

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)(Typ.)	I_D (A) ^a	Q_g (Typ.)
- 60	0.0075 at $V_{GS} = - 10$ V	- 85	146 nC
	0.0095 at $V_{GS} = - 4.5$ V	- 72	

FEATURES

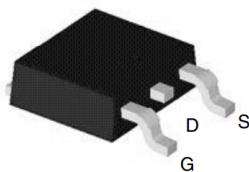
- DT-Trench Power MOSFET
- 100 % Rg and UIS Tested
- AEC-Q101 Qualified for Automotive Applications


RoHS
 COMPLIANT

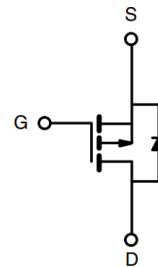
APPLICATIONS

- Load Switch

TO-252 Pin Configuration



Top View



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	I_D	- 85 ^a	A
	$T_C = 70$ °C		- 46.8	
	$T_A = 25$ °C		- 14.3 ^b	
	$T_A = 70$ °C		- 12.1 ^b	
Pulsed Drain Current		I_{DM}	- 310	
Avalanche Current Pulse		I_{AS}	- 85	mJ
Single Pulse Avalanche Energy		E_{AS}	301	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	79 ^a	A
	$T_A = 25$ °C		9.8 ^b	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	134.2 ^a	W
	$T_C = 70$ °C		86.7 ^a	
	$T_A = 25$ °C		6.1 ^b	
	$T_A = 70$ °C		5 ^b	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	Steady State	R_{thJA}	53	60	°C/W
	Steady State	R_{thJC}	0.81	0.9	

Notes:

a. Based on $T_C = 25$ °C.

b. Surface mounted on 1" x 1" FR4 board.

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

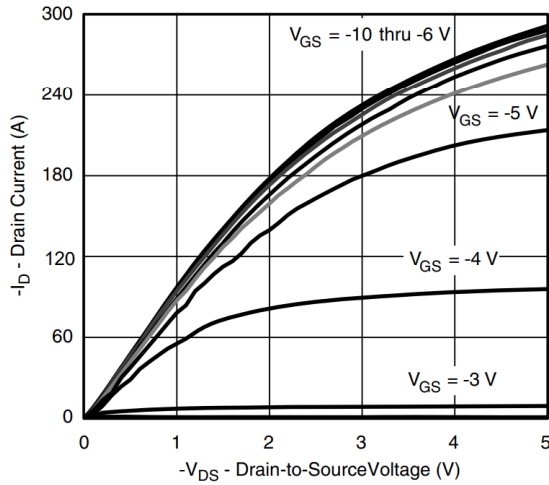
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 60			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T	I _D = - 250 μA		68		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5.2		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 60 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 60 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = - 5 V, V _{GS} = - 10 V	- 280			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 30 A		0.0075	0.0092	Ω
		V _{GS} = - 4.5 V, I _D = - 20 A		0.0095	0.0125	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 50 A	16			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 25 V, V _{GS} = 0 V, f = 1 MHz		8500		pF
Output Capacitance	C _{oss}			490		
Reverse Transfer Capacitance	C _{rss}			295		
Total Gate Charge	Q _g	V _{DS} = - 30 V, V _{GS} = - 10 V, I _D = - 55 A		142	215	nC
Gate-Source Charge	Q _{gs}			16		
Gate-Drain Charge	Q _{gd}			23		
Gate Resistance	R _g	f = 1 MHz		5.2		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 2 V, R _L = 2 Ω I _D ≅ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		70		ns
Rise Time	t _r			205		
Turn-Off Delay Time	t _{d(off)}			405		
Fall Time	t _f			186		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 85	A
Pulse Diode Forward Current ^a	I _{SM}				- 320	
Body Diode Voltage	V _{SD}	I _S = - 30 A		- 1	- 1.5	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 50 A, di/dt = 100 A/μs, T _J = 25 °C		95	188	ns
Body Diode Reverse Recovery Charge	Q _{rr}			59	120	nC
Reverse Recovery Fall Time	t _a			29		ns
Reverse Recovery Rise Time	t _b			16		

Notes:

