30V COMPLEMENTARY ENHANCEMENT MODE MOSFET

Product Summary

Device	BV_{DSS}	$R_{DS(ON)}$ Max	Package	I_D Max T_A = +25°C
N-Channel	30V	20mΩ @ V_{GS} = 10V	SO-8	8.5A
		32mΩ @ V_{GS} = 4.5V		7.0A
P-Channel	-30V	45mΩ @ V_{GS} = -10V		-5.5A
		85mΩ @ V_{GS} = -4.5V		-4.1A

Features

- 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**
- **PPAP Capable (Note 4)**

Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

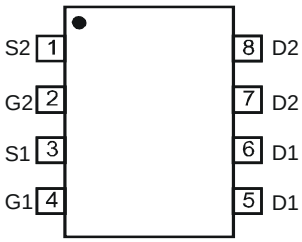
- DC Motor Control
- DC-AC Inverters

Mechanical Data

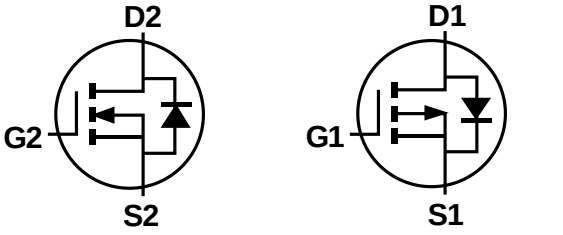
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed Over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

SO-8

Top View



Pin Configuration



Q2 N-CHANNEL MOSFET Q1 P-CHANNEL MOSFET

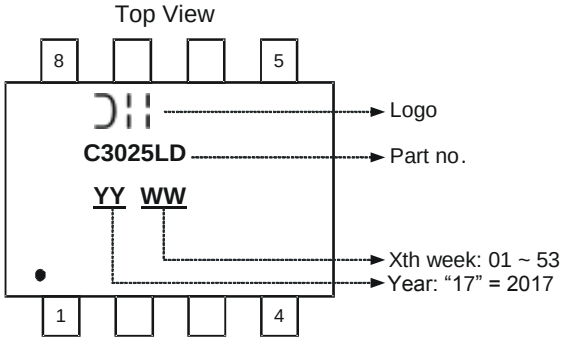
Equivalent Circuit

Ordering Information (Note 5)

Part Number	Case	Packaging
DMC3025LSDQ-13	SO-8	2,500/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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product_compliance_definitions.html
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



Maximum Ratings N-CHANNEL – Q2 (@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 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	6.5 5.1	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	8.5 6.8	A
Continuous Drain Current (Note 6) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	5.3 4.1	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	7.0 5.5	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	2	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	60	A
Pulsed Body Diode Current (10µs pulse, duty cycle = 1%)			I_{SM}	60	A
Avalanche Current (Note 8) L = 0.1mH			I_{AS}	14	A
Avalanche Energy (Note 8) L = 0.1mH			E_{AS}	10	mJ

Maximum Ratings P-CHANNEL – Q1 (@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 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-4.2 -3.2	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	-5.5 -4.3	A
Continuous Drain Current (Note 6) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-3.5 -2.3	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	-4.1 -3.2	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-2	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	-30	A
Pulsed Body Diode Current (10µs pulse, duty cycle = 1%)			I_{SM}	-30	A
Avalanche Current (Note 8) L = 0.1mH			I_{AS}	-14	A
Avalanche Energy (Note 8) L = 0.1mH			E_{AS}	10	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 7)	T_A = +25°C	P_D	1.2	W
	T_A = +70°C		0.77	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	104	°C/W
	t<10s		62	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.5	W
	T_A = +70°C		0.95	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	83	°C/W
	t<10s		49	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	15	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
8. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = 25°C.

Electrical Characteristics N-CHANNEL – Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±1	μA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	2.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	15	20	mΩ	V_{GS} = 10V, I_D = 7.4A
		—	23	32		V_{GS} = 4.5V, I_D = 6A
Forward Transfer Admittance	$\|Y_{FS}\|$	—	8	—	S	V_{DS} = 5V, I_D = 10A
Diode Forward Voltage	V_{SD}	—	0.70	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{ISS}	—	501	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{OSS}	—	72	—		
Reverse Transfer Capacitance	C_{RSS}	—	57	—		
Gate Resistance	R_G	—	1.84	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_G	—	4.6	—	nC	V_{DS} = 15V, I_D = 10A
Total Gate Charge (V_{GS} = 10V)	Q_G	—	9.8	—		
Gate-Source Charge	Q_{GS}	—	1.6	—		
Gate-Drain Charge	Q_{GD}	—	2.0	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.9	—	ns	V_{DD} = 15V, V_{GS} = 10V, R_G = 6Ω, I_D = 1A
Turn-On Rise Time	t_R	—	4.2	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	16.6	—		
Turn-Off Fall Time	t_F	—	5.8	—		
Reverse Recovery Time	t_{RR}	—	5.5	—	ns	I_F = 12A, di/dt = 500A/μs
Reverse Recovery Charge	Q_{RR}	—	2.6	—	nC	

