

# 30V COMPLEMENTARY ENHANCEMENT MODE MOSFET H-BRIDGE

## Product Summary

Device	V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = 25°C
N-Channel	30V	25mΩ @ V <sub>GS</sub> = 10V	6.0
		40mΩ @ V <sub>GS</sub> = 4.5V	4.6
P-Channel	-30V	50mΩ @ V <sub>GS</sub> = -10V	-4.2
		80mΩ @ V <sub>GS</sub> = -4.5V	-3.2

## Description

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


## Applications

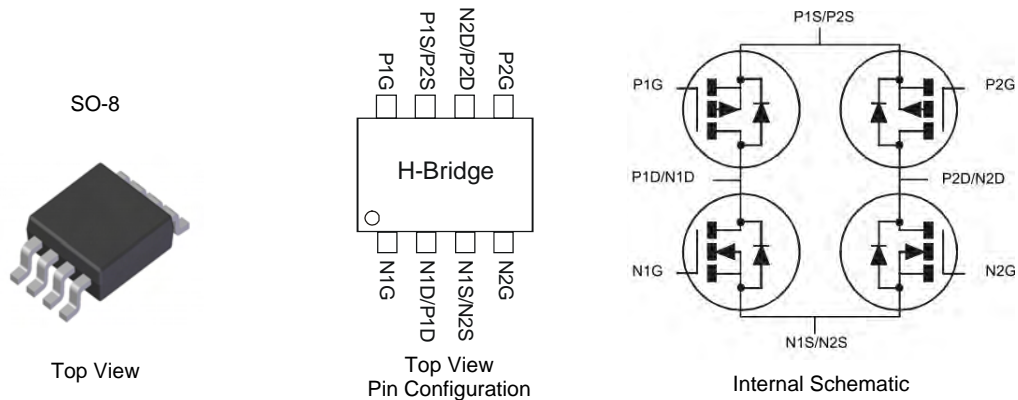
- DC Motor control
- DC-AC Inverters

## 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)

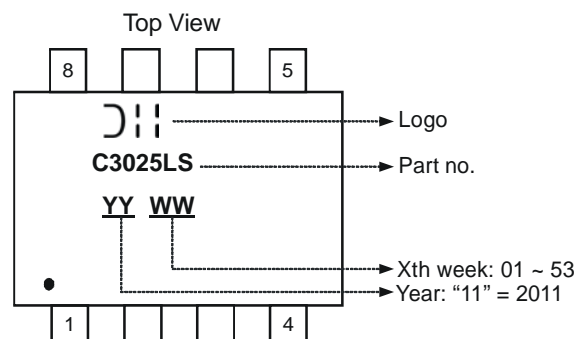


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMHC3025LSD-13	SO-8	2500/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See <http://www.diodes.com> 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>.

## Marking Information



**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.5	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	83	°C/W
		50	
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	14.5	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

**Maximum Ratings N-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	30	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	I <sub>D</sub>	6.0	A
		4.8	
	I <sub>D</sub>	7.8	A
		6.1	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	I <sub>D</sub>	4.6	A
		3.6	
	I <sub>D</sub>	6.1	A
		4.8	
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	2.5	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I <sub>DM</sub>	60	A

**Maximum Ratings P-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	30	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = -10V	I <sub>D</sub>	-4.2	A
		-3.3	
	I <sub>D</sub>	-5.4	A
		-4.3	
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	-3.2	A
		-2.5	
	I <sub>D</sub>	-4.3	A
		-3.3	
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	-2.5	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I <sub>DM</sub>	-30	A

