

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

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

Features

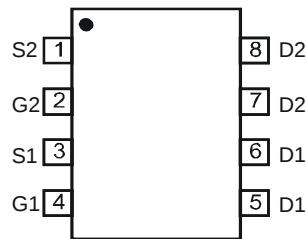
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

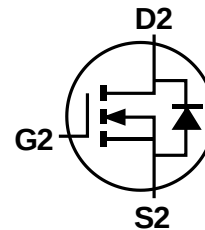
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed Over Copper Leadframe.
Solderable per MIL-STD-202, Method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



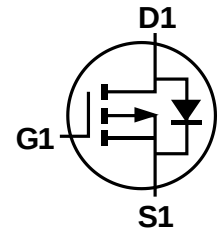
Top View



Pin Configuration



Q2 N-CHANNEL MOSFET



Q1 P-CHANNEL MOSFET

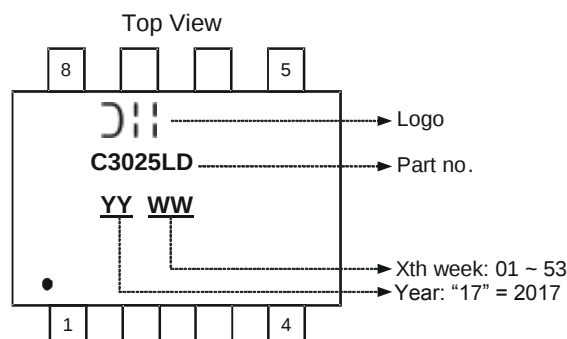
Equivalent Circuit

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 _{θJA}	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 _{θJA}	83	°C/W
	t<10s		49	
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	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	—	ns	I _F = 12A, di/dt = 500A/μs
Reverse Recovery Time	t _{RR}	—	5.5	—		
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

