

Product Summary

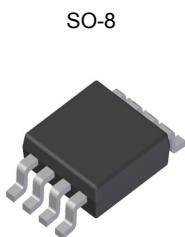
Device	$V_{(BR)DSS}$	$R_{DS(ON)} \text{ max}$	$I_D \text{ max}$ $T_A = +25^\circ\text{C}$
N-Channel	40V	45m Ω @ $V_{GS} = 10\text{V}$	4.5A
		58m Ω @ $V_{GS} = 4.5\text{V}$	4A
P-Channel	-40V	65m Ω @ $V_{GS} = -10\text{V}$	-3.7A
		100m Ω @ $V_{GS} = -4.5\text{V}$	-2.9A

Description

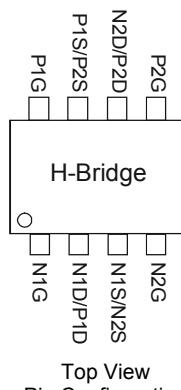
This new generation complementary MOSFET H-Bridge features low on-resistance achievable with low gate drive.

Applications

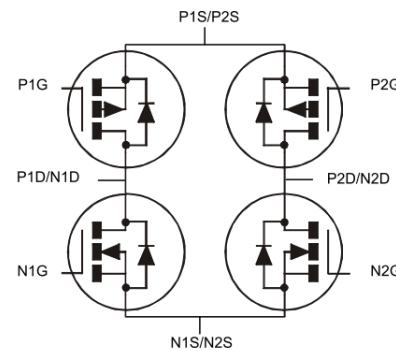
- DC Motor Control
- DC-AC Inverters



Top View



Top View
Pin Configuration



Internal Schematic

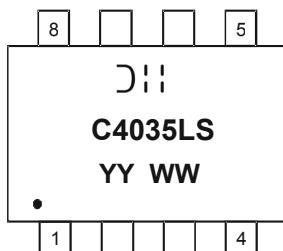
Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMHC4035LSD-13	Standard	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/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
C4035LS = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 13 = 2013)
WW = Week (01 - 53)

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	1.5	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	85	°C/W
$t < 10\text{s}$		53	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	15	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Maximum Ratings N-CHANNEL (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V_{DSS}	40	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 4.5 3.5
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D 5.8 4.5
Continuous Drain Current (Note 5) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D 4 3.1
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D 5.1 4
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	1.5	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I_{DM}	25	A

Maximum Ratings P-CHANNEL (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V_{DSS}	-40	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 -3.7 -2.9
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D -4.8 -3.8
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D -2.9 -2.3
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D -3.9 -3.0
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	-1.5	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I_{DM}	-15	A

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

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$\text{V}_{\text{DS}} = 40\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$\text{V}_{\text{GS}} = \pm 20\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	1	—	3	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	—	26	45	$\text{m}\Omega$	$\text{V}_{\text{GS}} = 10\text{V}$, $\text{I}_D = 3.9\text{A}$
		—	35	58		$\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{I}_D = 3.5\text{A}$
Diode Forward Voltage	V_{SD}	—	0.7	1	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 1.25\text{A}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	574	—	pF	$\text{V}_{\text{DS}} = 20\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	87.8	—		
Reverse Transfer Capacitance	C_{rss}	—	38.7	—		
Gate resistance	R_g	—	1.6	—	Ω	$\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Total Gate Charge ($\text{V}_{\text{GS}} = 4.5\text{V}$)	Q_g	—	5.9	—	nC	$\text{V}_{\text{DS}} = 20\text{V}$, $\text{I}_D = 3.9\text{A}$
Total Gate Charge ($\text{V}_{\text{GS}} = 10\text{V}$)	Q_g	—	12.5	—		
Gate-Source Charge	Q_{gs}	—	1.7	—		
Gate-Drain Charge	Q_{gd}	—	2.2	—		
Turn-On Delay Time	$\text{t}_{\text{D}(\text{on})}$	—	3.1	—	ns	$\text{V}_{\text{DD}} = 20\text{V}$, $\text{V}_{\text{GS}} = 10\text{V}$, $\text{R}_L = 20\Omega$, $\text{R}_G = 6\Omega$
Turn-On Rise Time	t_r	—	2.6	—		
Turn-Off Delay Time	$\text{t}_{\text{D}(\text{off})}$	—	15	—		
Turn-Off Fall Time	t_f	—	5.5	—		
Reverse Recovery Time	t_{rr}	—	6.5	—	ns	$\text{I}_F = 3.9\text{A}$, $\text{di/dt} = 500\text{A}/\mu\text{s}$
Reverse Recovery Charge	Q_{rr}	—	1.2	—		

