

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

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ) (Typ.)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
- 60	7.5 at V <sub>GS</sub> = - 10 V	- 85	140 nC
	11 at V <sub>GS</sub> = - 4.5 V		

### FEATURES

- DT-Trench Power MOSFET
- 100 % Rg and UIS Tested

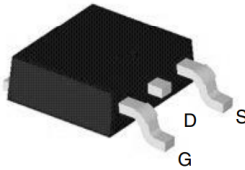
### APPLICATIONS

- Load Switch

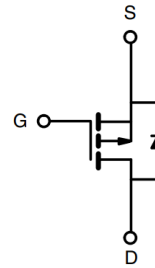


RoHS  
COMPLIANT

TO-252 Pin Configuration



Top View



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 60	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 85 <sup>a</sup>
		T <sub>C</sub> = 70 °C	- 56.8
		T <sub>A</sub> = 25 °C	- 14.3 <sup>b</sup>
		T <sub>A</sub> = 70 °C	- 12.1 <sup>b</sup>
Pulsed Drain Current	I <sub>DM</sub>	- 310	A
Avalanche Current Pulse	I <sub>AS</sub>	- 85	
Single Pulse Avalanche Energy	E <sub>AS</sub>	301	mJ
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	79 <sup>a</sup>
		T <sub>A</sub> = 25 °C	9.8 <sup>b</sup>
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	138.9 <sup>a</sup>
		T <sub>C</sub> = 70 °C	88.9 <sup>a</sup>
		T <sub>A</sub> = 25 °C	6.1 <sup>b</sup>
		T <sub>A</sub> = 70 °C	3.9 <sup>b</sup>
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b</sup>	R <sub>thJA</sub>	15	20.5	°C/W
Maximum Junction-to-Case	R <sub>thJC</sub>	0.81	0.9	

Notes:

a. Based on T<sub>C</sub> = 25 °C.

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

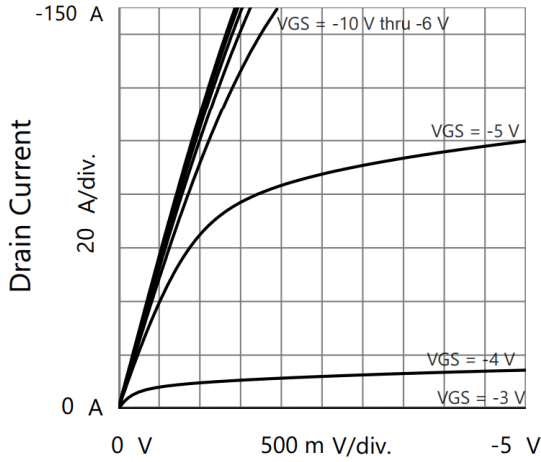
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 60			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T$	$I_D = -250\text{ }\mu\text{A}$		68		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 3	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			- 1	$\mu\text{A}$
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 280			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		7.5	9.2	m $\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		11	14	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -30\text{ A}$	13			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		5050		pF
Output Capacitance	$C_{oss}$			961		
Reverse Transfer Capacitance	$C_{rss}$			102		
Total Gate Charge	$Q_g$	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		140		nC
				65		
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -30\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -30\text{ A}$		15		
Gate-Drain Charge	$Q_{gd}$			21		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		7		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -2\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		70		ns
Rise Time	$t_r$			205		
Turn-Off Delay Time	$t_{d(off)}$			405		
Fall Time	$t_f$			186		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			- 85	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				- 310	
Body Diode Voltage	$V_{SD}$	$I_S = -1\text{ A}$			- 1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -30\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		90	180	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			55	120	nC
Reverse Recovery Fall Time	$t_a$			26		ns
Reverse Recovery Rise Time	$t_b$			14		

Notes:

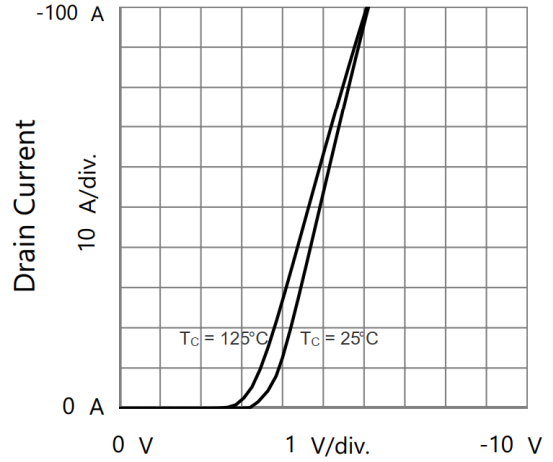
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

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.