Electrical Characteristics P-CHANNEL – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.0	—	-2.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	38	45	mΩ	V_{GS} = -10V, I_D = -5.2A
		—	65	85		V_{GS} = -4.5V, I_D = -4A
Forward Transfer Admittance	$\|Y_{FS}\|$	—	5	—	S	V_{DS} = -5V, I_D = -5.2A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{ISS}	—	590	—	pF	V_{DS} = -25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{OSS}	—	69	—	pF	
Reverse Transfer Capacitance	C_{RSS}	—	53	—	pF	
Gate resistance	R_G	—	11	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_G	—	5.1	—	nC	V_{DS} = -15V, I_D = -6A
Total Gate Charge (V_{GS} = 10V)	Q_G	—	10.5	—	nC	
Gate-Source Charge	Q_{GS}	—	1.8	—	nC	
Gate-Drain Charge	Q_{GD}	—	1.9	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	6.8	—	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	$t_{D(OFF)}$	—	28.4	—	ns	
Turn-Off Fall Time	t_F	—	12.4	—	ns	
Reverse Recovery Time	t_{RR}	—	14	—	ns	I_F = 12A, di/dt = 500A/µs
Reverse Recovery Charge	Q_{RR}	—	11	—	nC	

Notes: 9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.

N-CHANNEL

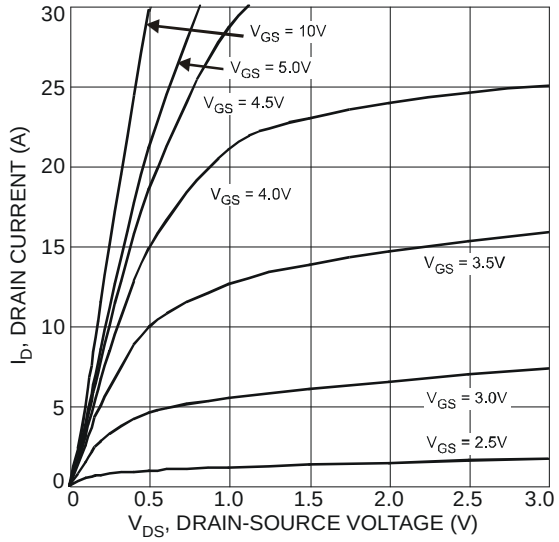


Figure 1. Typical Output Characteristic

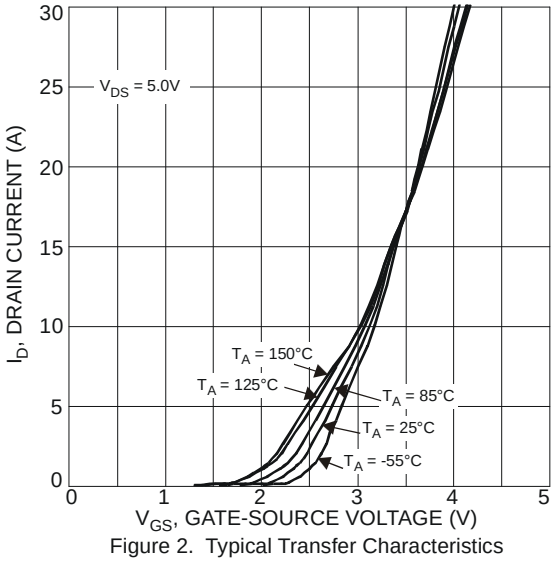


Figure 2. Typical Transfer Characteristics

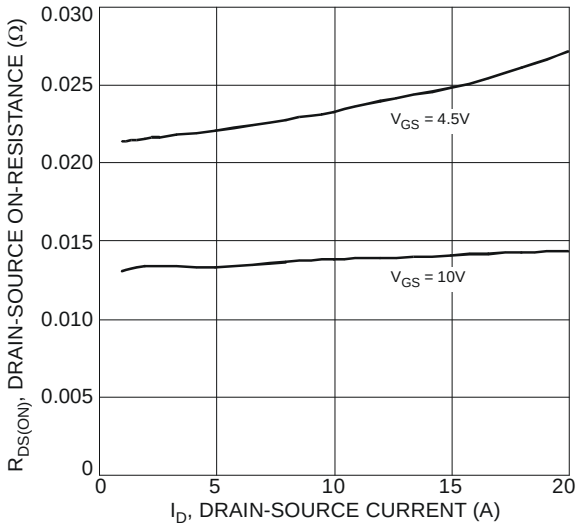


Figure. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

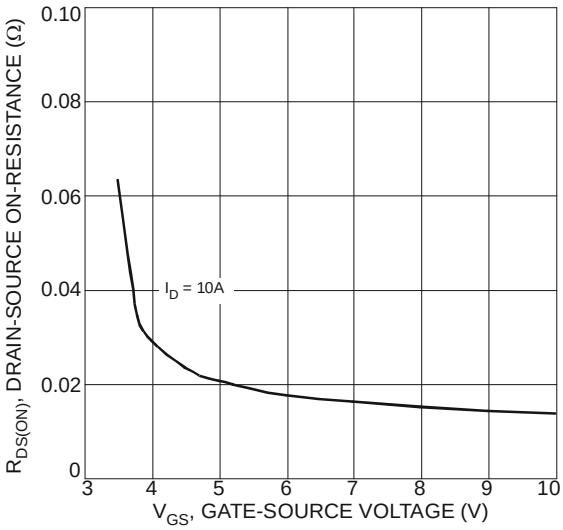


Figure 4. Typical On-Resistance vs. Drain Current and Gate Voltage

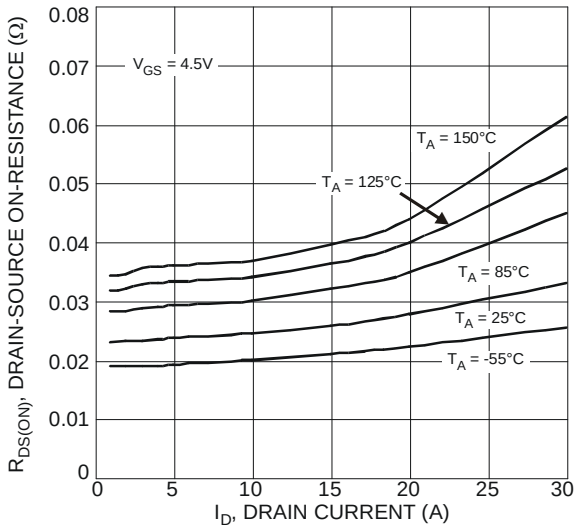


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