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

**Electrical Characteristics N-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	0.5	μA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±1	μA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	-	2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	19	25	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5A
		-	26	40		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4A
Forward Transfer Admittance	Y <sub>fs</sub>	-	4	-	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 5A
Diode Forward Voltage	V <sub>SD</sub>	-	0.70	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.7A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	-	590	-	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	122	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	58	-		
Gate resistance	R <sub>g</sub>	-	1.5	-	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	-	5.4	-	nC	V <sub>DS</sub> = 15V, I <sub>D</sub> = 7.8A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	-	11.7	-		
Gate-Source Charge	Q <sub>gs</sub>	-	1.8	-		
Gate-Drain Charge	Q <sub>gd</sub>	-	2.1	-		
Turn-On Delay Time	t <sub>D(on)</sub>	-	11.2	-	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 2.4Ω, R <sub>G</sub> = 1Ω,
Turn-On Rise Time	t <sub>r</sub>	-	15.0	-		
Turn-Off Delay Time	t <sub>D(off)</sub>	-	17.5	-		
Turn-Off Fall Time	t <sub>f</sub>	-	8.7	-		
Reverse Recovery Time	t <sub>rr</sub>	-	18.3	-	ns	I <sub>F</sub> = 12A, di/dt = 500A/μs
Reverse Recovery Charge	Q <sub>rr</sub>	-	12.0	-	nC	

**Electrical Characteristics P-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	-0.5	μA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±1	μA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.0	-	-2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	43	50	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A
		-	68	80		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A
Forward Transfer Admittance	Y <sub>fs</sub>	-	3.5	-	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -5A
Diode Forward Voltage	V <sub>SD</sub>	-	-0.7	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1.7A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	-	631	-	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	137	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	70	-	pF	
Gate resistance	R <sub>g</sub>	-	10.8	-	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	-	5.5	-	nC	V <sub>DS</sub> = -15V, I <sub>D</sub> = -6A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	-	11.4	-		
Gate-Source Charge	Q <sub>gs</sub>	-	1.8	-		
Gate-Drain Charge	Q <sub>gd</sub>	-	2.4	-		
Turn-On Delay Time	t <sub>D(on)</sub>	-	7.5	-	ns	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>r</sub>	-	4.9	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	28.2	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	13.5	-	ns	
Reverse Recovery Time	t <sub>rr</sub>	-	15.1	-	ns	I <sub>F</sub> = 12A, di/dt = 500A/μs
Reverse Recovery Charge	Q <sub>rr</sub>	-	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