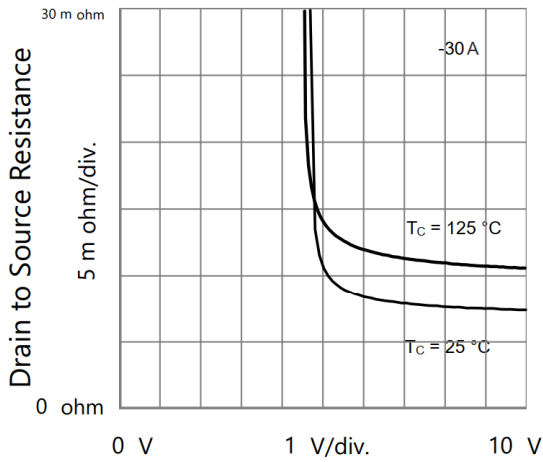
**TYPICAL CHARACTERISTICS** ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



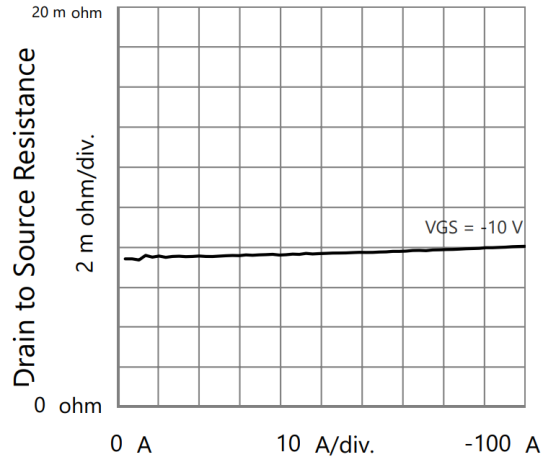
Drain to Source Voltage  
Output Characteristics



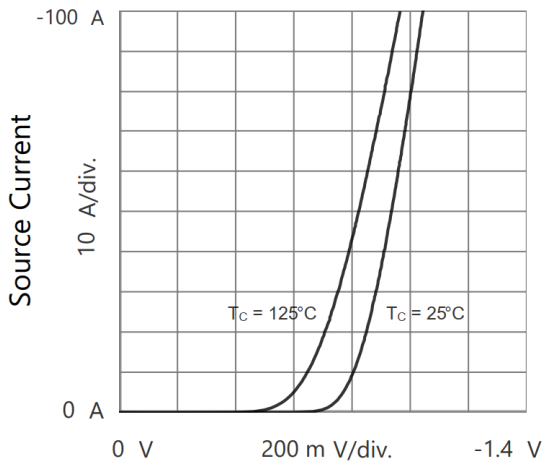
Gate to Source Voltage  
Transfer Characteristics



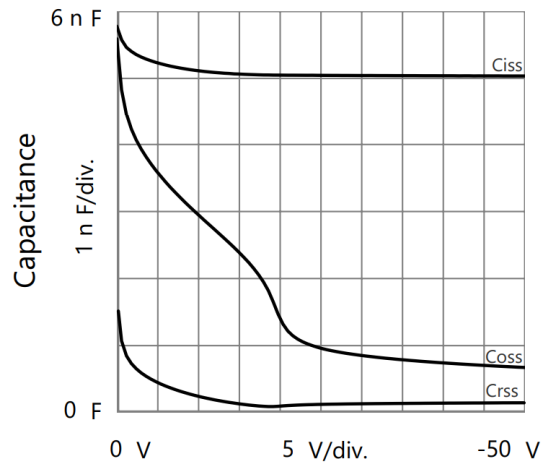
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