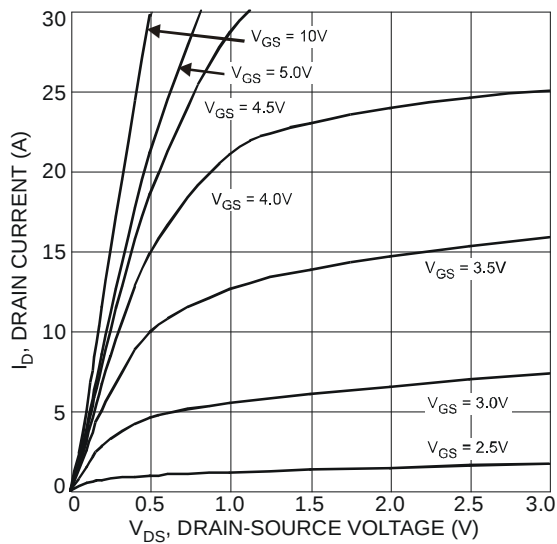


Figure 1. Typical Output Characteristic

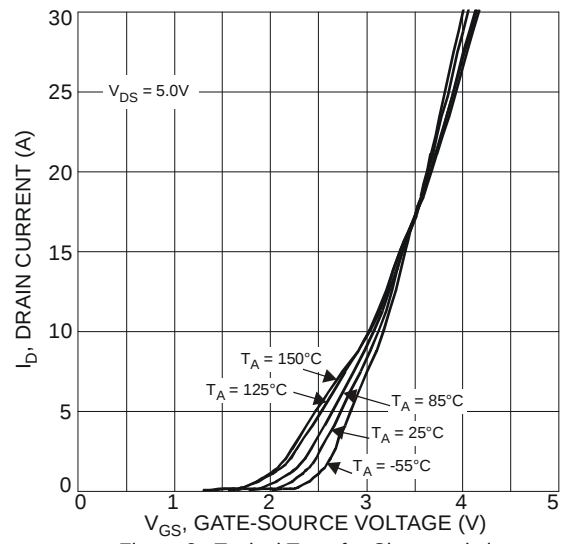


Figure 2. Typical Transfer Characteristics

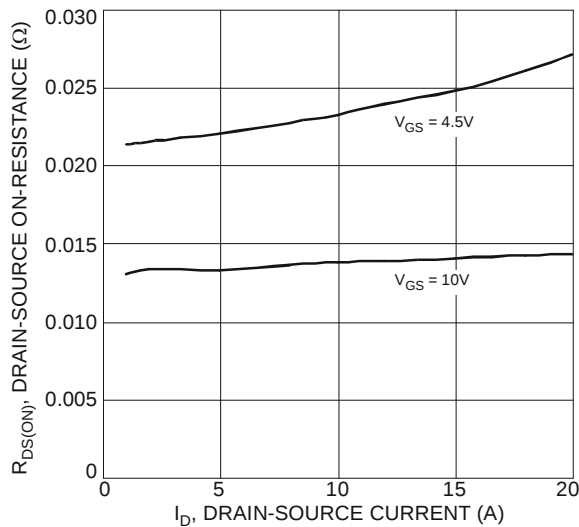


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

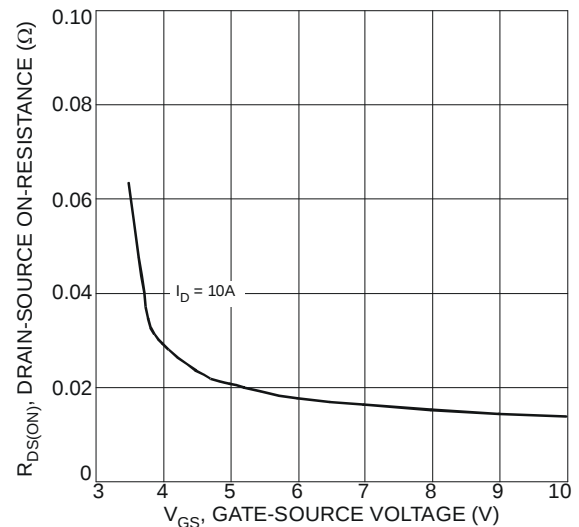


Figure 4. Typical On-Resistance vs. Drain Current and Gate Voltage