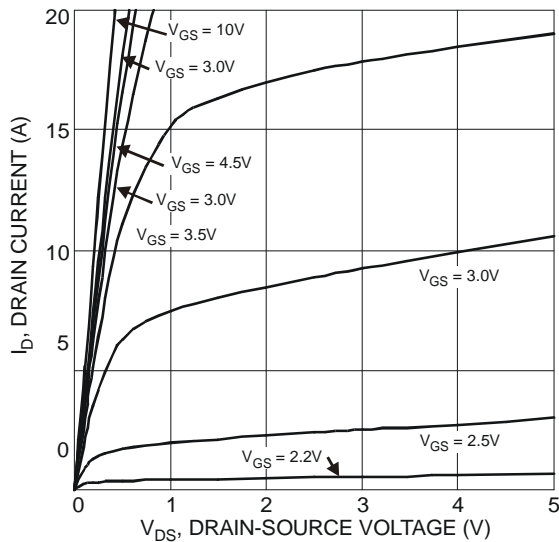


Figure 1 Typical Output Characteristic

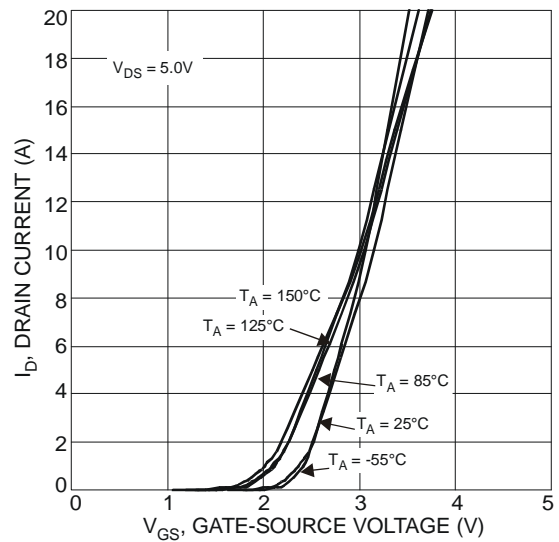


Figure 2 Typical Transfer Characteristics

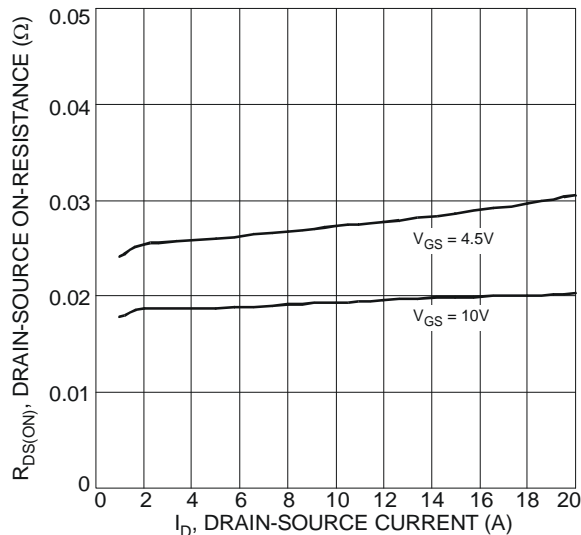