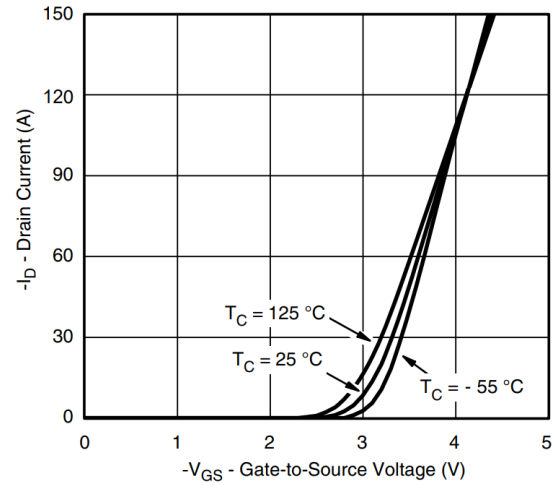
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

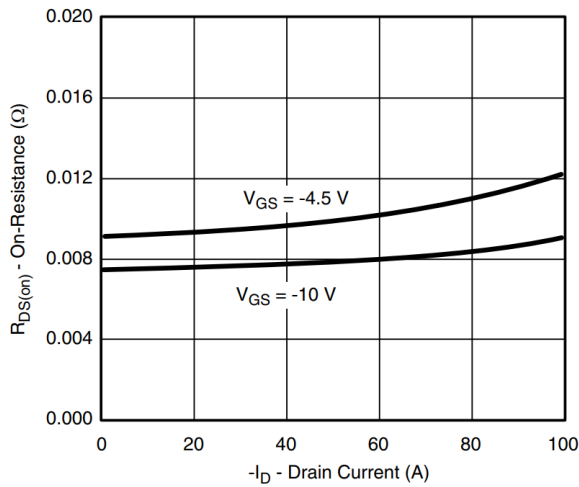
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