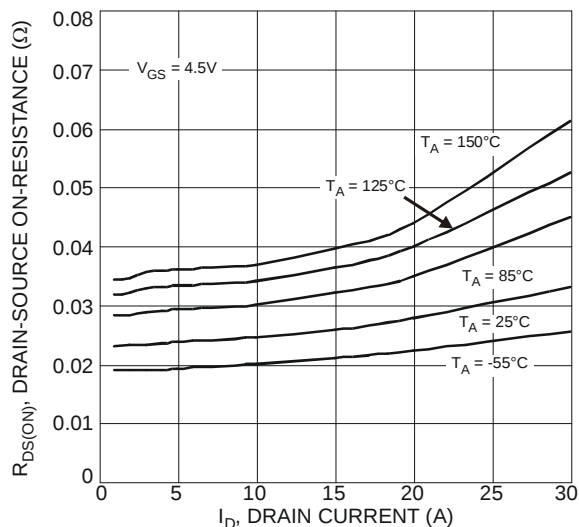


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

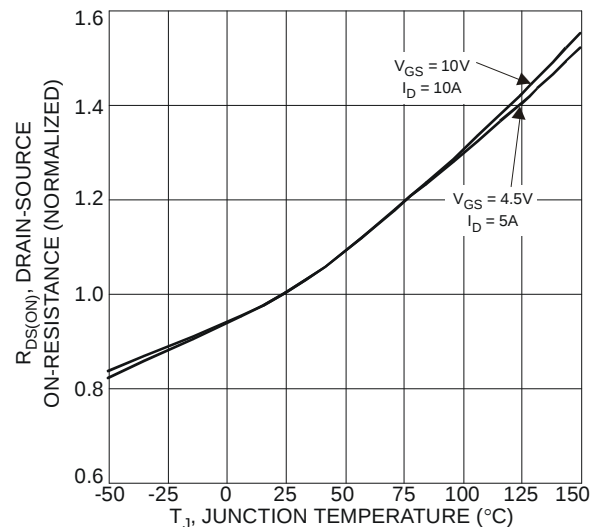


Figure 6. On-Resistance Variation with Temperature

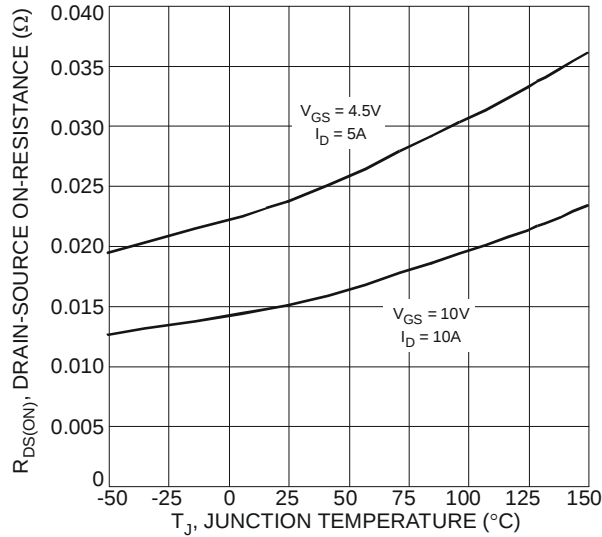


Figure 7. On-Resistance Variation with Temperature

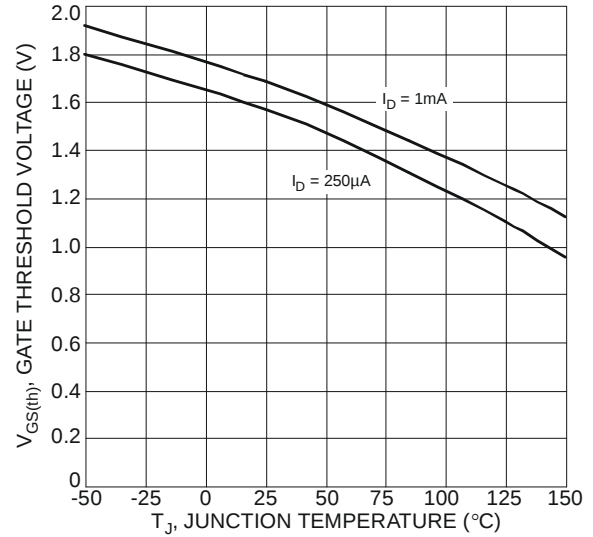