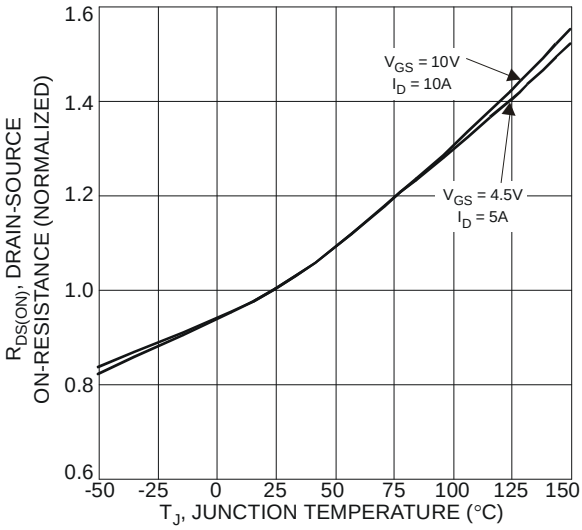


Figure 6. On-Resistance Variation with Temperature

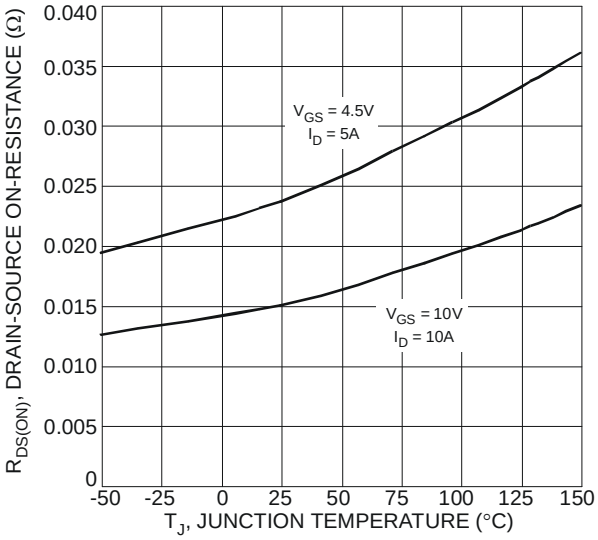


Figure 7. On-Resistance Variation with Temperature

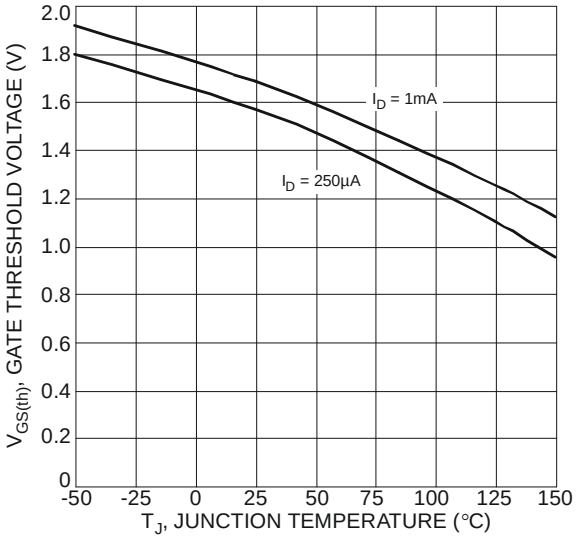


Figure 8 Gate Threshold Variation vs. Ambient Temperature

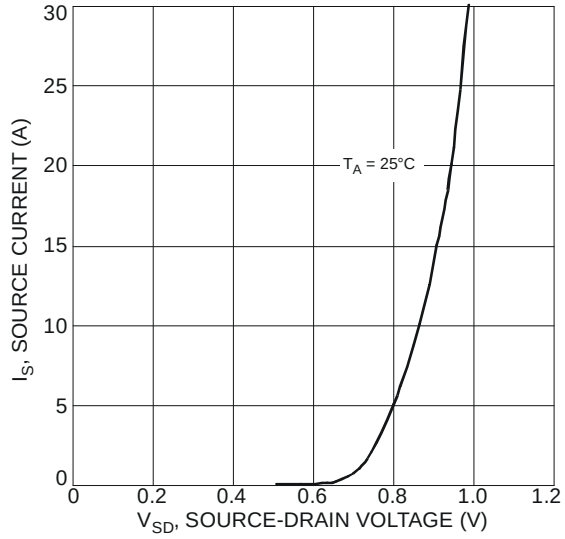


Figure 9. Diode Forward Voltage vs. Current

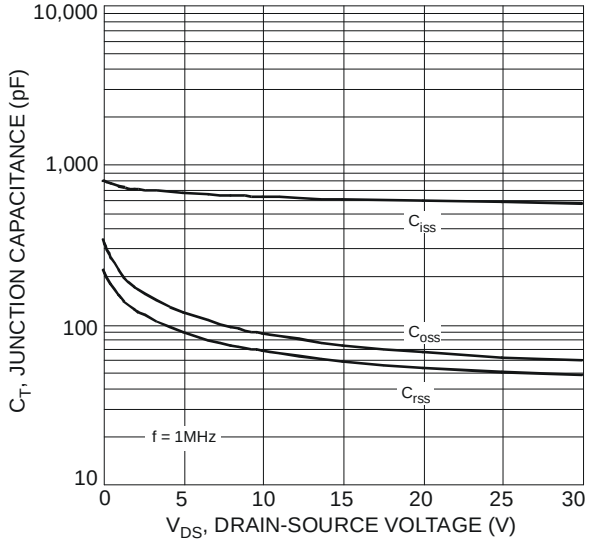


Figure 10. Typical Junction Capacitance

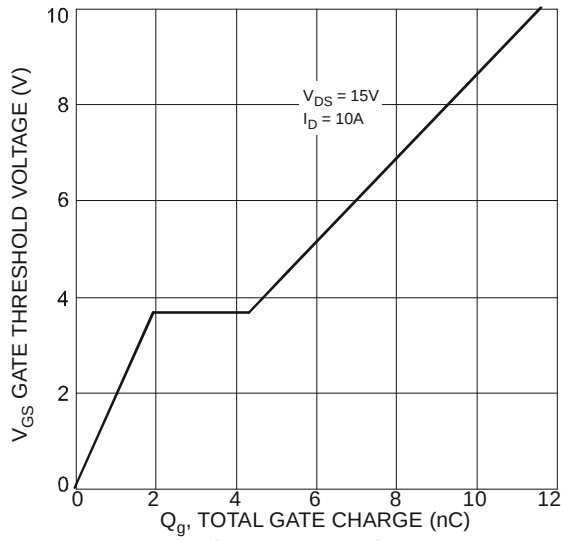


Figure 11. Gate Charge

