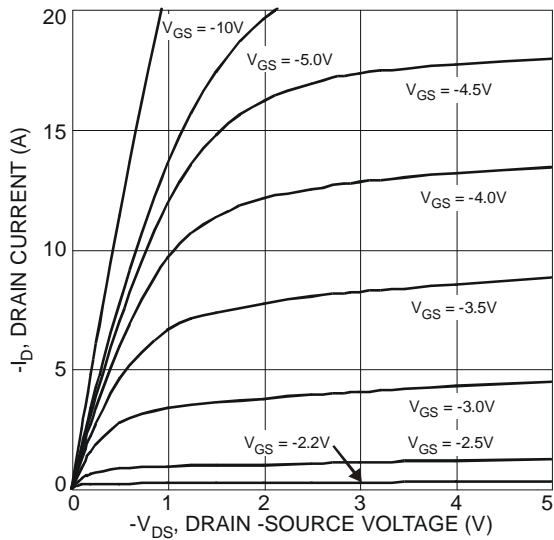


Figure 12 Typical Output Characteristics

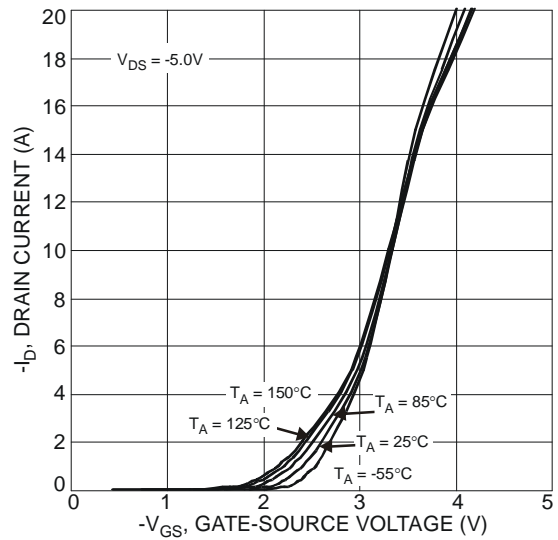


Figure 13 Typical Transfer Characteristics

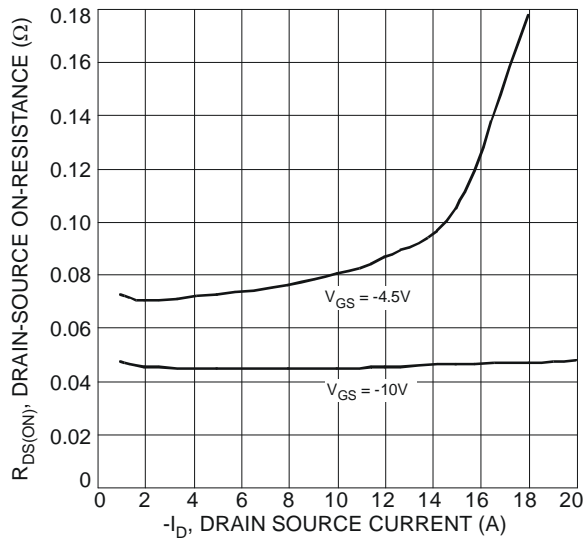


Figure 14 Typical On-Resistance vs. Drain Current and Gate Voltage

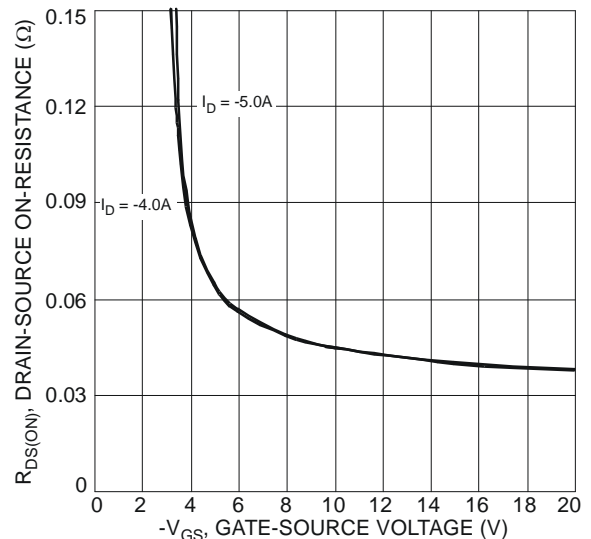


Figure 15 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

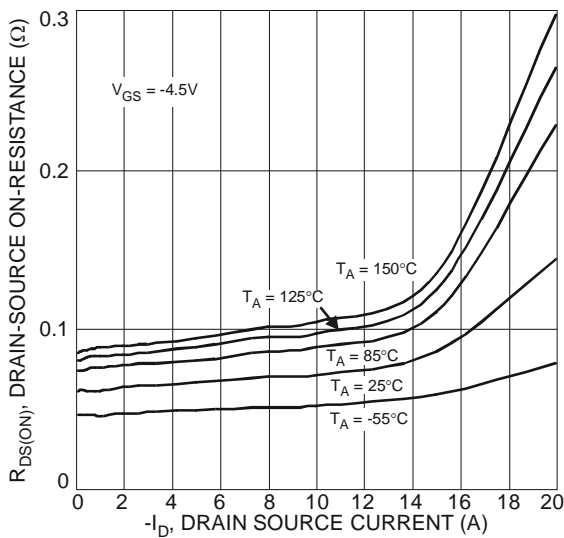


Figure 16 Typical On-Resistance vs. Drain Current and Temperature