Figure 8. Gate Threshold Variation vs. Ambient Temperature

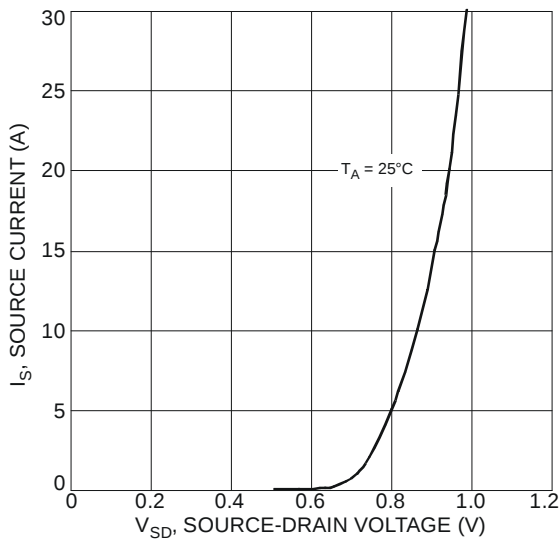


Figure 9. Diode Forward Voltage vs. Current

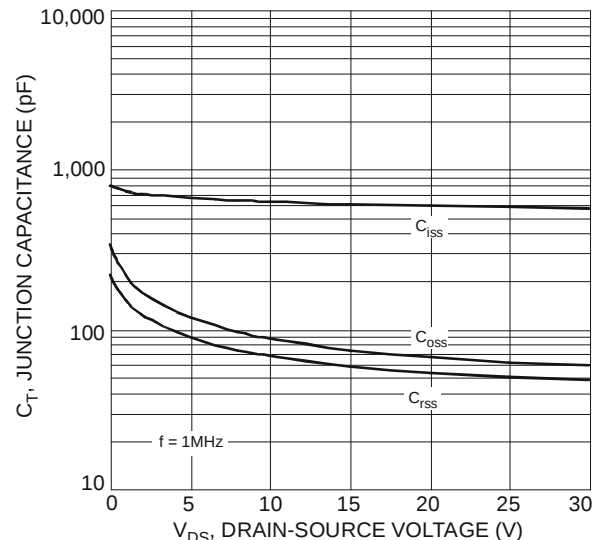


Figure 10. Typical Junction Capacitance

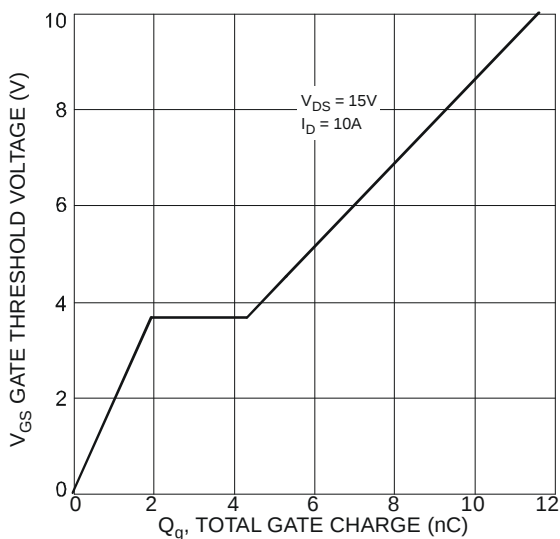


Figure 11. Gate Charge

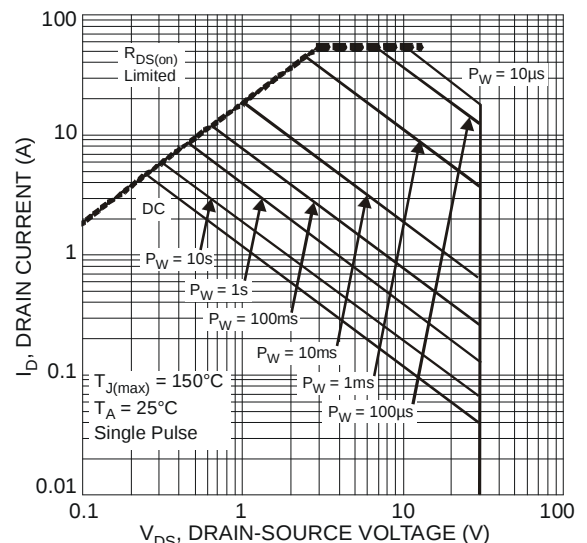


Figure 12. SOA, Safe Operation Area

P-CHANNEL