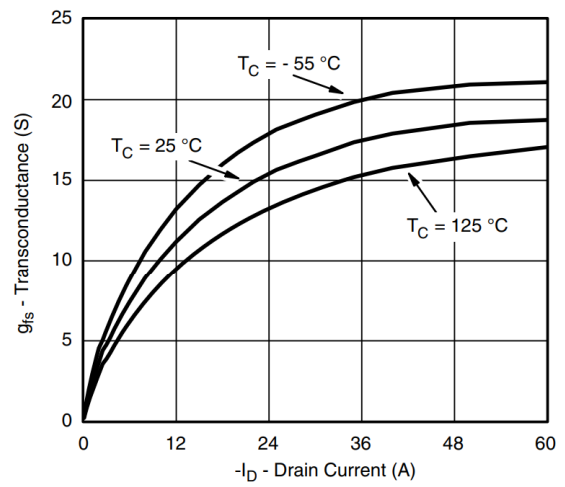
Output Characteristics



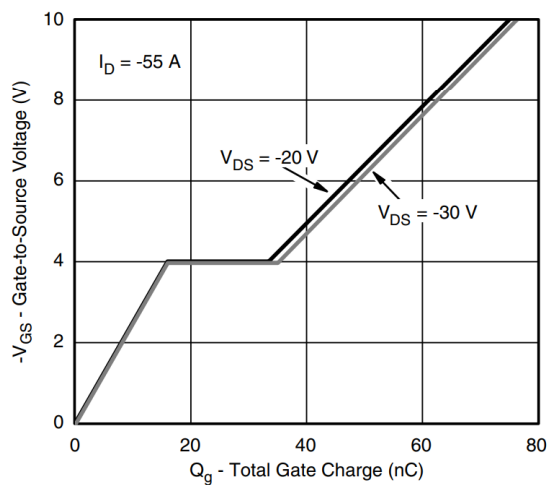
Transfer Characteristics



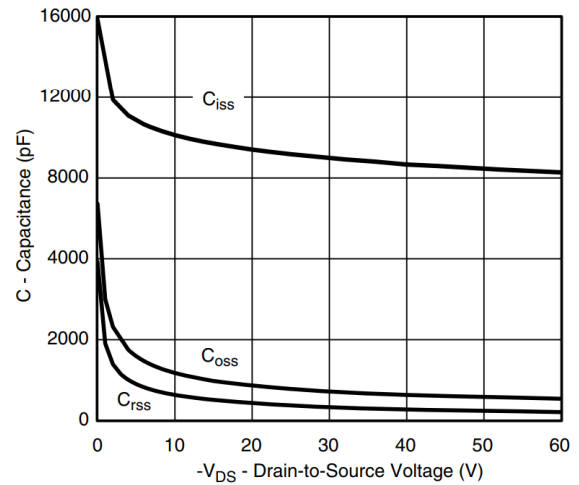
On-Resistance vs. Drain Current



Transconductance

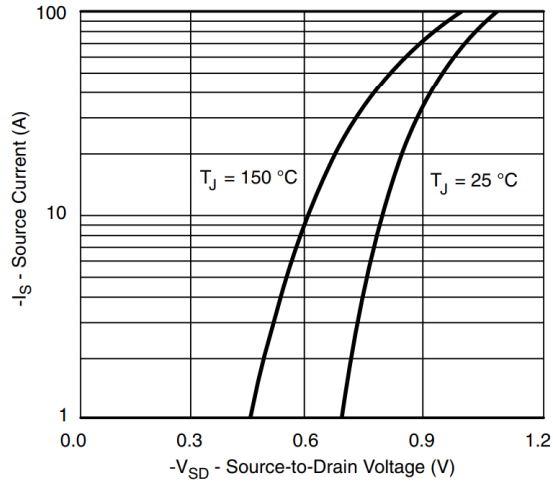


Gate Charge

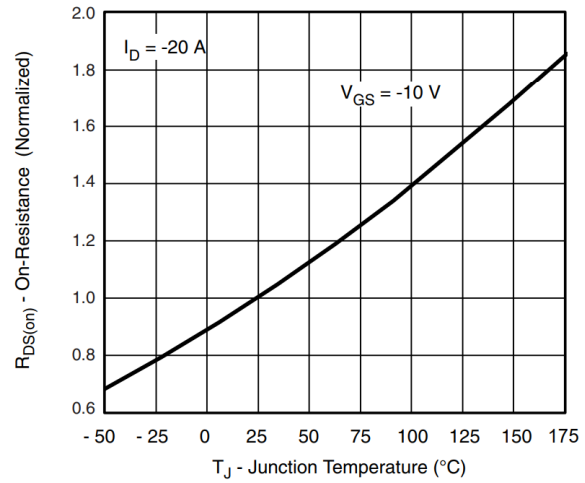


Capacitance

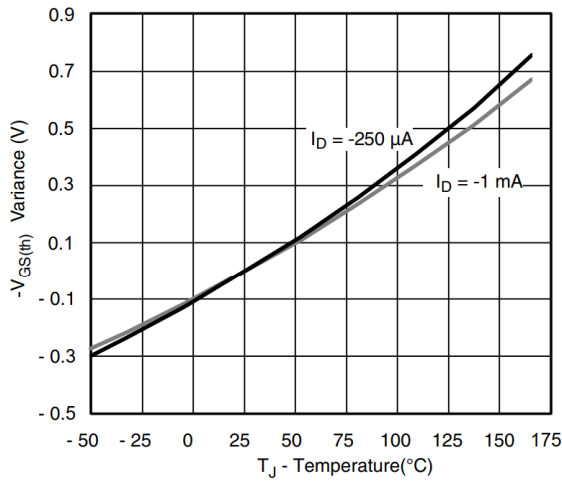
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