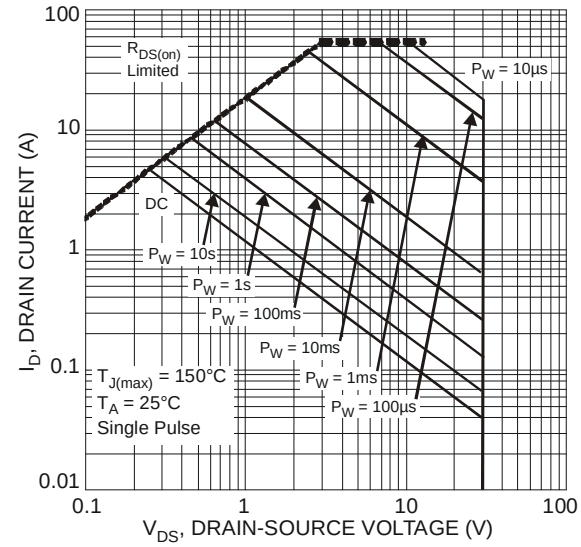


Figure 12. SOA, Safe Operation Area

P-CHANNEL

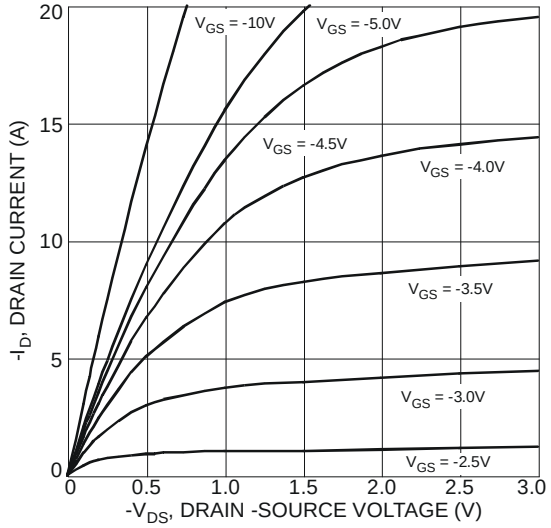


Figure 13. Typical Output Characteristics

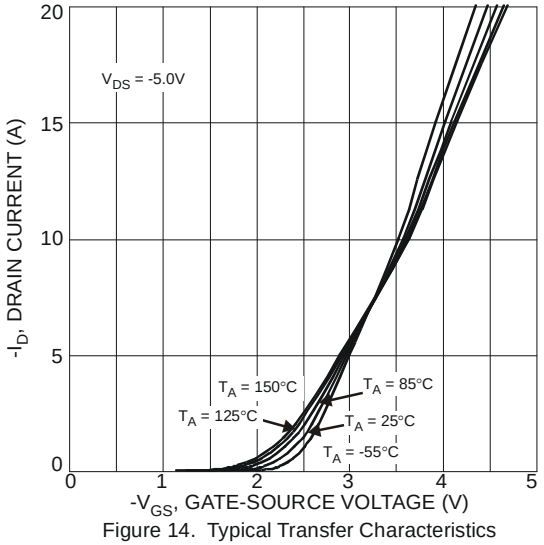


Figure 14. Typical Transfer Characteristics

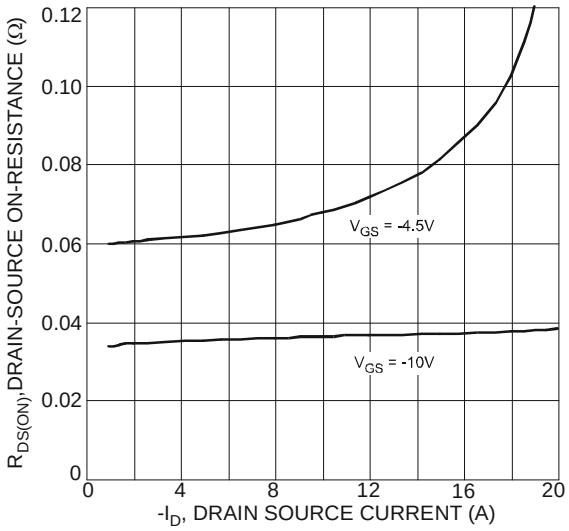


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

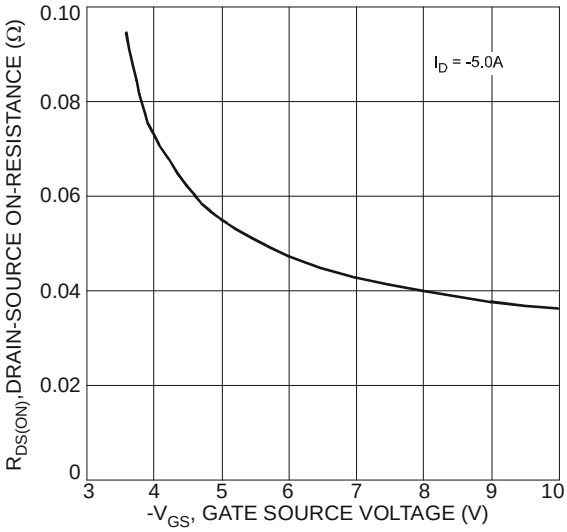


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

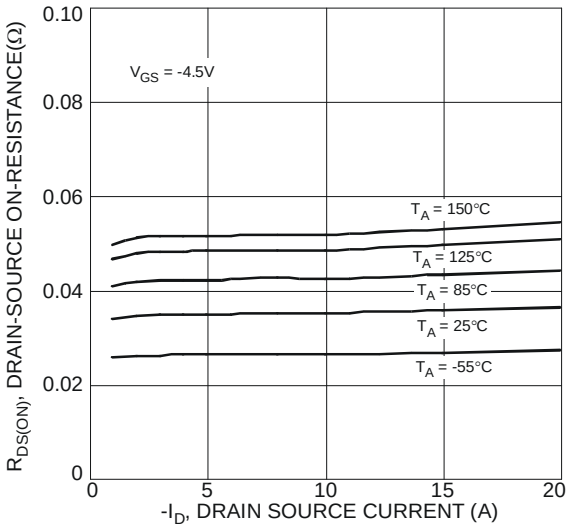


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