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

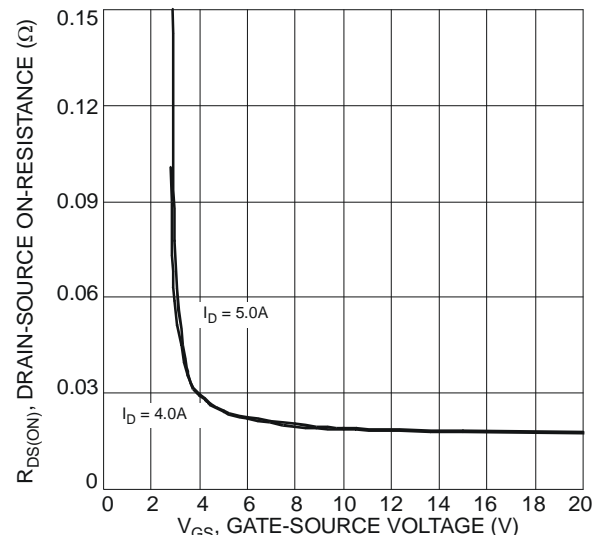


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

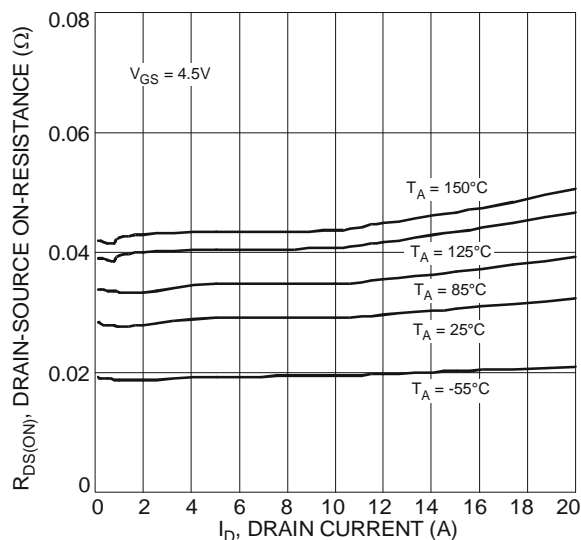


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