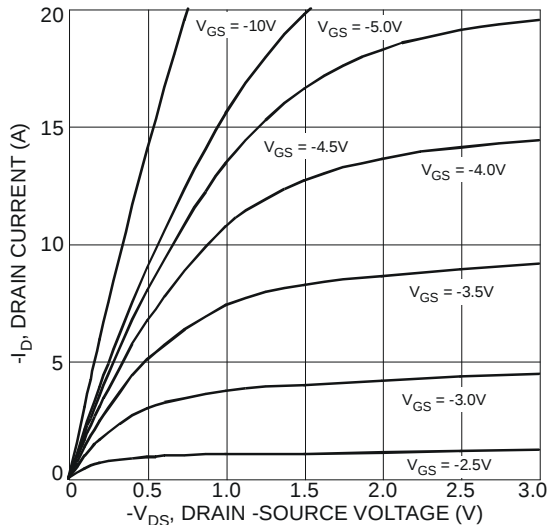


Figure 13. Typical Output Characteristics

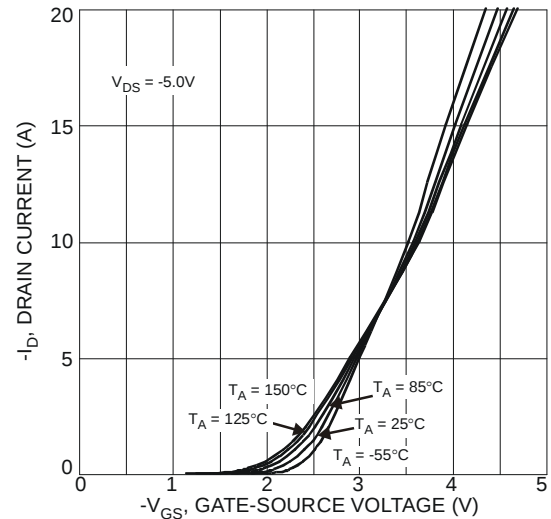


Figure 14. Typical Transfer Characteristics

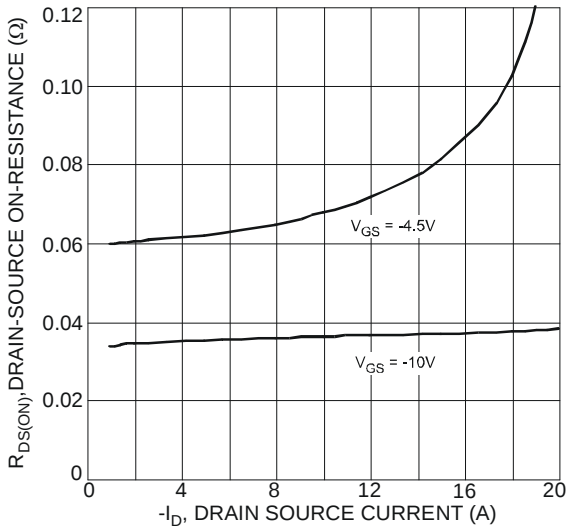


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

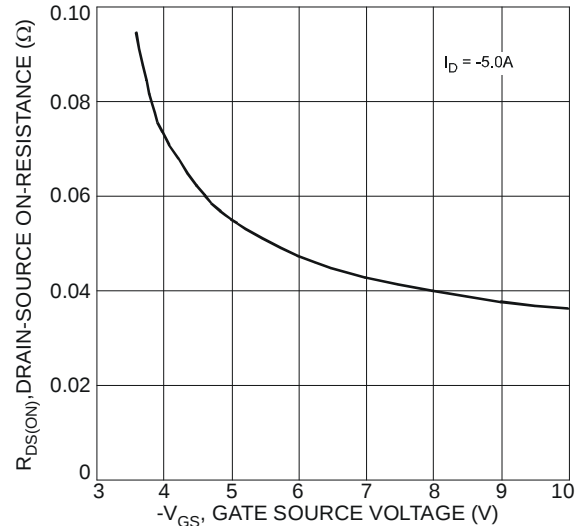


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