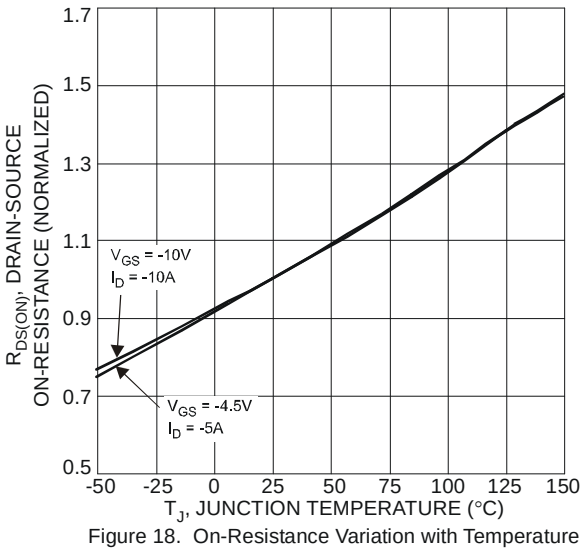


Figure 18. On-Resistance Variation with Temperature

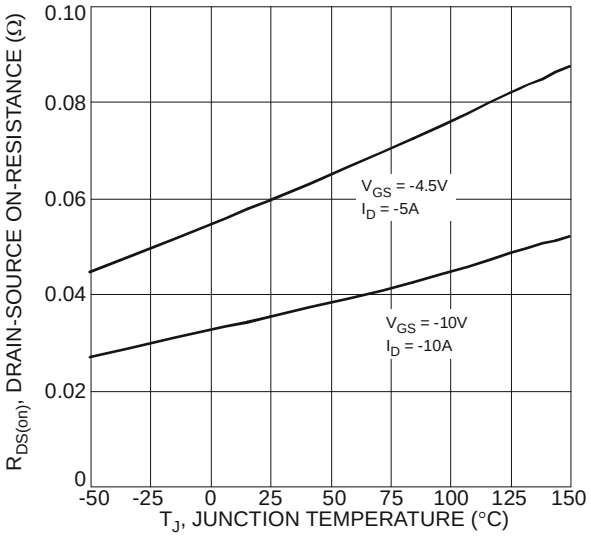


Figure 19. On-Resistance Variation with Temperature

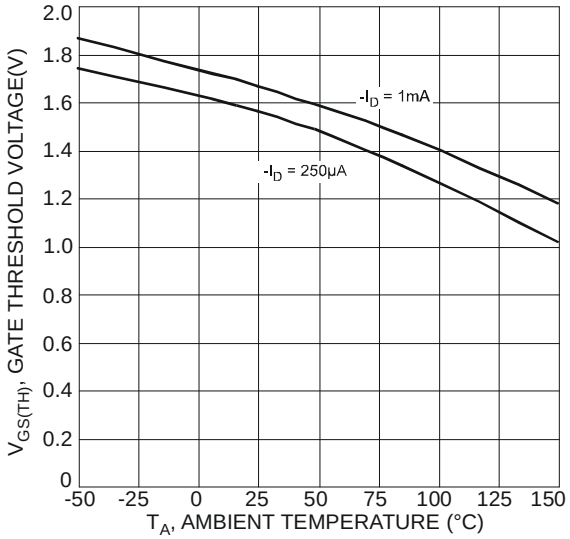


Figure 20. Gate Threshold Variation vs. Ambient Temperature

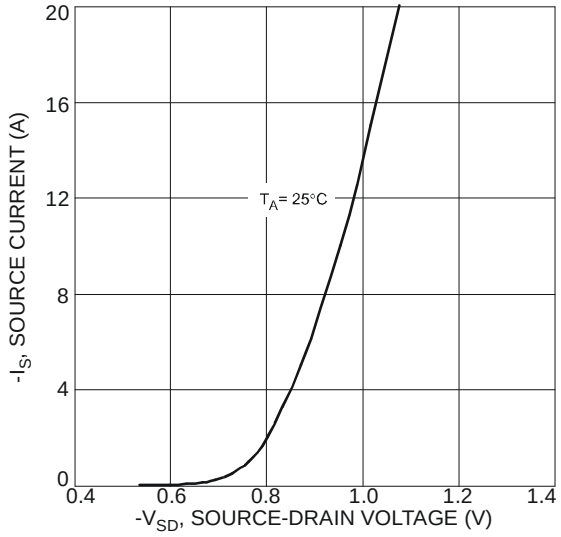


Figure 21. Diode Forward Voltage vs. Current

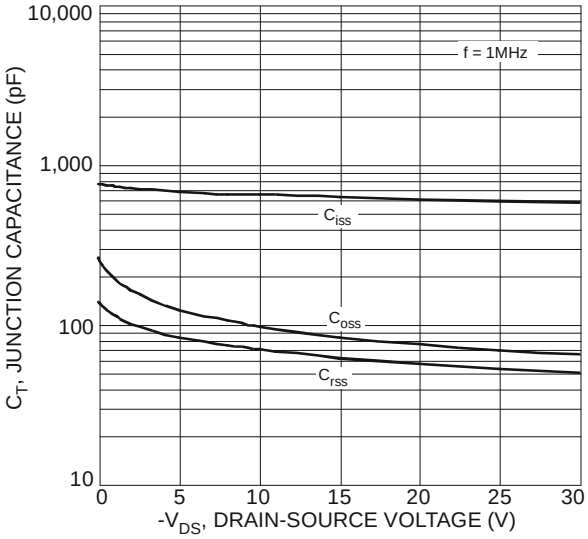


Figure 22. Typical Junction Capacitance

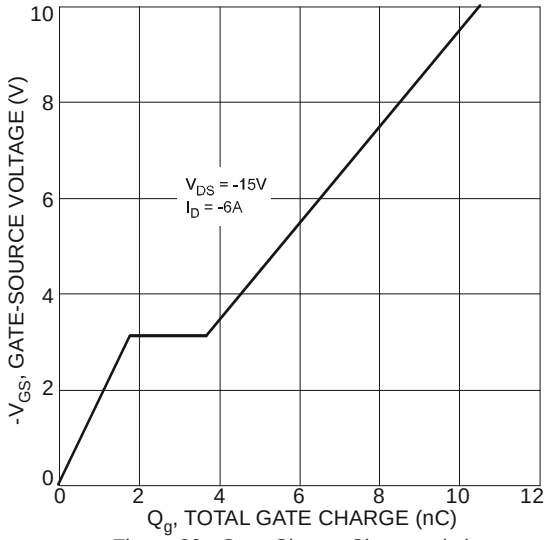