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$\text{V}_{\text{DS}} = -40\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$\text{V}_{\text{GS}} = \pm 20\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	-1	—	-3	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	—	49	65	$\text{m}\Omega$	$\text{V}_{\text{GS}} = -10\text{V}$, $\text{I}_D = -4.2\text{A}$
		—	73	100		$\text{V}_{\text{GS}} = -4.5\text{V}$, $\text{I}_D = -3.3\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = -1\text{A}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	587	—	pF	$\text{V}_{\text{DS}} = -20\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	88.1	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	40.2	—	pF	
Gate resistance	R_g	—	12.3	—	Ω	$\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Total Gate Charge ($\text{V}_{\text{GS}} = -4.5\text{V}$)	Q_g	—	5.4	—	nC	$\text{V}_{\text{DS}} = -20\text{V}$, $\text{I}_D = -4.2\text{A}$
Total Gate Charge ($\text{V}_{\text{GS}} = -10\text{V}$)	Q_g	—	11.1	—	nC	
Gate-Source Charge	Q_{gs}	—	1.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	2	—	nC	
Turn-On Delay Time	$\text{t}_{\text{D}(\text{on})}$	—	3.6	—	ns	$\text{V}_{\text{DD}} = -15\text{V}$, $\text{V}_{\text{GS}} = -10\text{V}$, $\text{R}_G = 6\Omega$, $\text{I}_D = -1\text{A}$
Turn-On Rise Time	t_r	—	2.9	—	ns	
Turn-Off Delay Time	$\text{t}_{\text{D}(\text{off})}$	—	36.3	—	ns	
Turn-Off Fall Time	t_f	—	15.3	—	ns	
Reverse Recovery Time	t_{rr}	—	15.5	—	ns	$\text{I}_F = -4.2\text{A}$, $\text{di/dt} = 500\text{A}/\mu\text{s}$
Reverse Recovery Charge	Q_{rr}	—	16.9	—	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