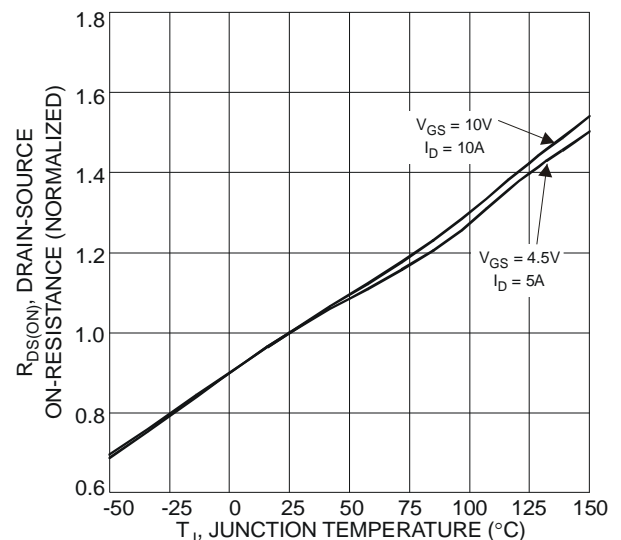
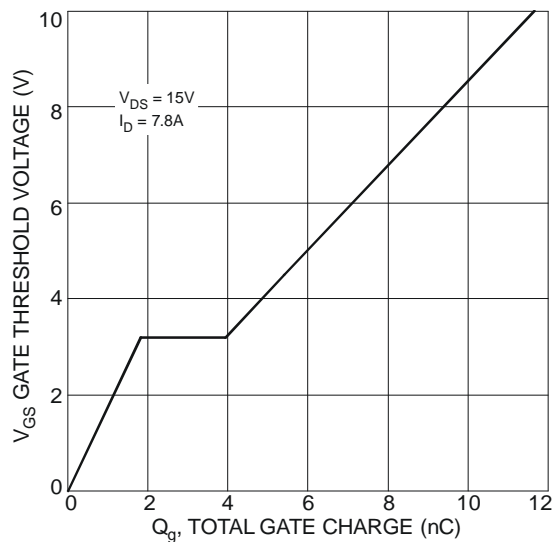
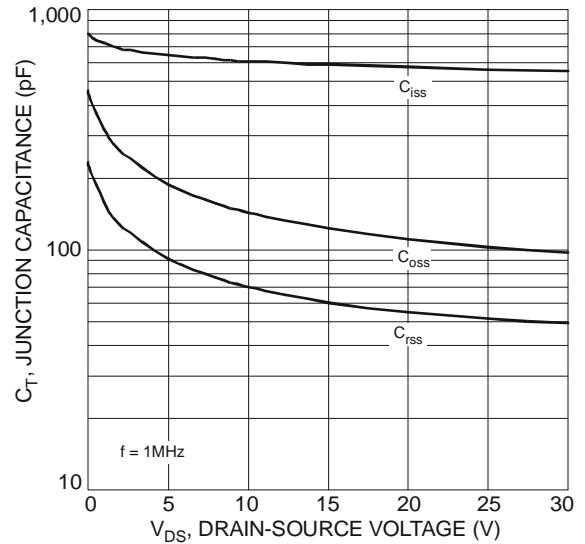
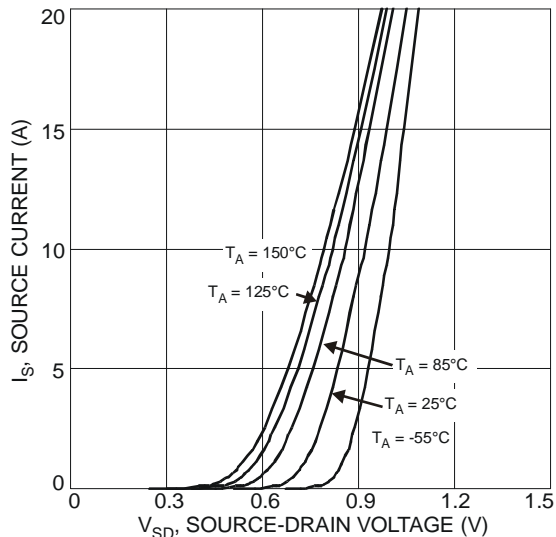
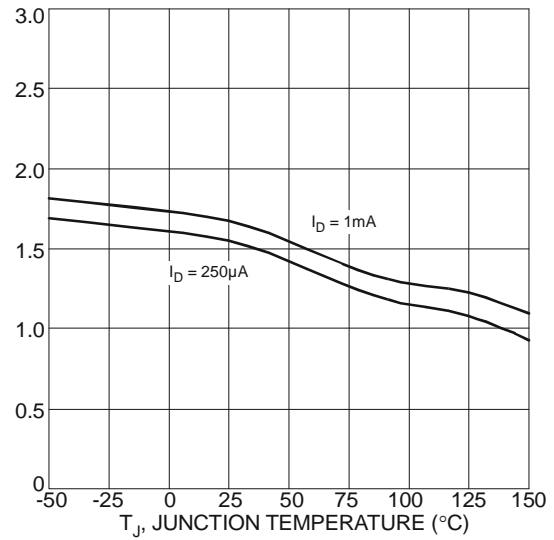
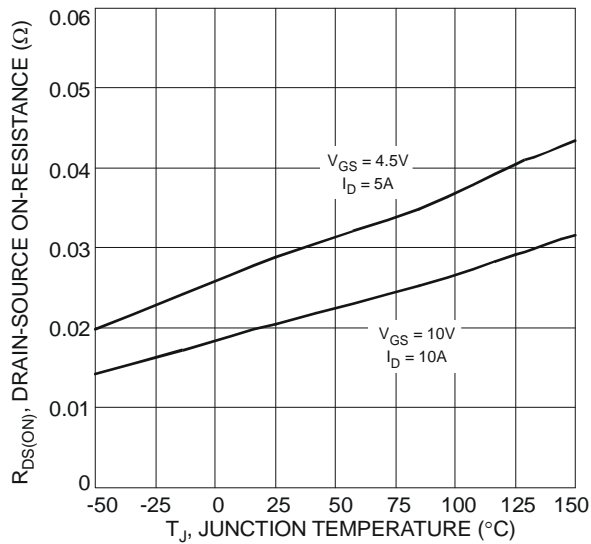