Figure 23. Gate-Charge Characteristics

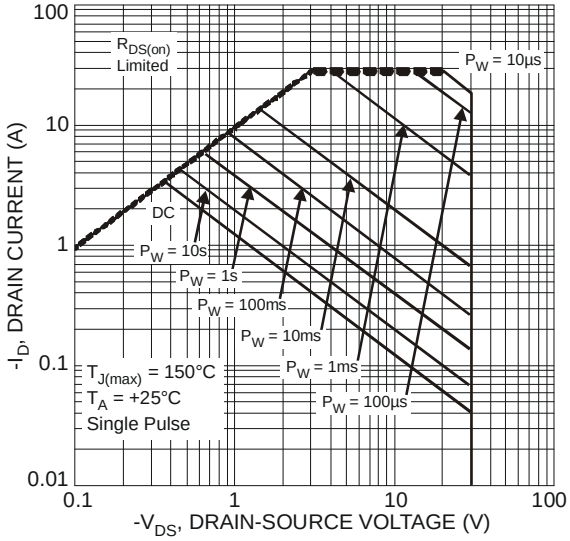


Figure 24. SOA, Safe Operation Area

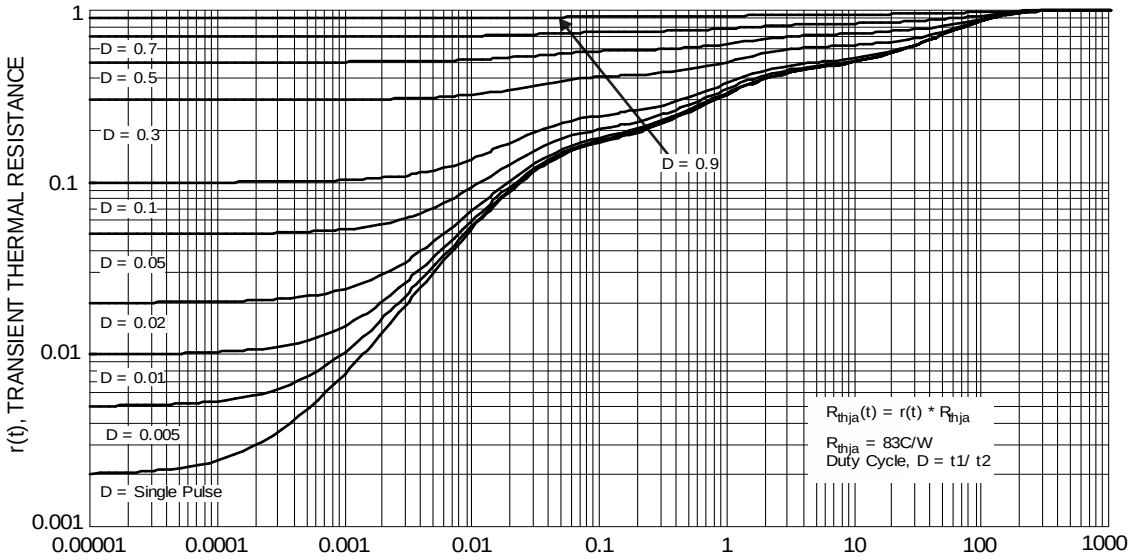
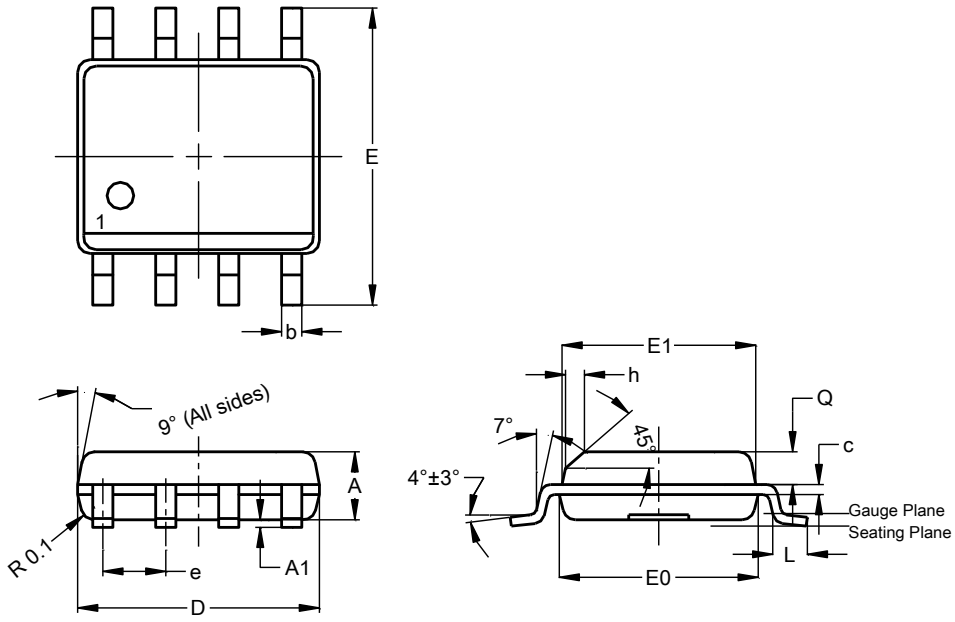


Figure 25 Transient Thermal Resistance

Package Outline Dimensions

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

SO-8

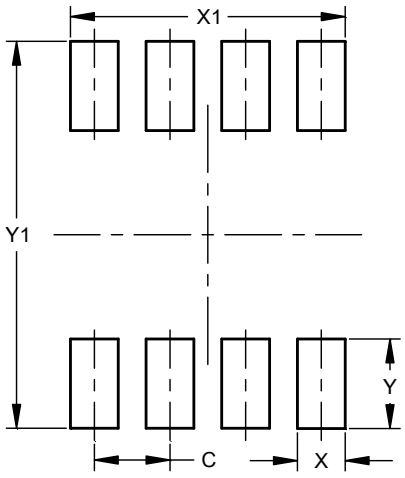


SO-8			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

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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