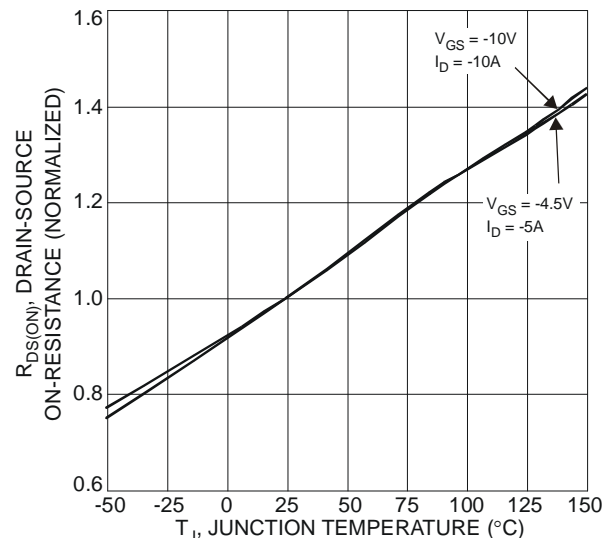


Figure 17 On-Resistance Variation with Temperature

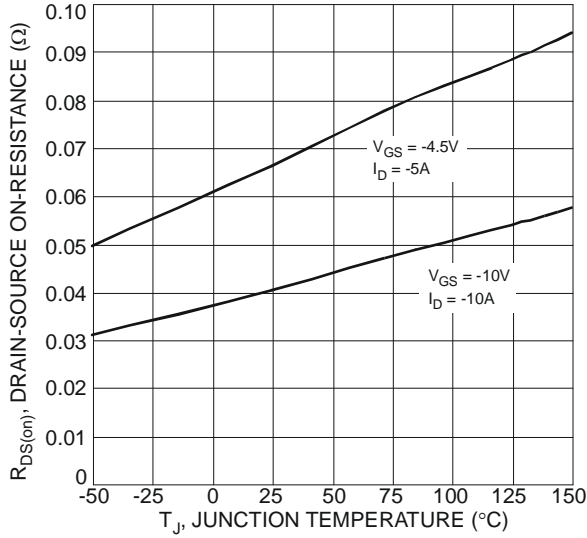


Figure 18 On-Resistance Variation with Temperature

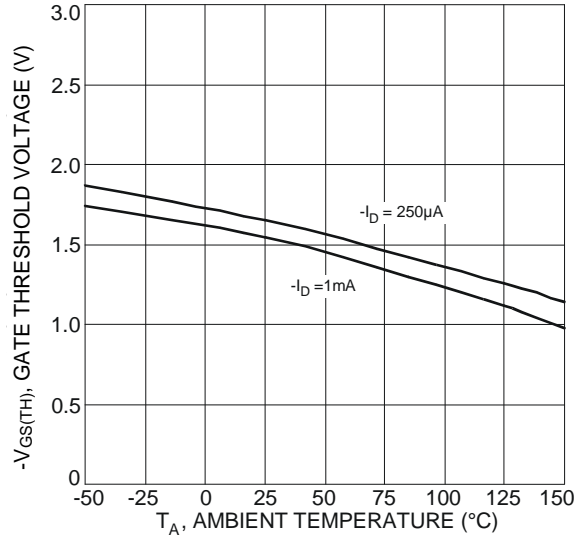


Figure 19 Gate Threshold Variation vs. Ambient Temperature

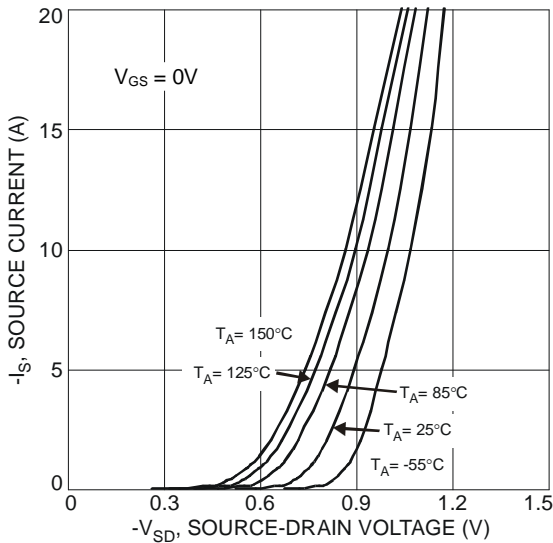


Figure 20 Diode Forward Voltage vs. Current

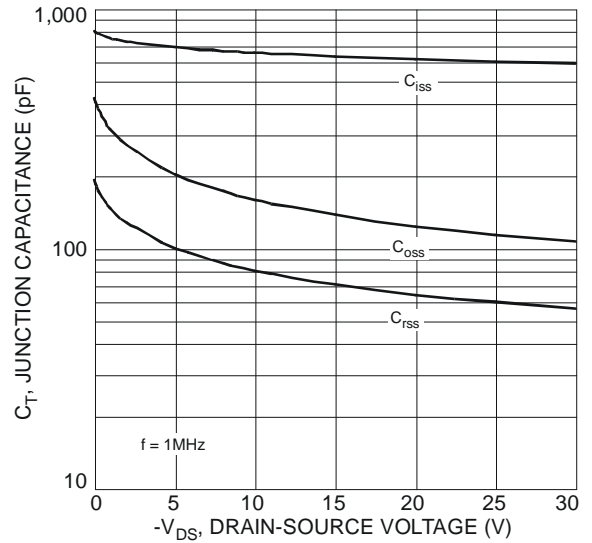


Figure 21 Typical Junction Capacitance

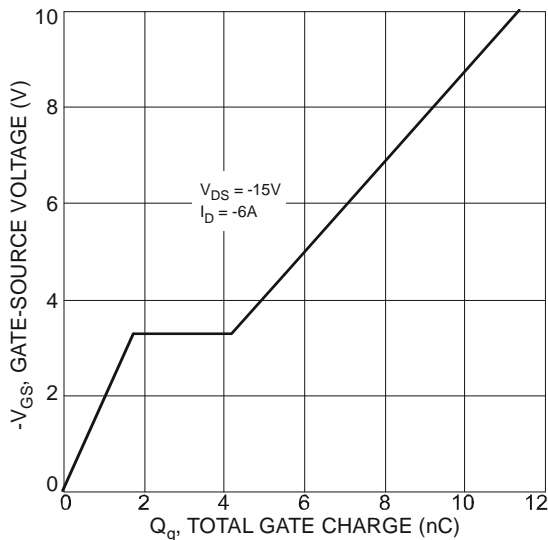