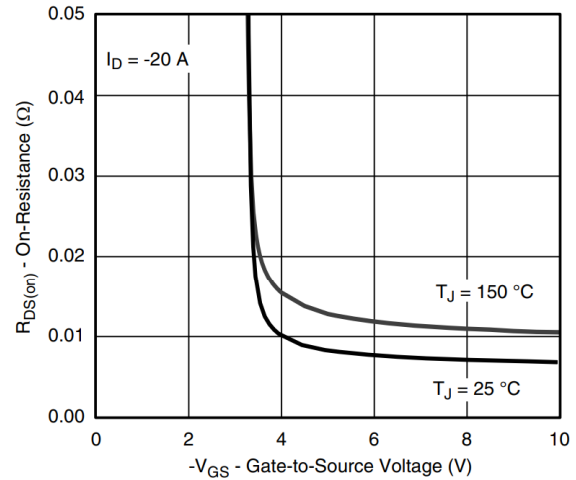
Source-Drain Diode Forward Voltage



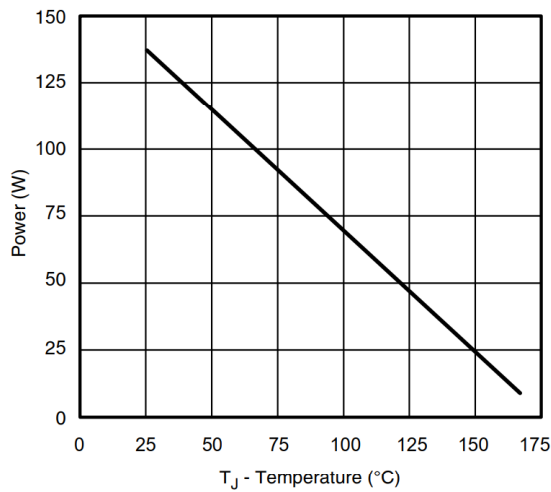
On-Resistance vs. Gate-to-Source Voltage



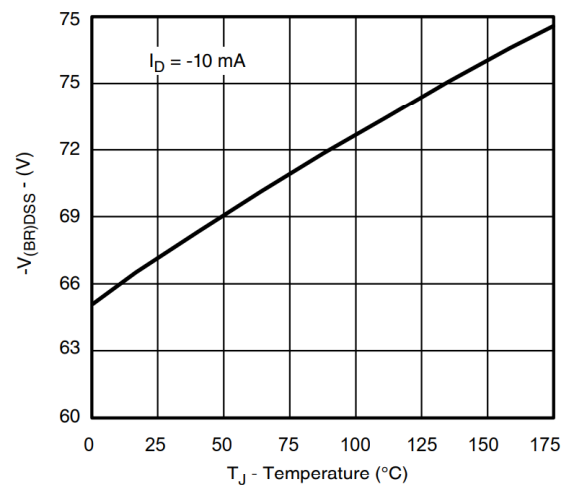
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage

