

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

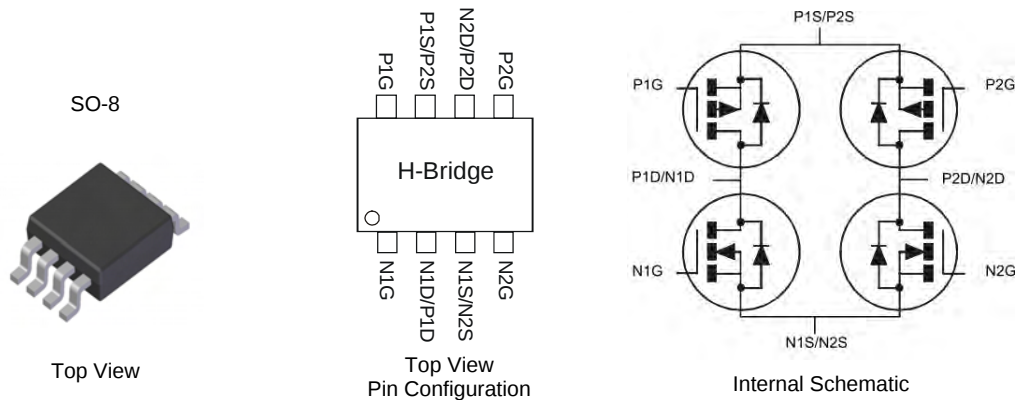
- DC Motor control
- DC-AC Inverters

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 
- Weight: 0.008 grams (approximate)

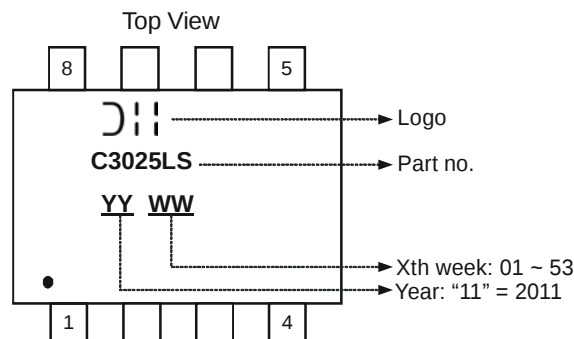


Ordering Information (Note 4)

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

Marking Information



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 _{θJA}	83	°C/W
	t < 10s		50	
Thermal Resistance, Junction to Case		R _{θJC}	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

Notes: 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)}	1.0	-	2.0	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 = 1.0MHz
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 = 1.0MHz
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	-	15.0	-		
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}	-	12.0	-	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)}	-1.0	-	-2.0	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} = -15V, 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 = 1.0MHz
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 = 1.0MHz
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	-	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