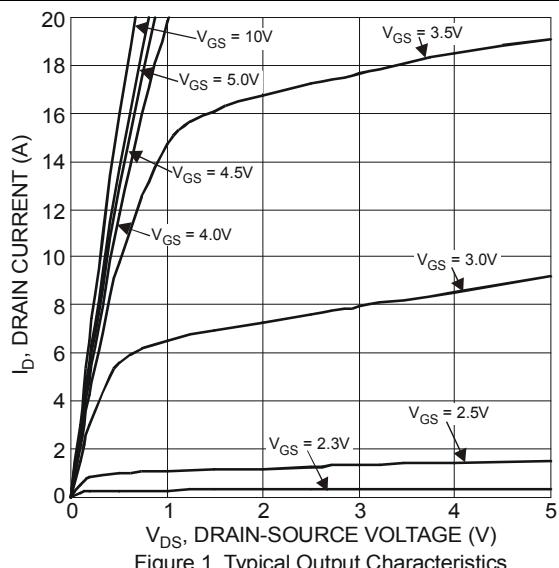


Figure 1 Typical Output Characteristics

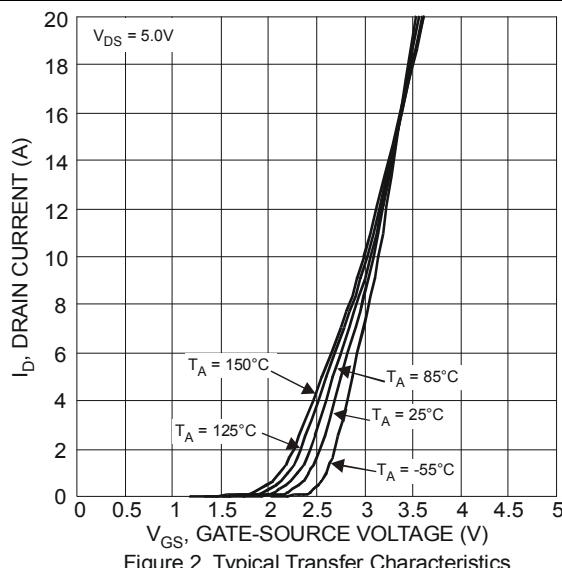


Figure 2 Typical Transfer Characteristics

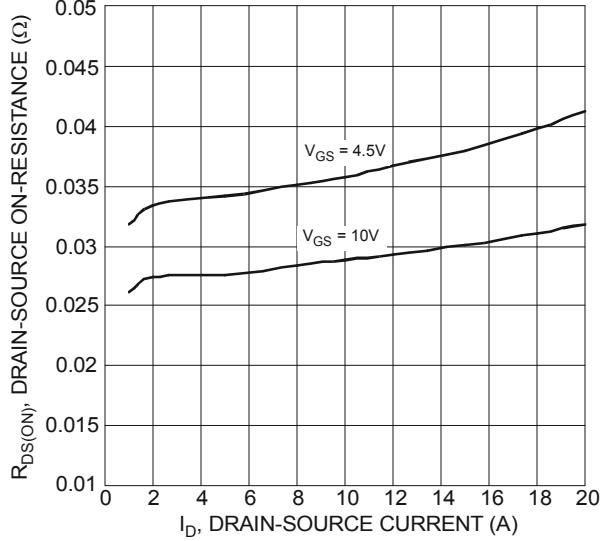


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

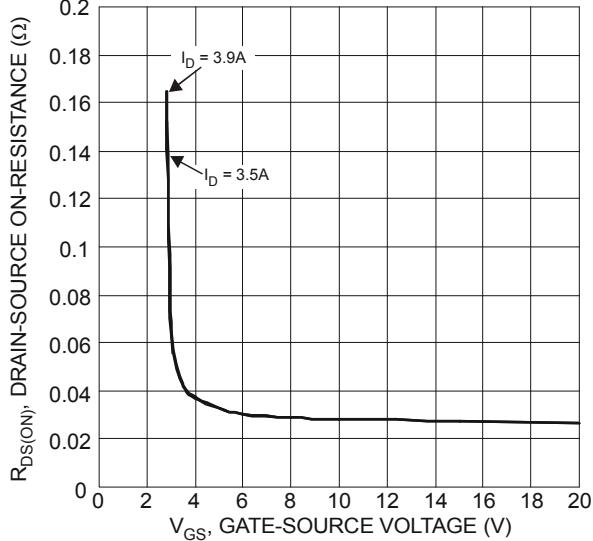


Figure 4 Typical Transfer Characteristics