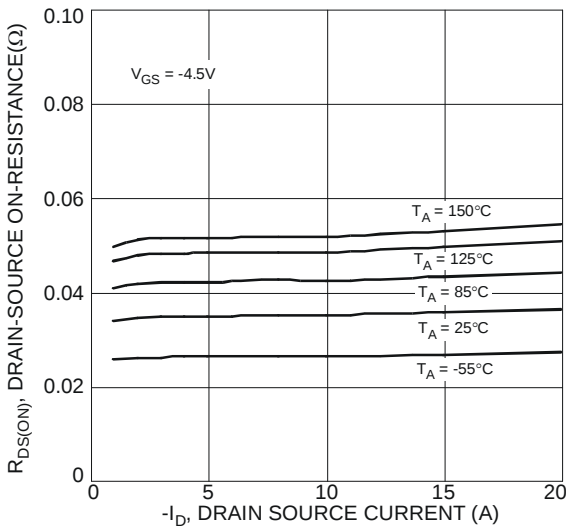


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

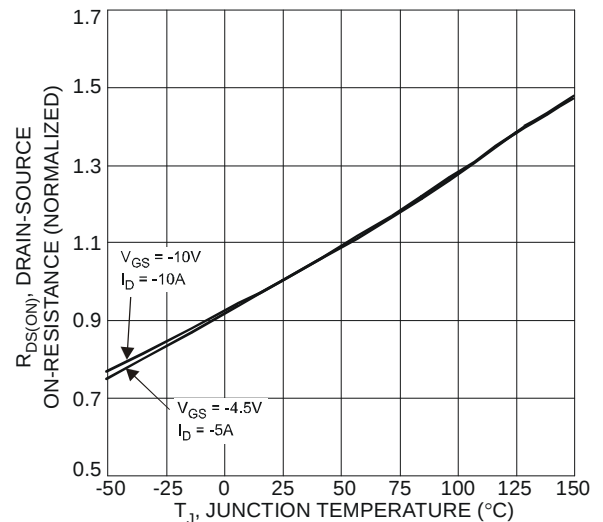


Figure 18. On-Resistance Variation with Temperature

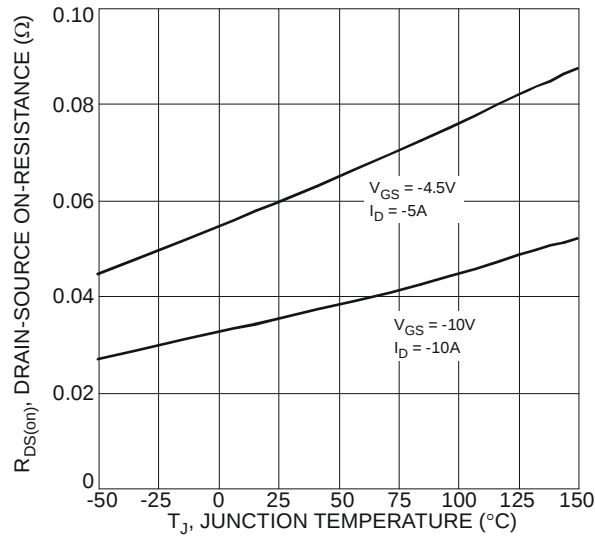


Figure 19. On-Resistance Variation with Temperature

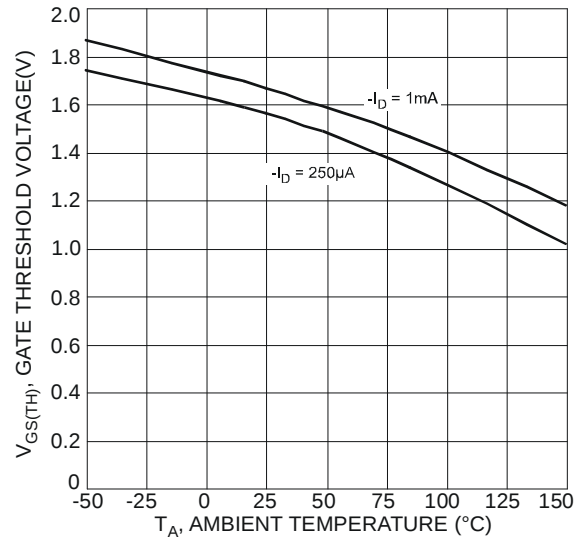


Figure 20. Gate Threshold Variation vs. Ambient Temperature