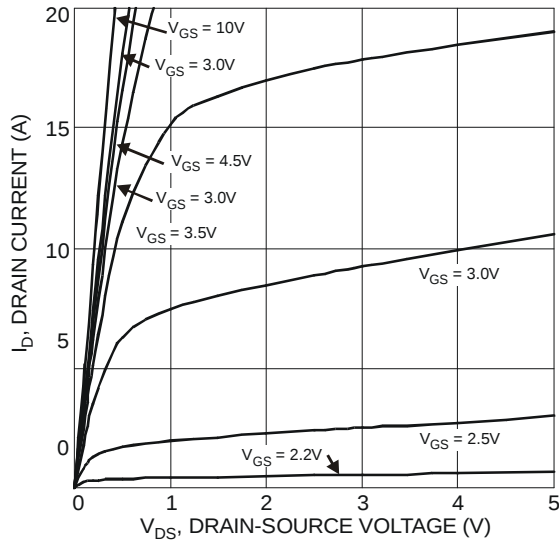


Figure 1 Typical Output Characteristic

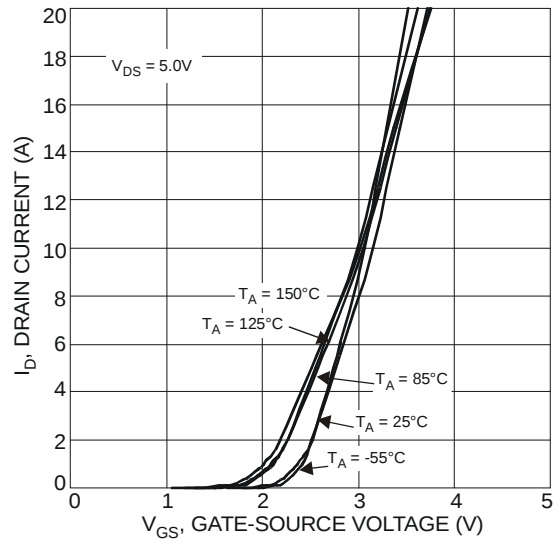


Figure 2 Typical Transfer Characteristics

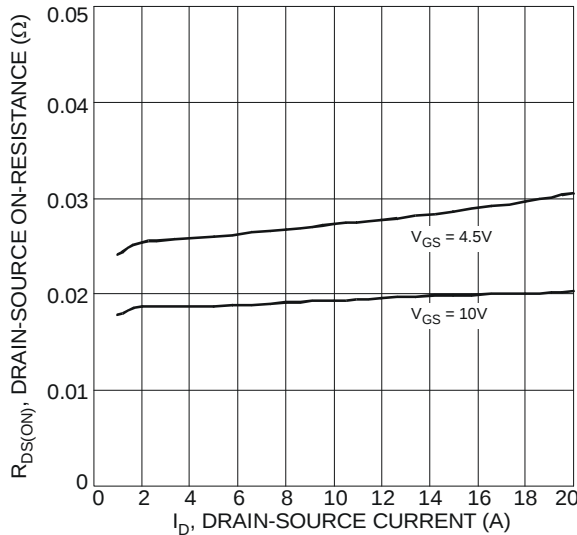


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

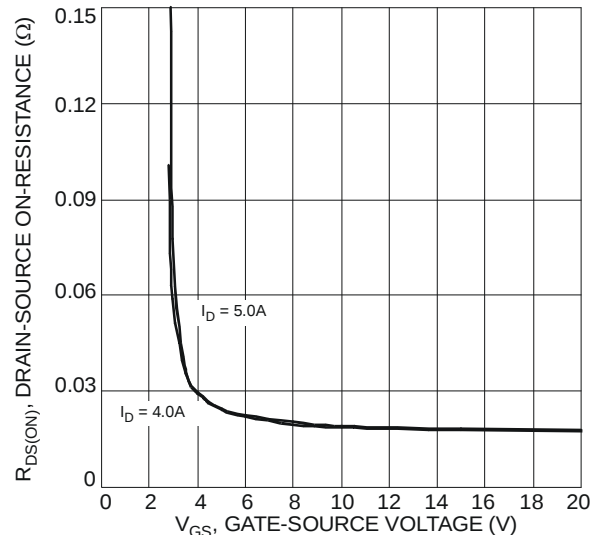