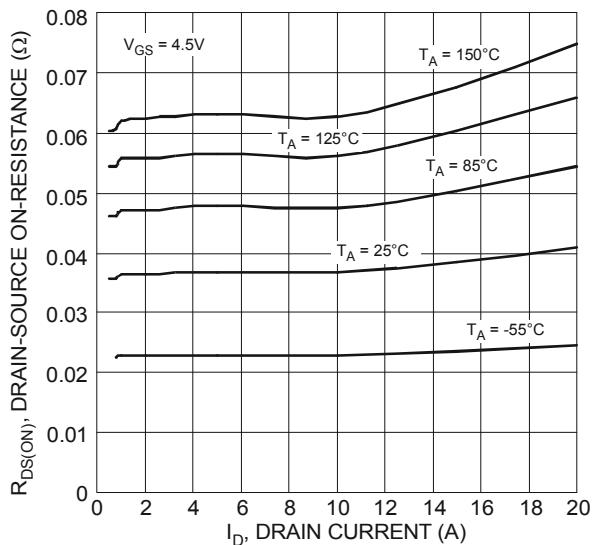


Figure 5 Typical On-Resistance vs.
Drain Current and Temperature

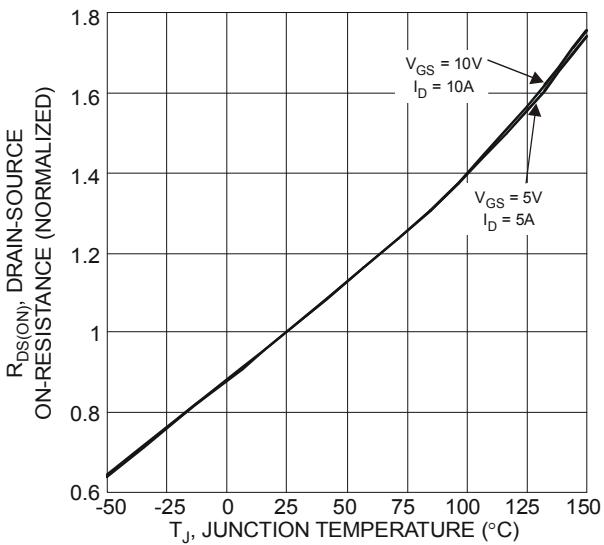


Figure 6 On-Resistance Variation with Temperature

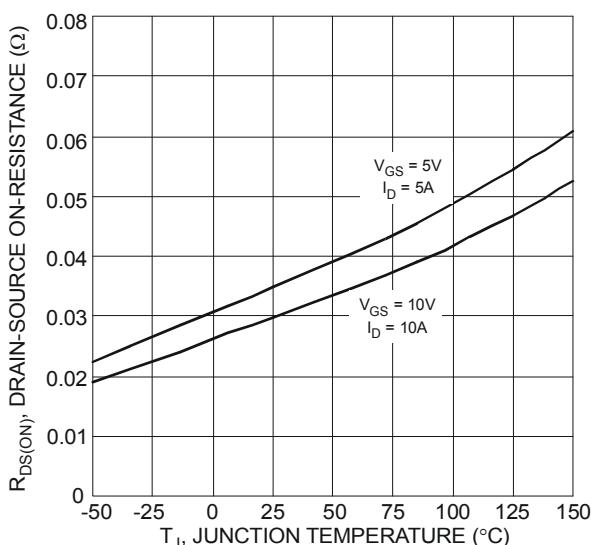


Figure 7 On-Resistance Variation with Temperature

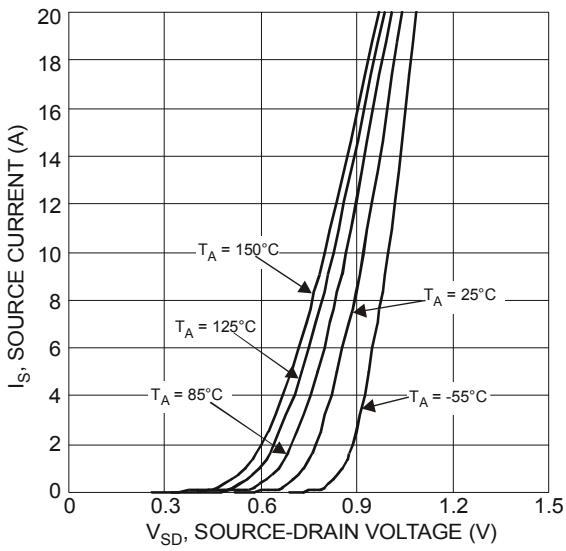


Figure 9 Diode Forward Voltage vs. Current