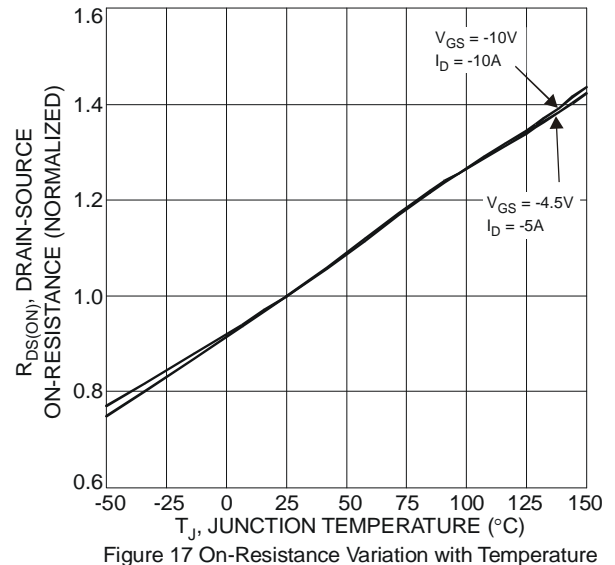
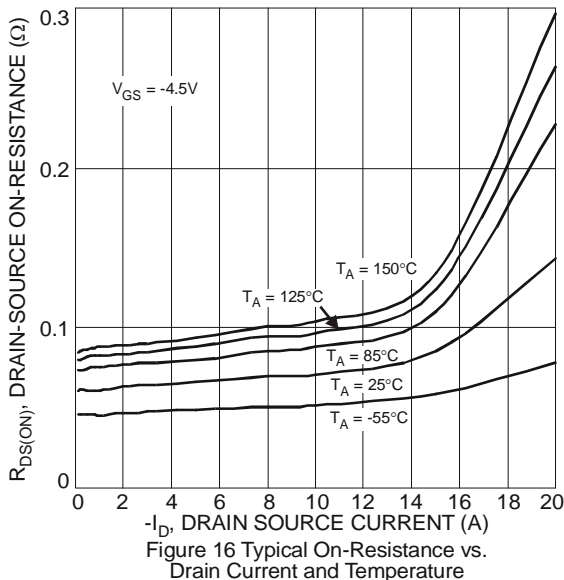
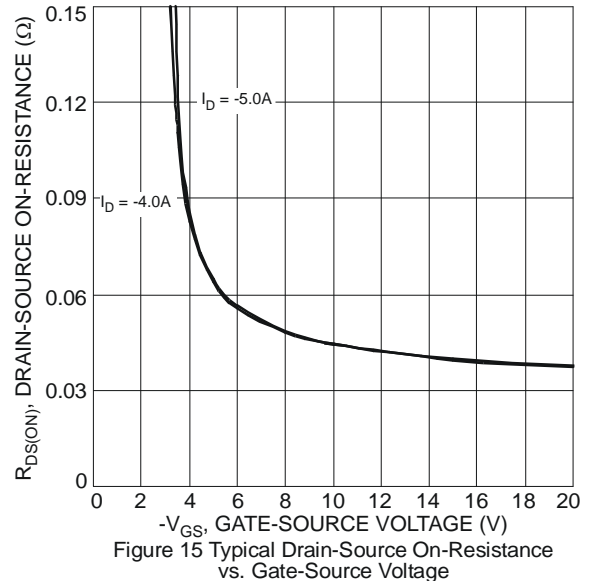
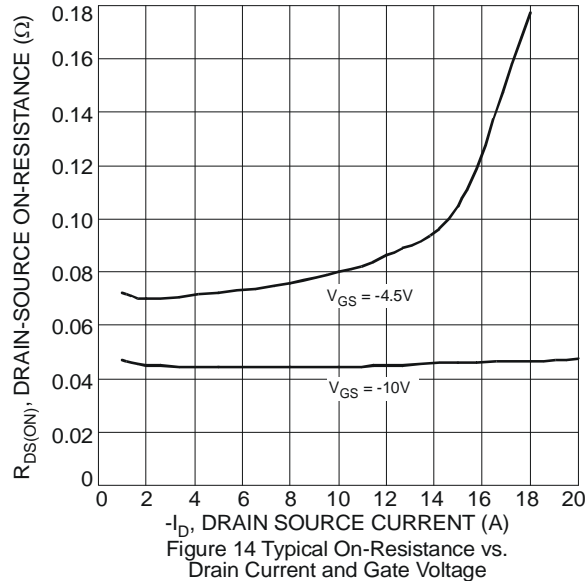
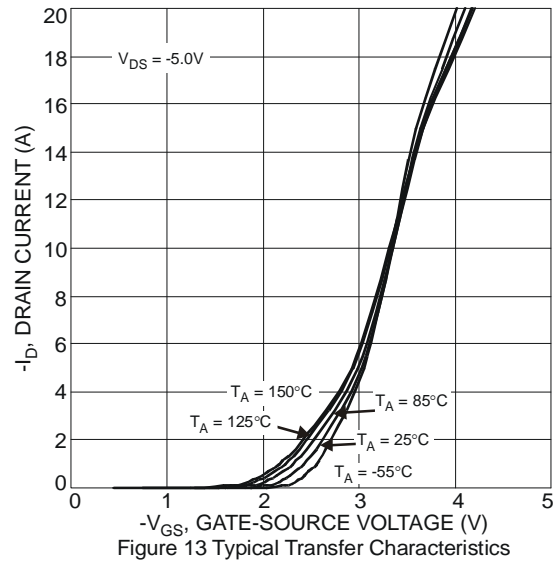