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

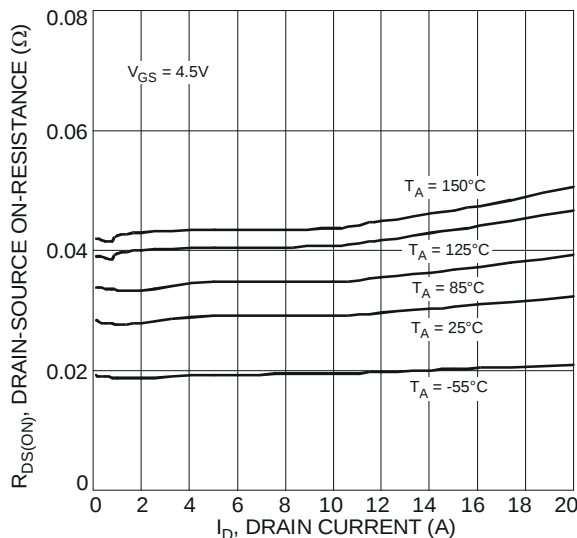


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

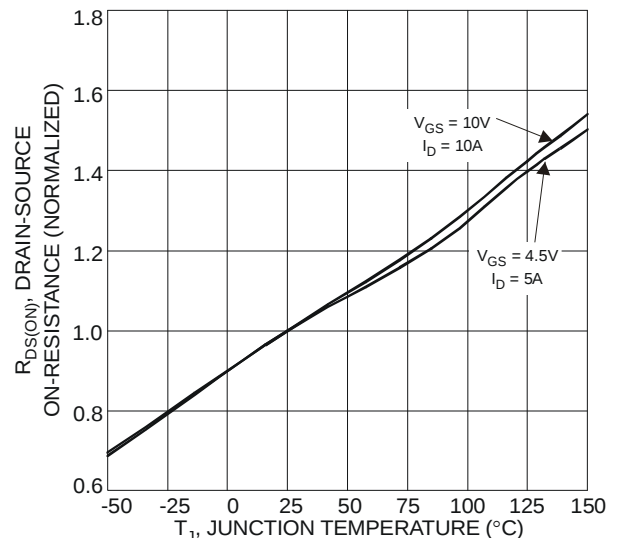


Figure 6 On-Resistance Variation with Temperature

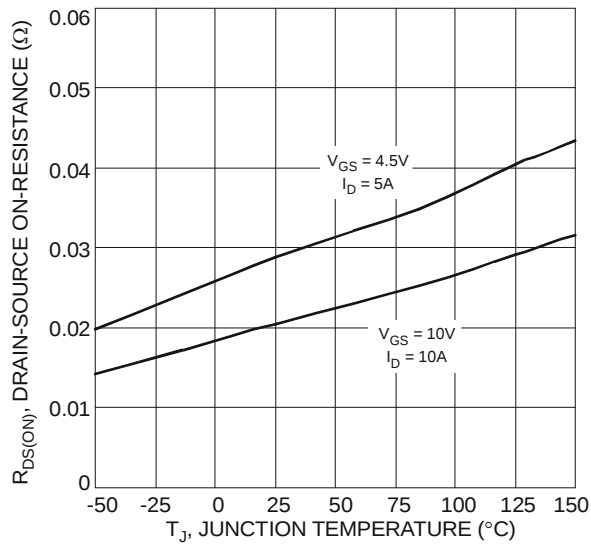