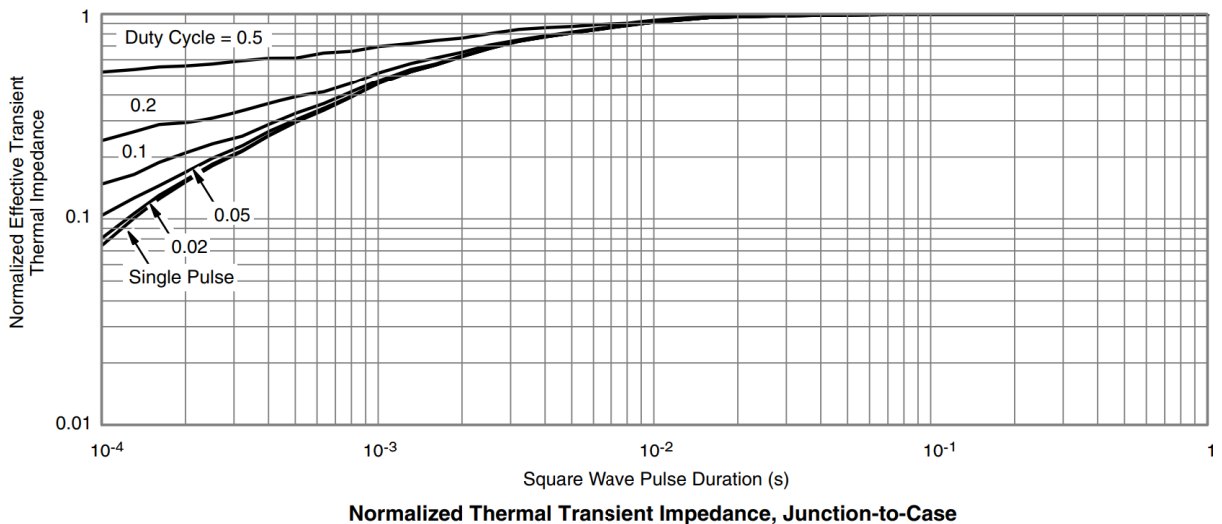
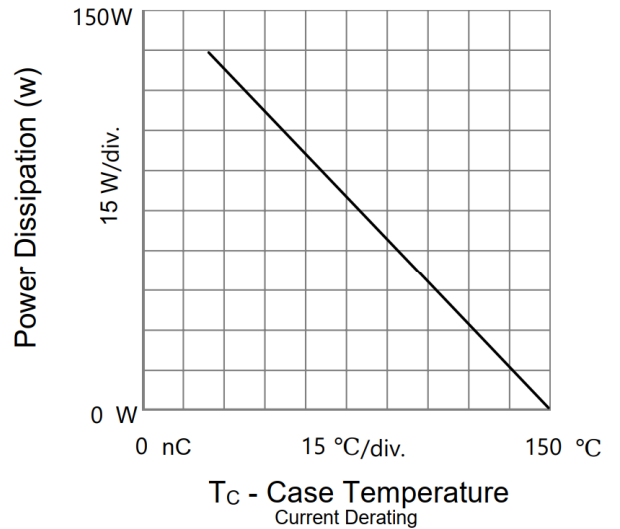
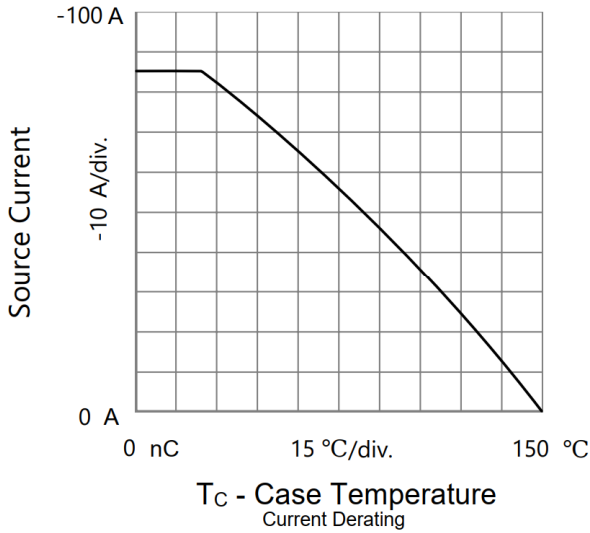
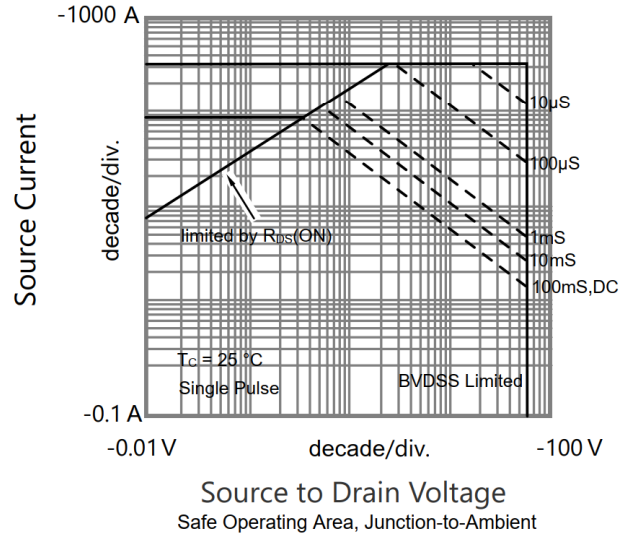
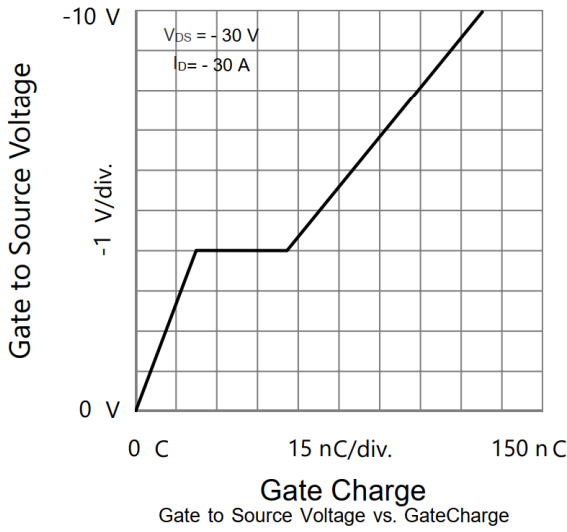