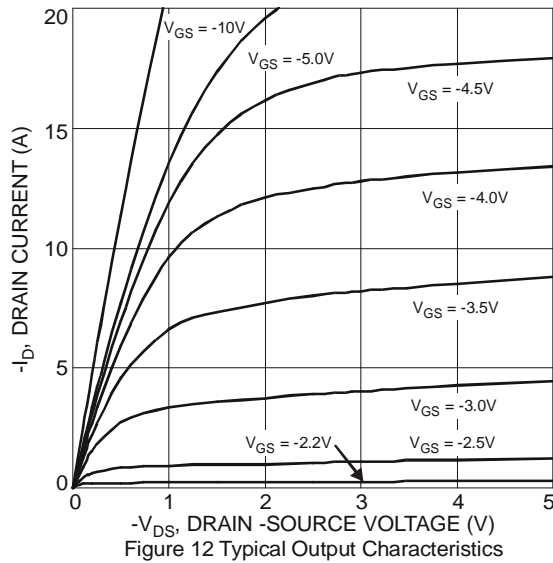
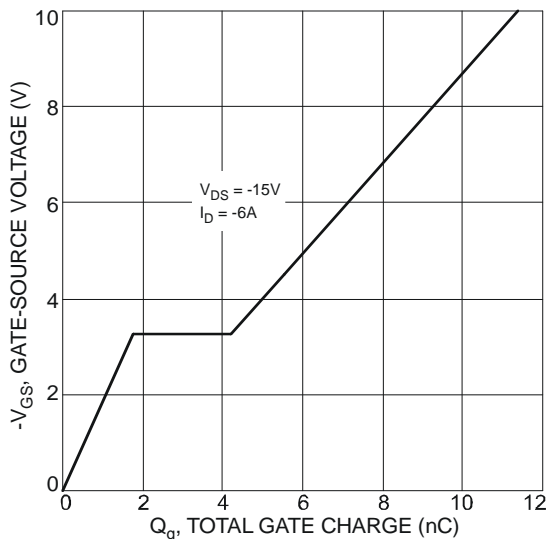
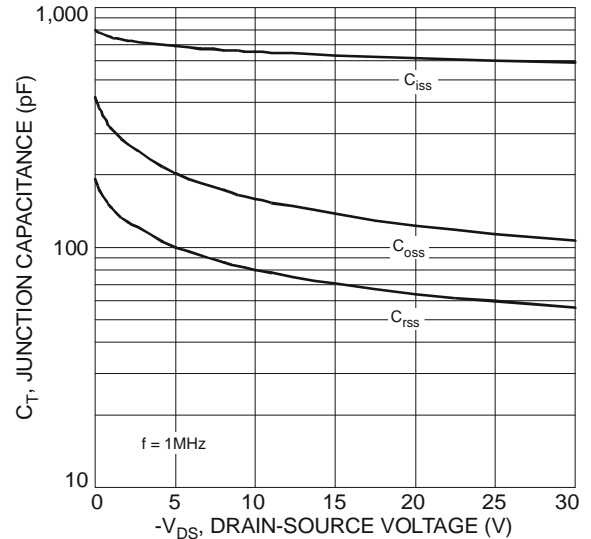
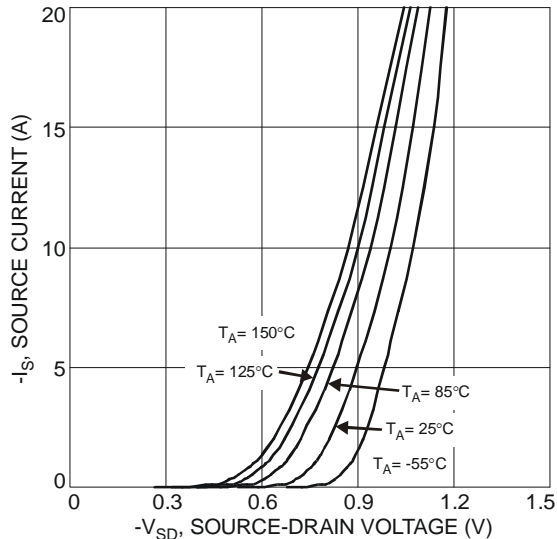
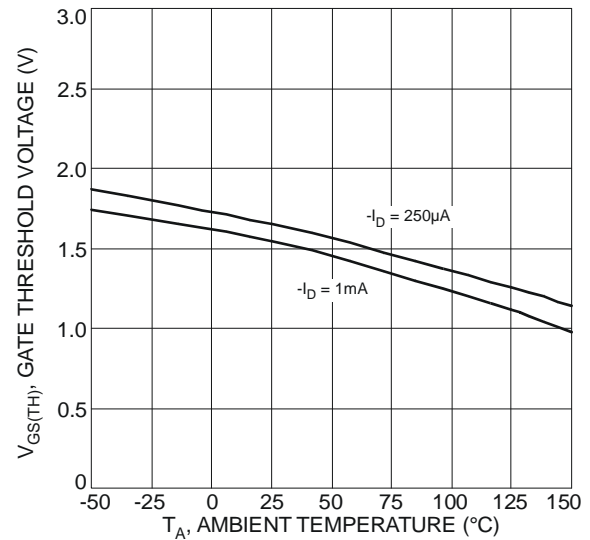
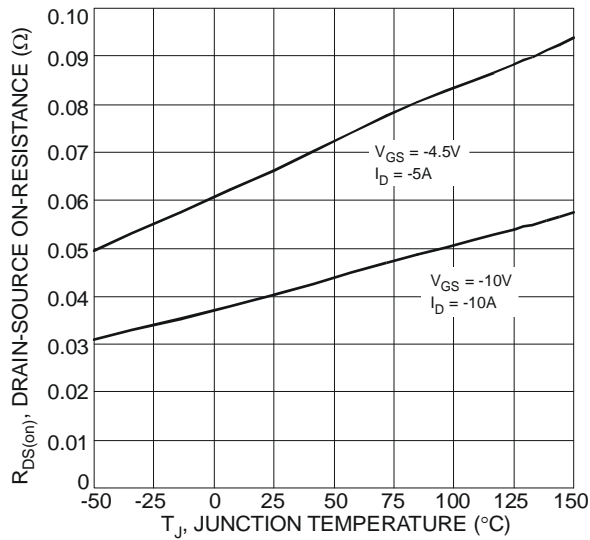