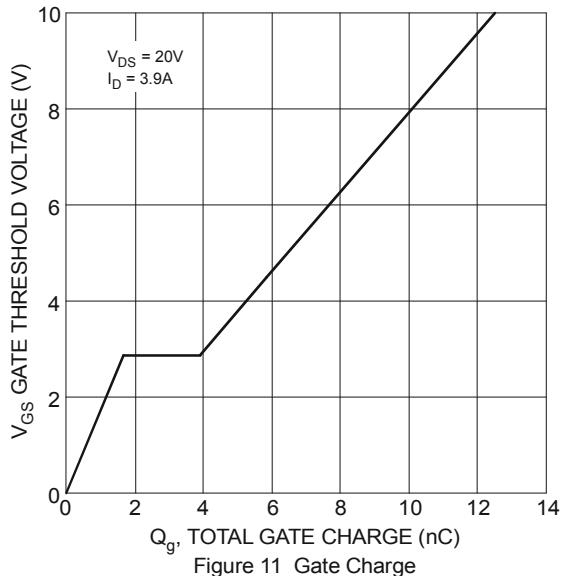


Figure 11 Gate Charge

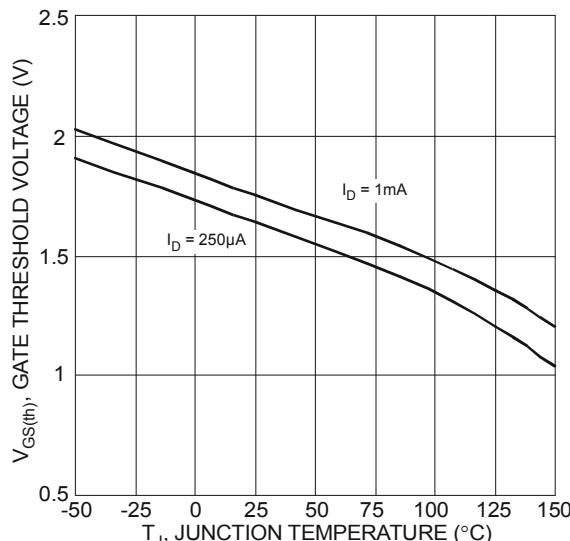


Figure 8 Gate Threshold Variation vs. Ambient Temperature

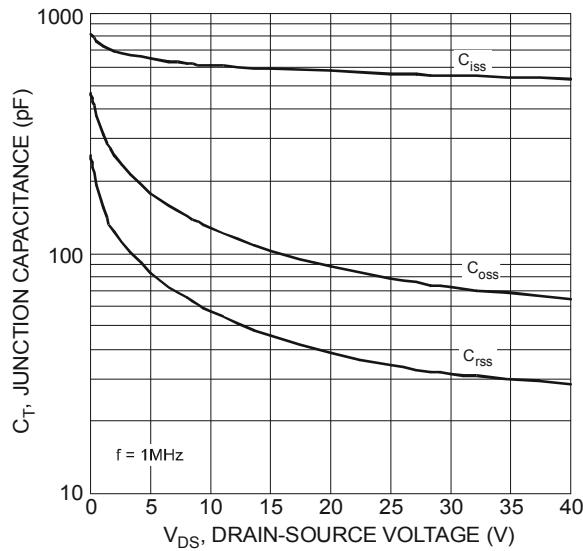


Figure 10 Typical Junction Capacitance

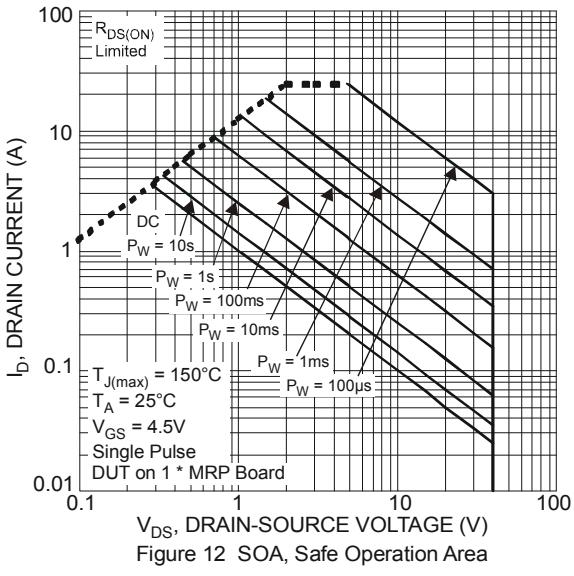


Figure 12 SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

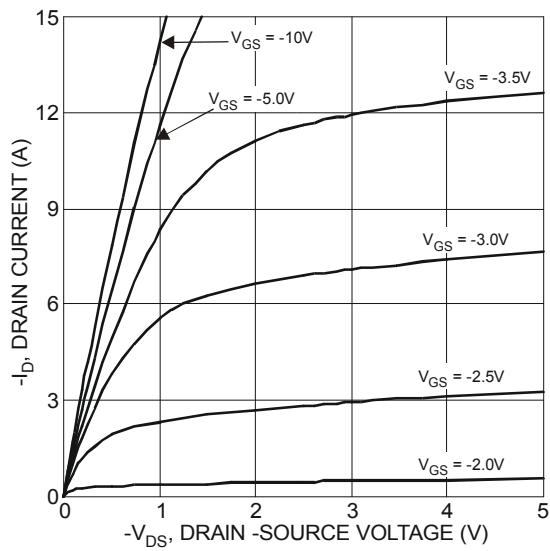