Figure 7 On-Resistance Variation with Temperature

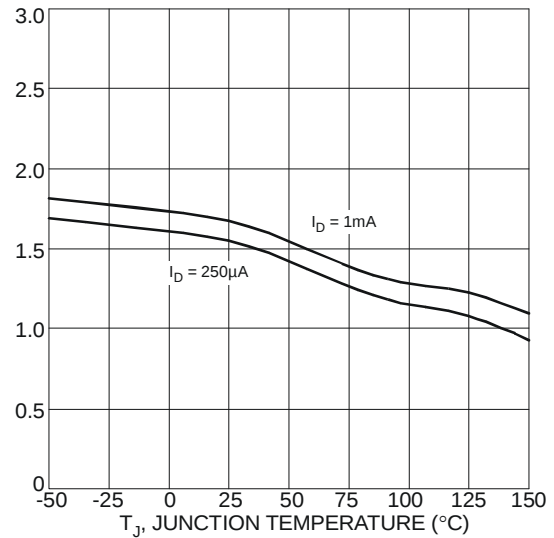


Figure 8 Gate Threshold Variation vs. Ambient Temperature

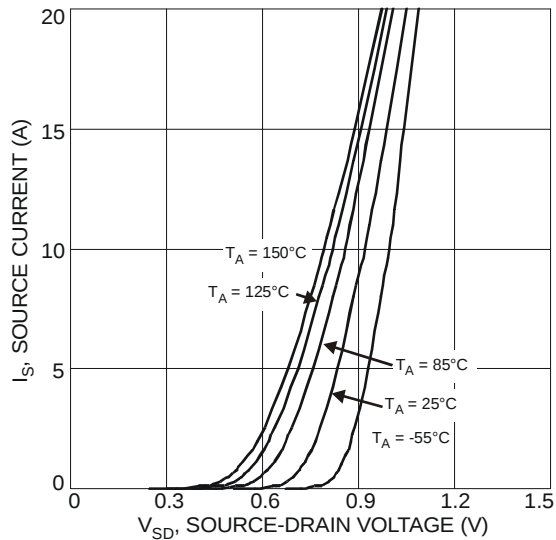


Figure 9 Diode Forward Voltage vs. Current

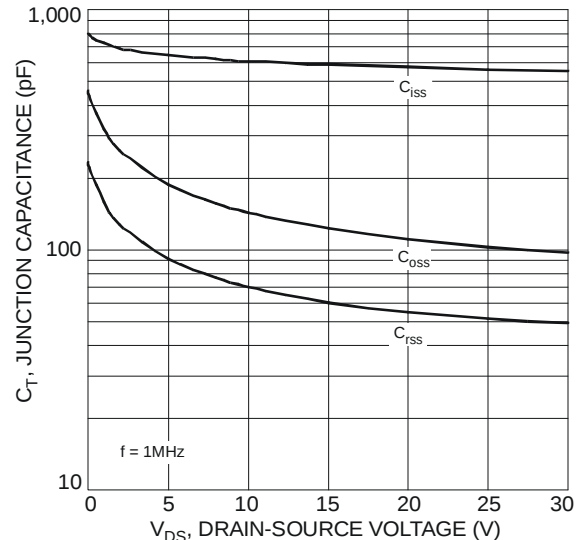


Figure 10 Typical Junction Capacitance