Source to Drain Voltage  
Body Diode Forward Characteristics

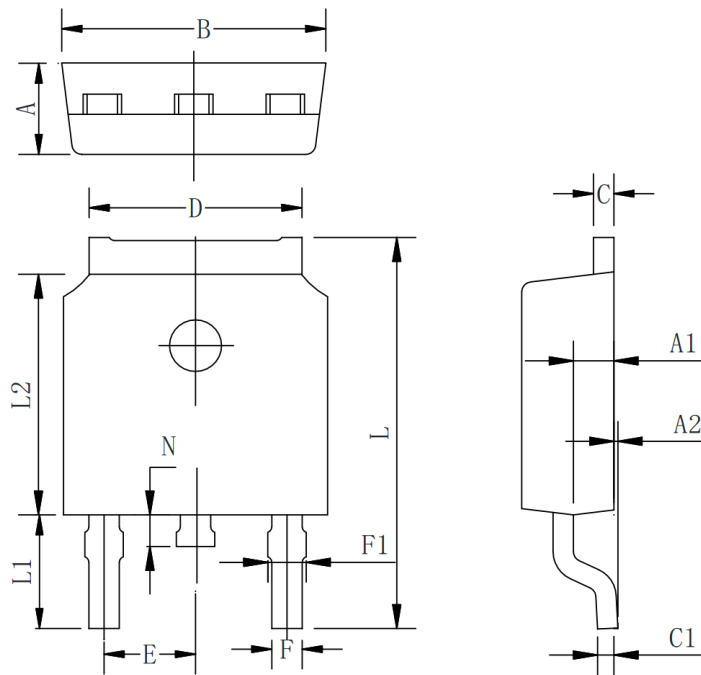


Drain to Source Voltage  
Capacitances

**TYPICAL CHARACTERISTICS** ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



## 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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