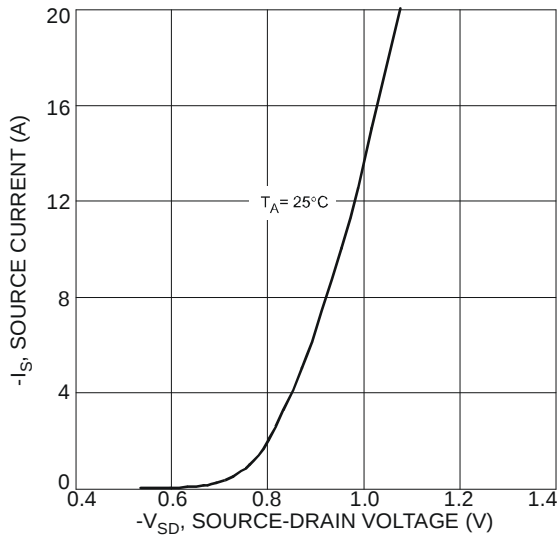


Figure 21. Diode Forward Voltage vs. Current

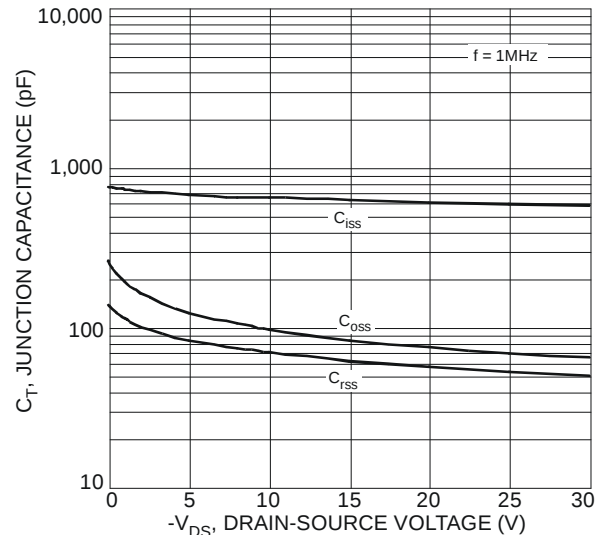


Figure 22. Typical Junction Capacitance

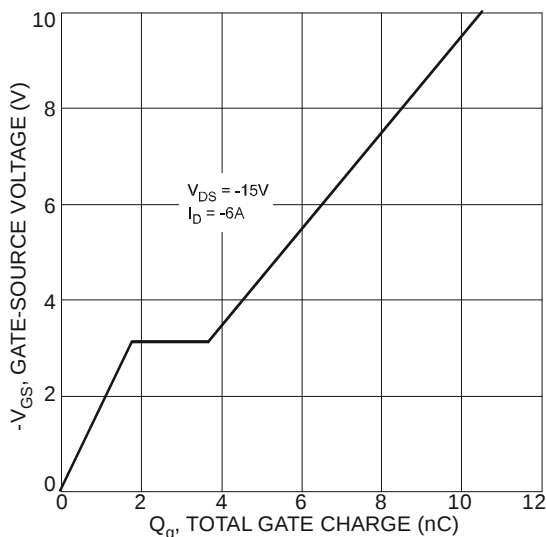


Figure 23. Gate-Charge Characteristics

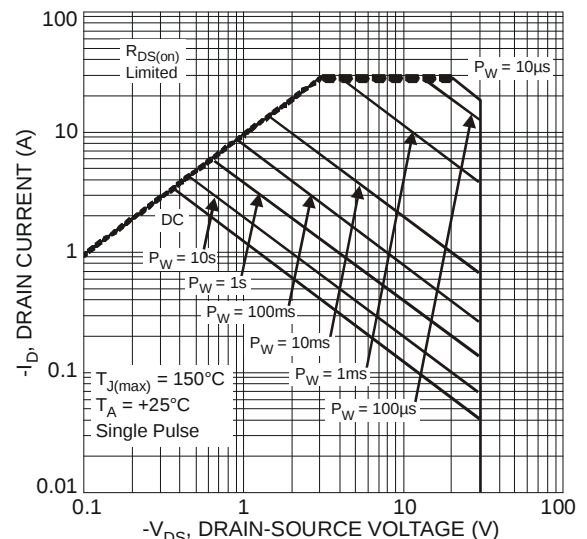
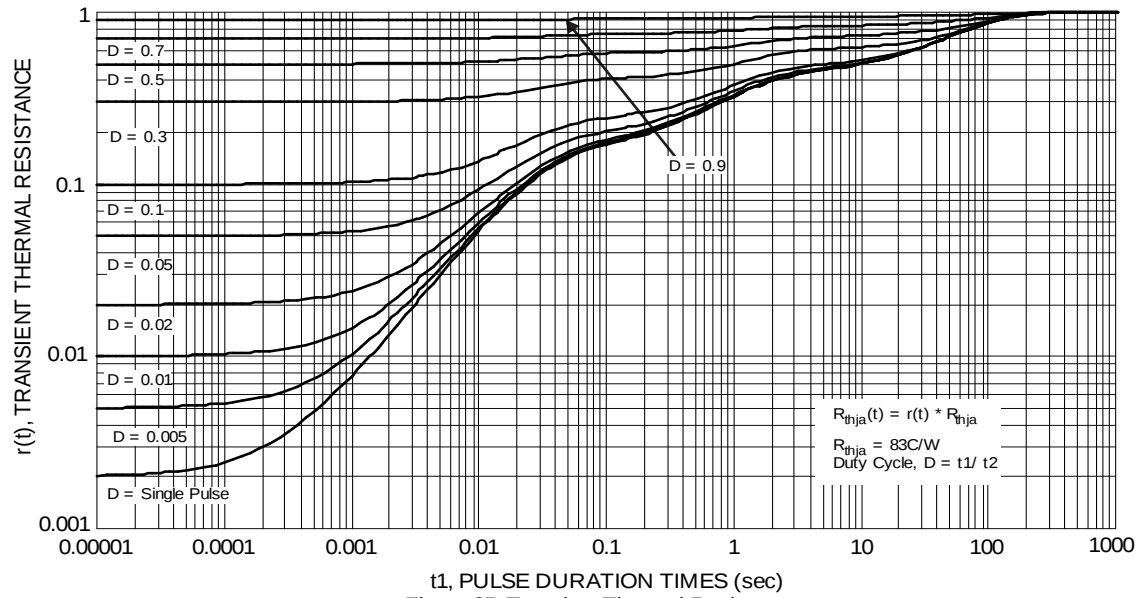