Figure 13 Typical Output Characteristics

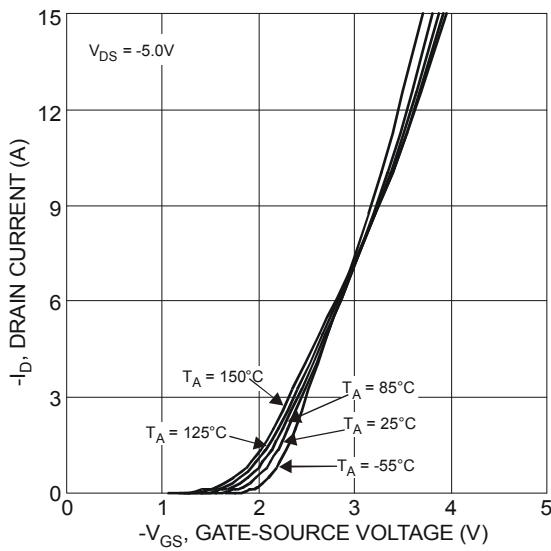


Figure 14 Typical Transfer Characteristics

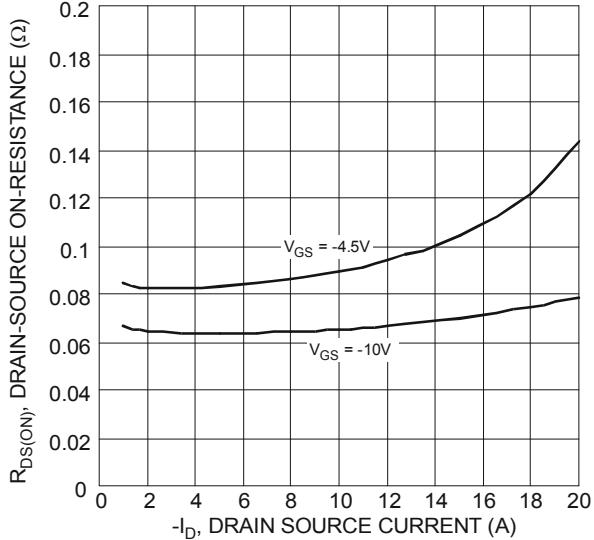


Figure 15 Typical On-Resistance vs.
Drain Current and Gate Voltage

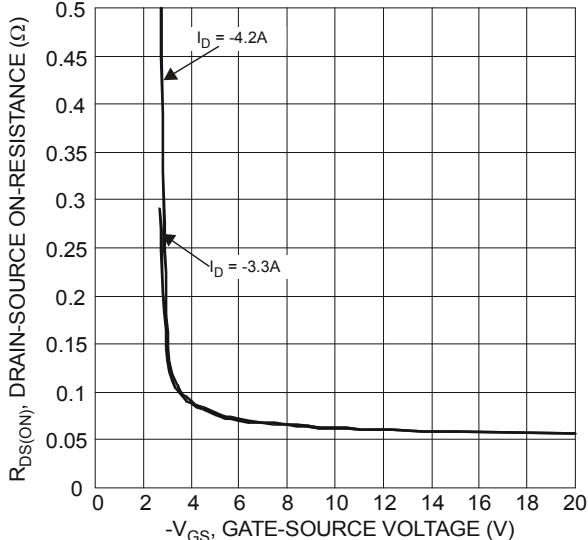


Figure 16 Typical Transfer Characteristics

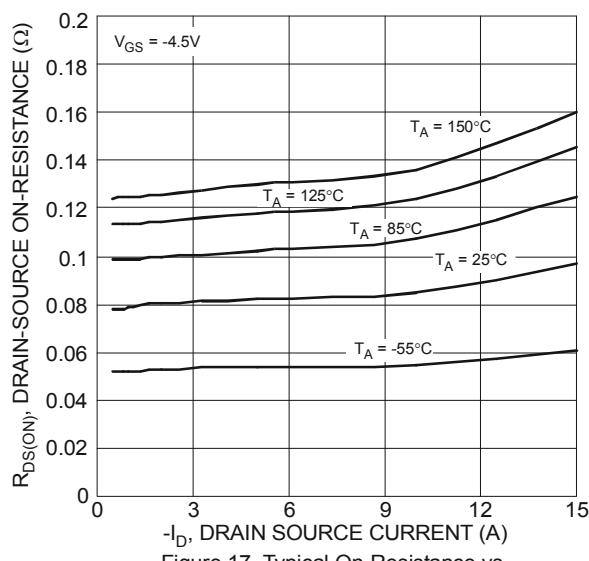