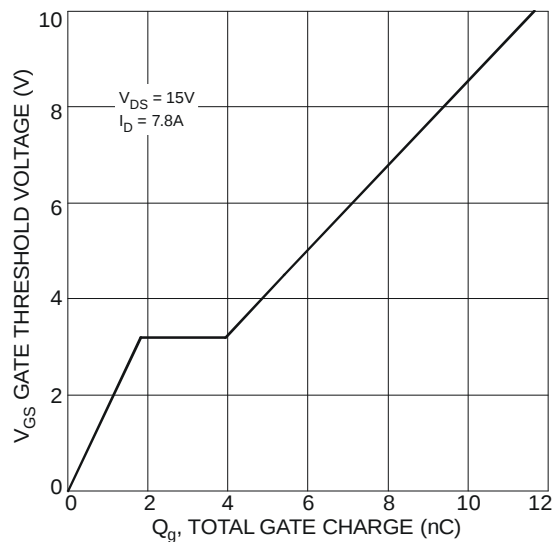
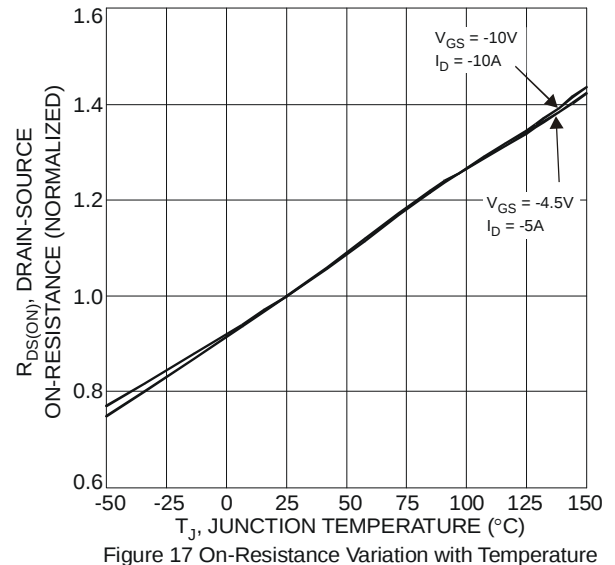
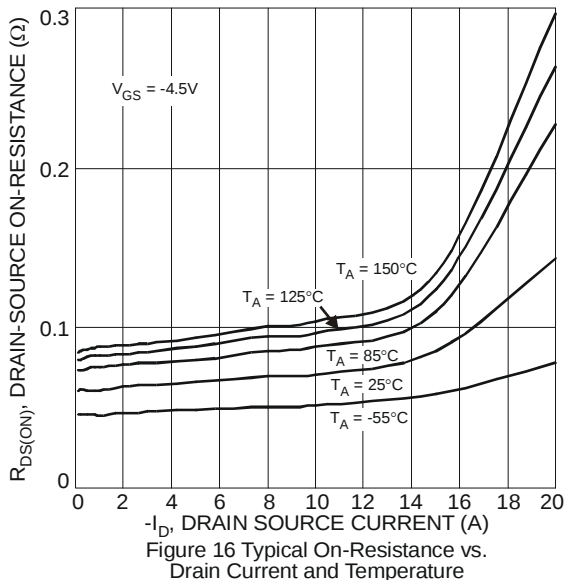
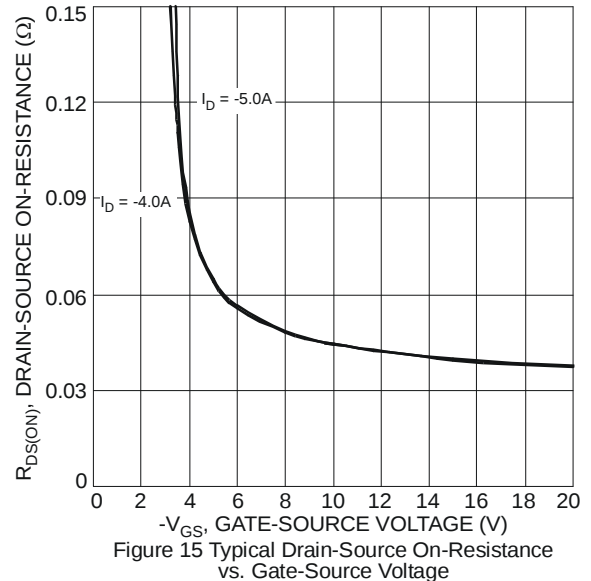
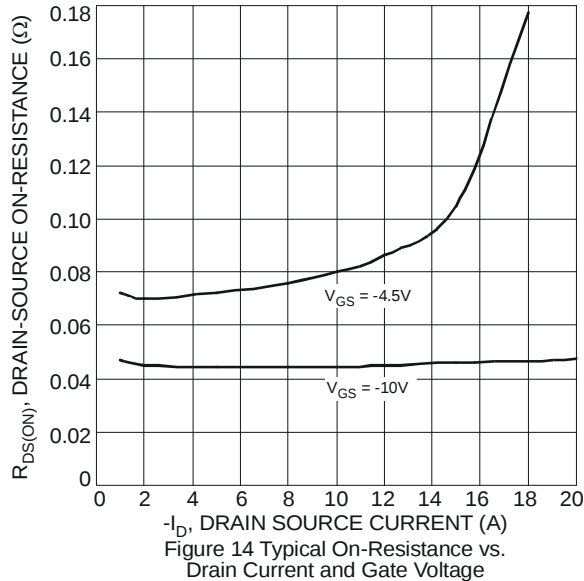
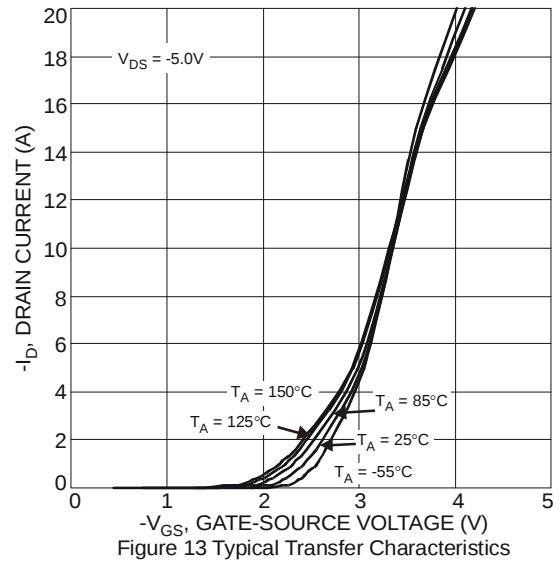
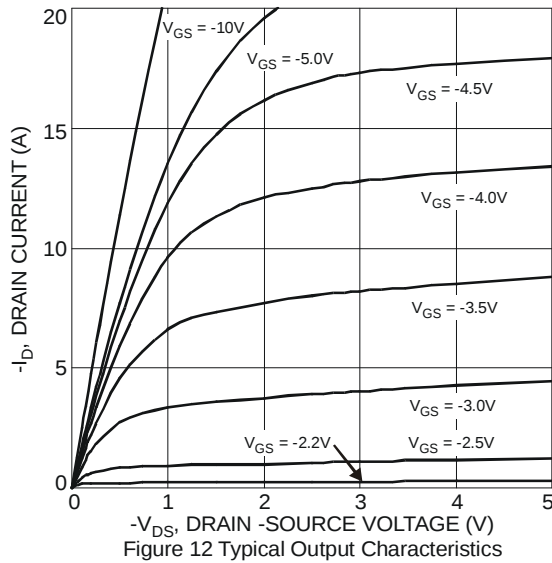