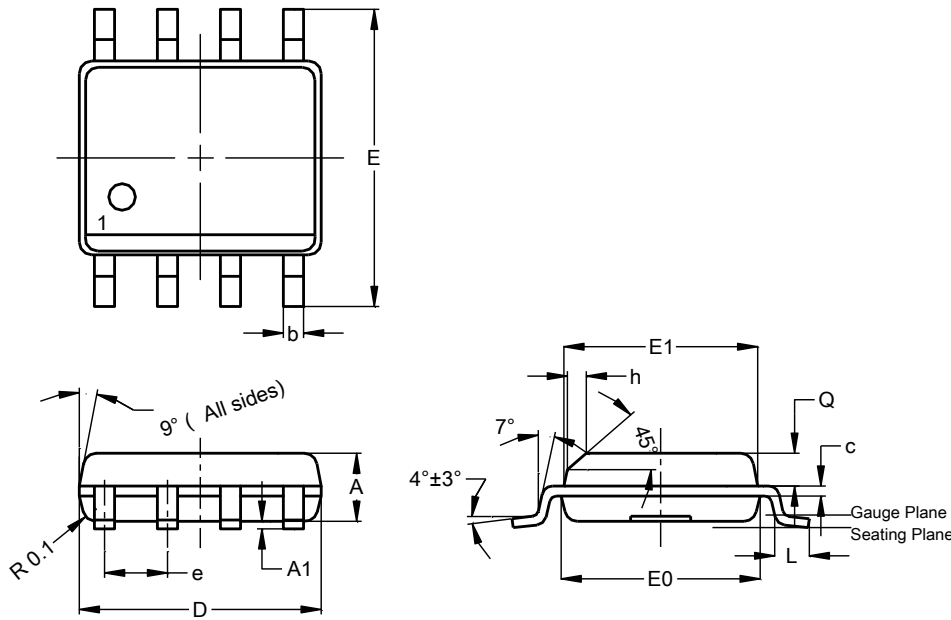


Figure 22 Gate-Charge Characteristics

Package Outline Dimensions

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

SO-8



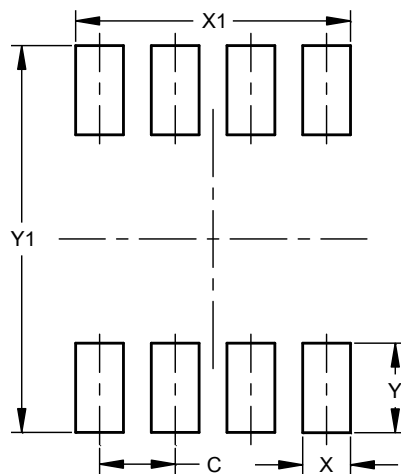
SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65

All Dimensions in mm

Suggested Pad Layout

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

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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