Figure 17 Typical On-Resistance vs.
Drain Current and Temperature

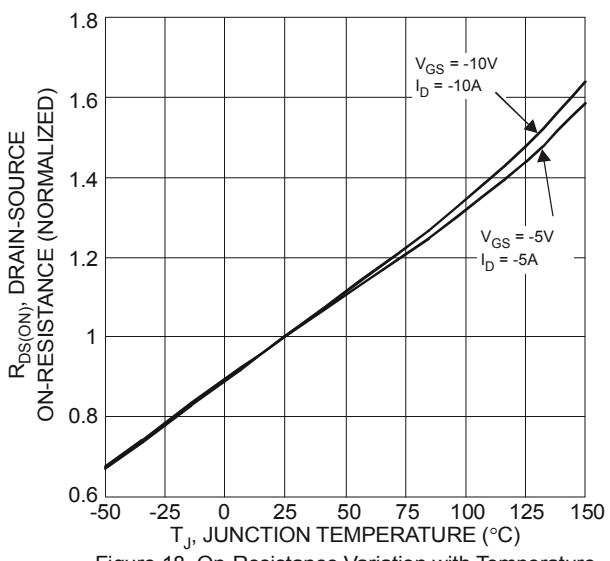
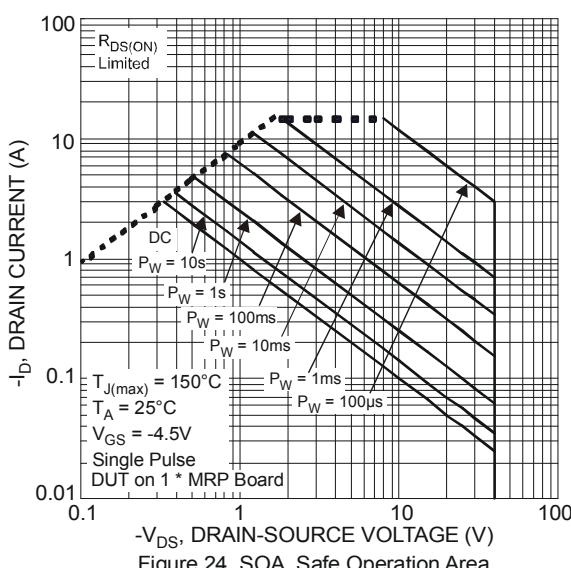
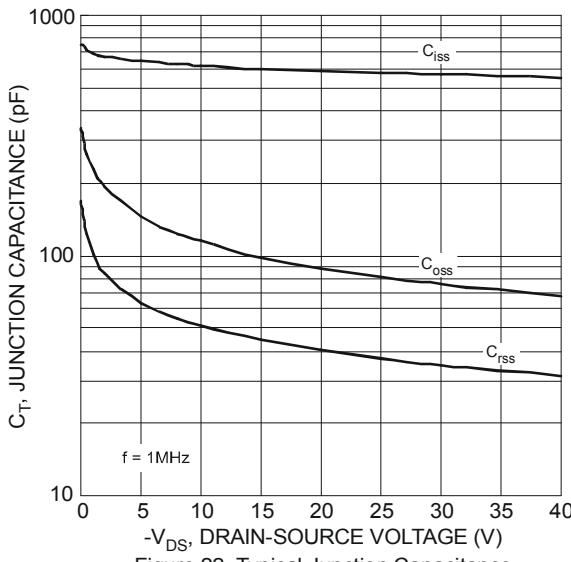
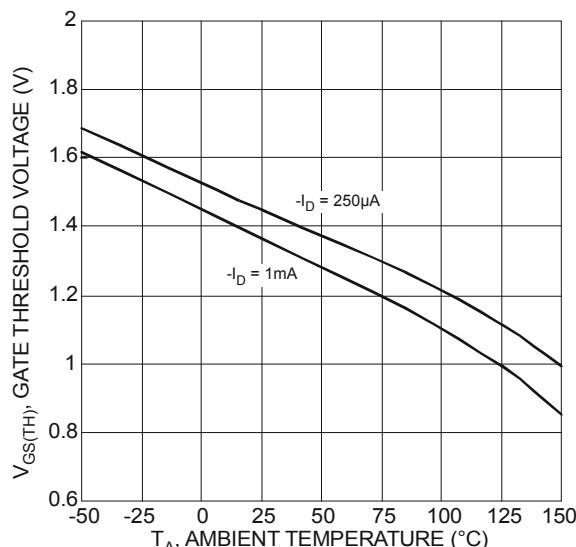
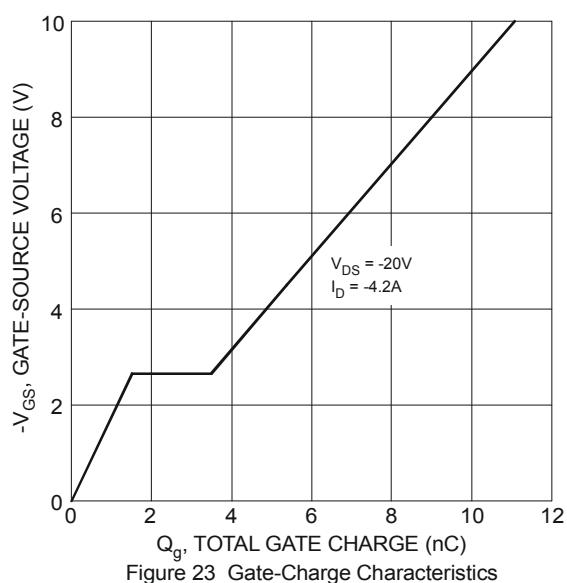
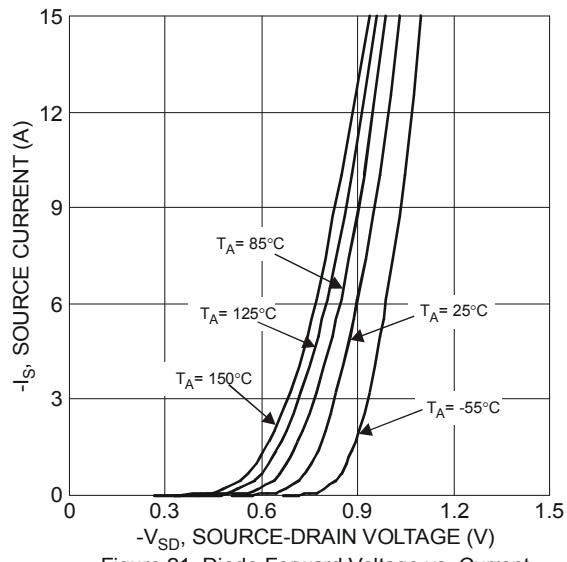
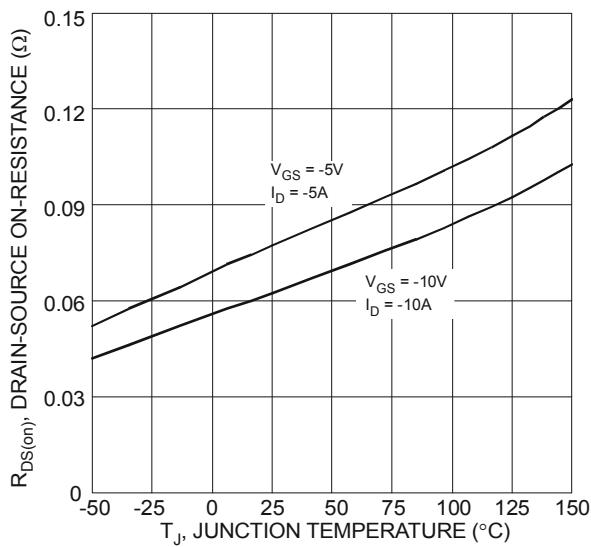