Figure 6 On-Resistance Variation with Temperature



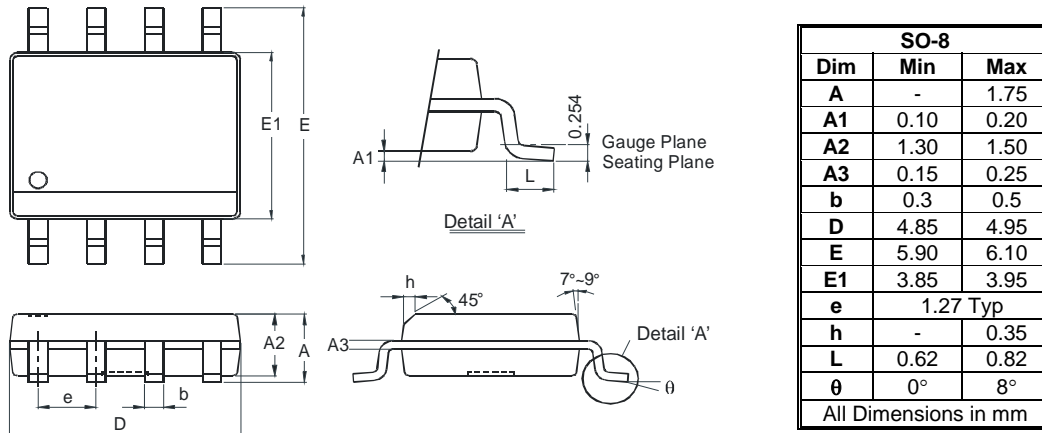
# Typical Characteristics - P-CHANNEL





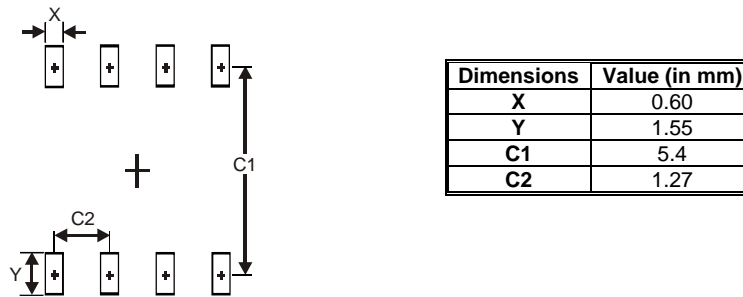
## Package Outline Dimensions

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



## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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