Figure 11 Gate Charge

Typical Characteristics - P-CHANNEL



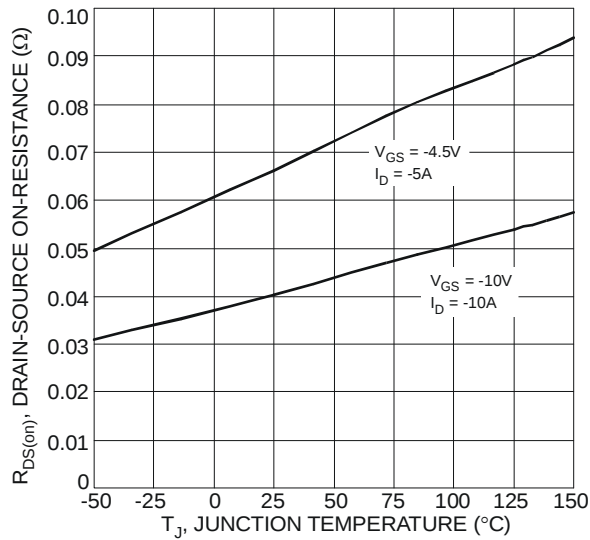


Figure 18 On-Resistance Variation with Temperature

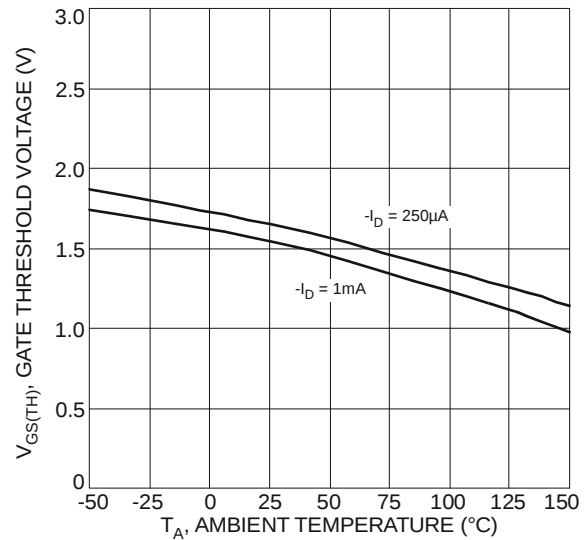


Figure 19 Gate Threshold Variation vs. Ambient Temperature

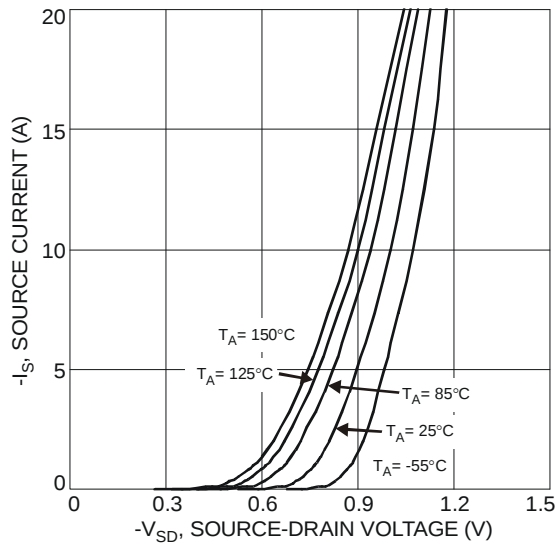


Figure 20 Diode Forward Voltage vs. Current

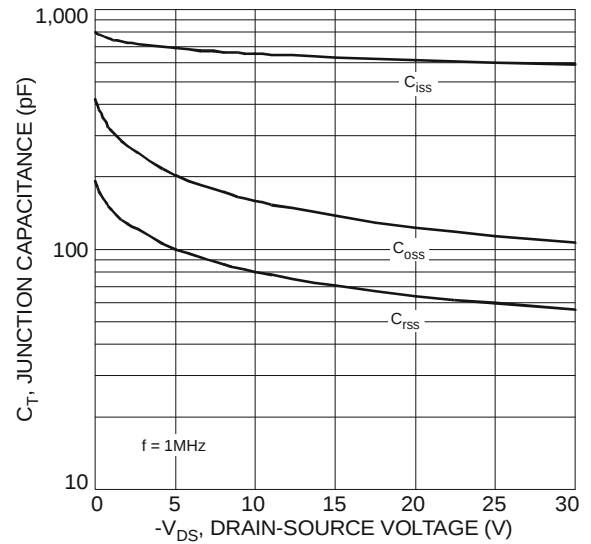