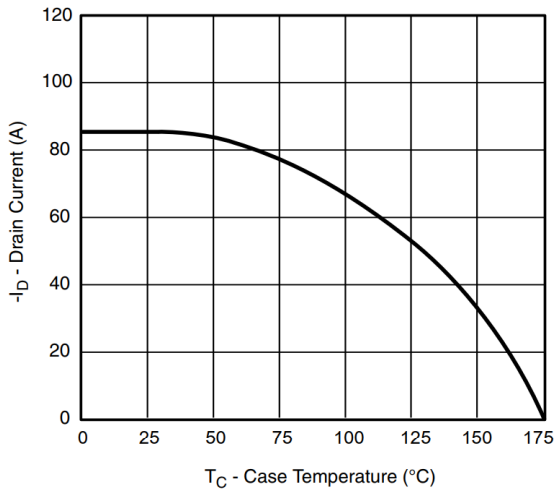


Power Derating, Junction-to-Case

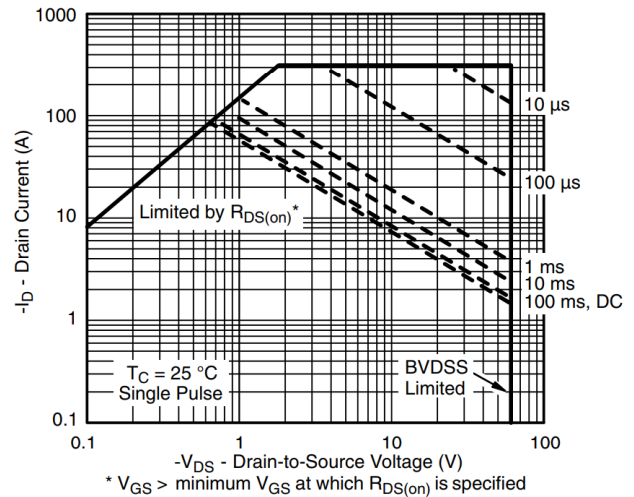


Drain-Source Breakdown Voltage vs. Junction Temperature

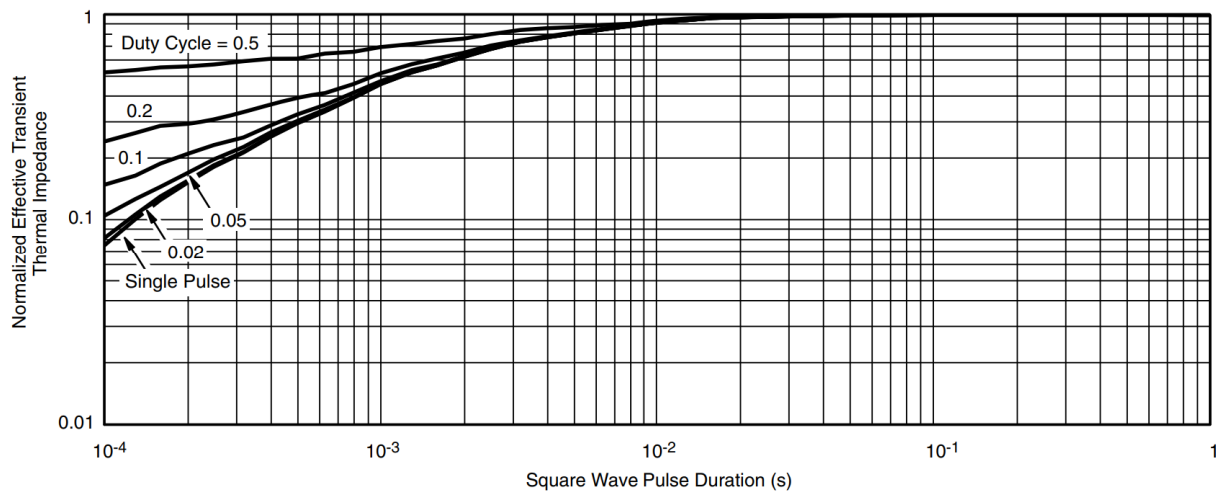
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Max. Drain Current vs. Case Temperature

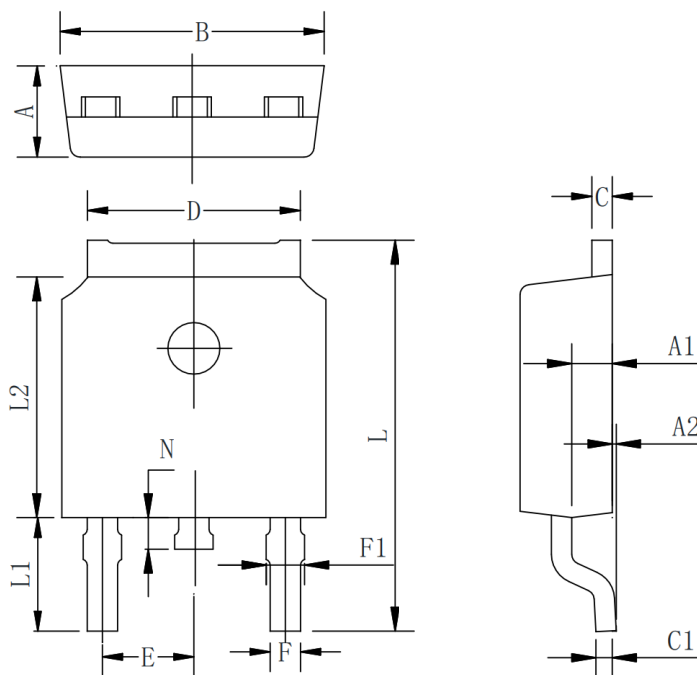


Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Case

TO-252-2L PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	2.10	2.30	2.50
A1	0.88	1.01	1.16
A2	0.00	0.15	0.28
B	6.40	6.60	6.80
C	0.42	0.50	0.63
C1	0.42	0.50	0.63
D	5.08	5.32	5.65
E	2.286 TYP		
F	0.63	0.76	0.89
F1	0.64	0.86	1.08
L	9.30	9.90	10.80
L1	2.4	2.8	3.6
L2	5.90	6.10	6.55
N	0.57	0.80	1.05

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