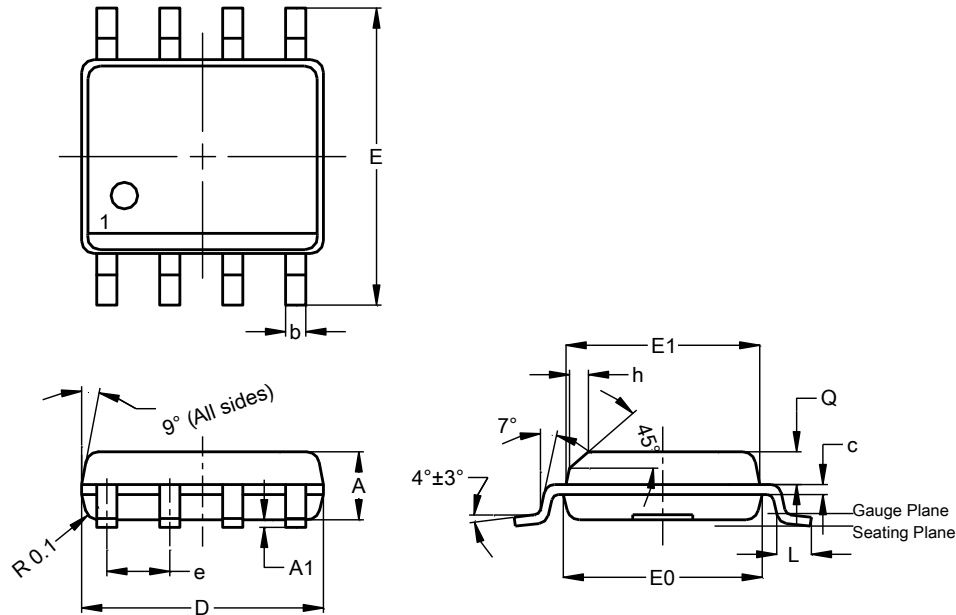
Figure 24. SOA, Safe Operation Area



Package Outline Dimensions

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

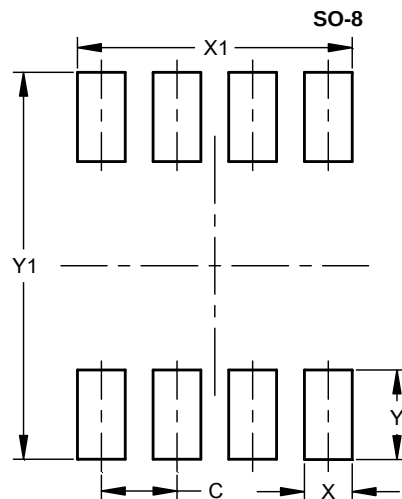
SO-8



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.



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

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