Figure 21 Typical Junction Capacitance

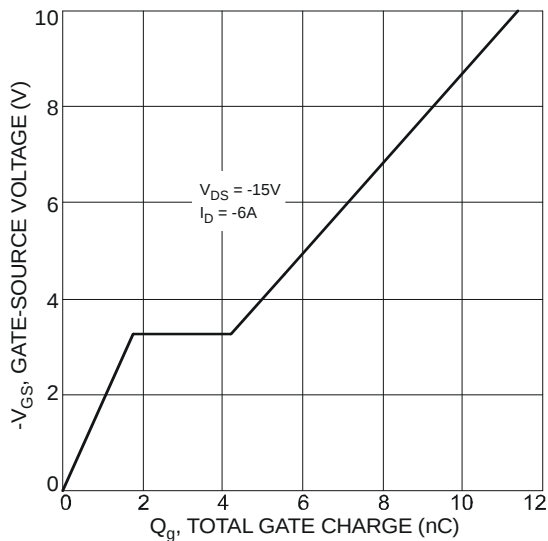
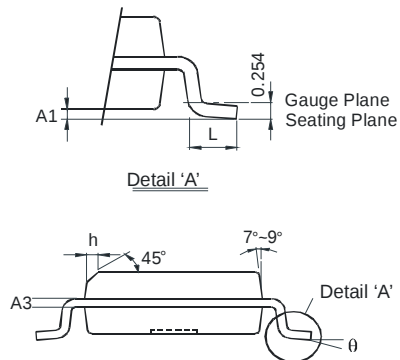
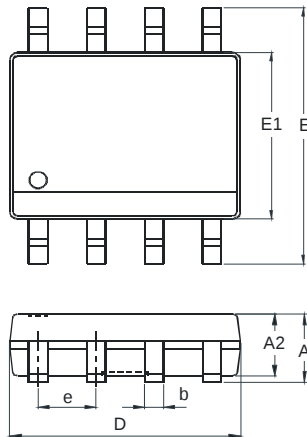


Figure 22 Gate-Charge Characteristics

Package Outline Dimensions

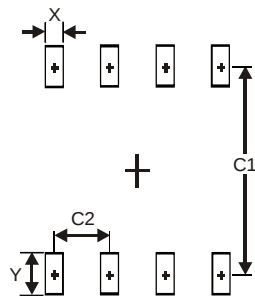
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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