Figure 18 On-Resistance Variation with Temperature



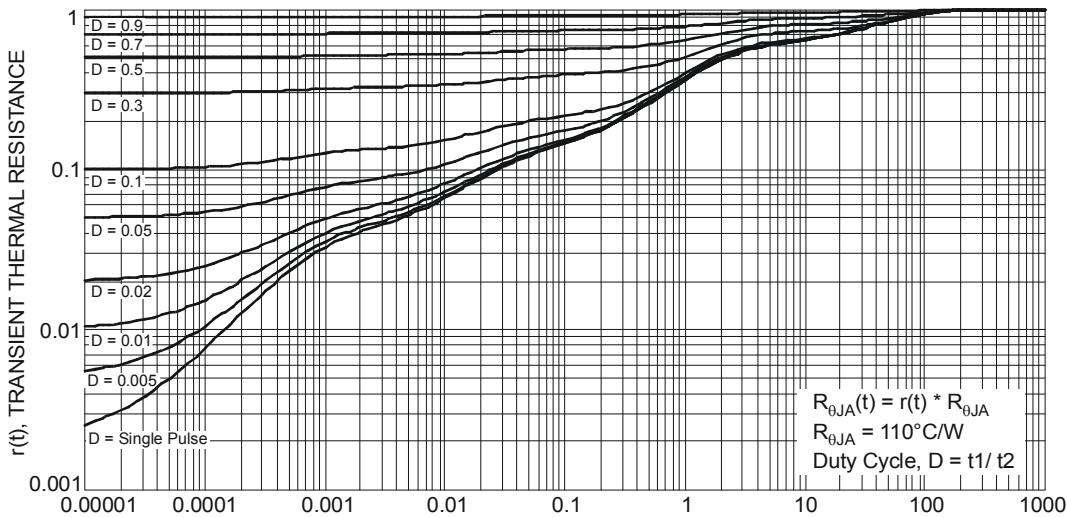
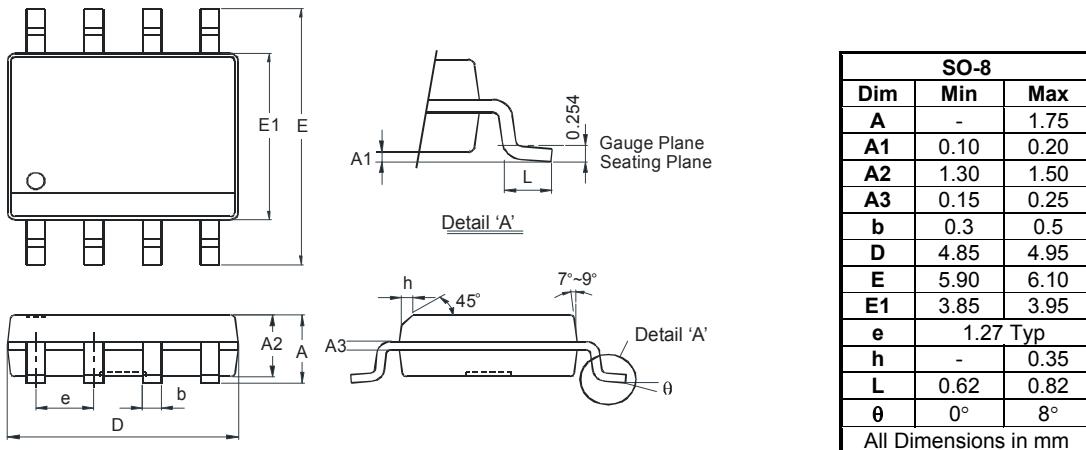


Figure 25 Transient Thermal Resistance

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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