

P-Channel 60 V (D-S) 175 °C MOSFET

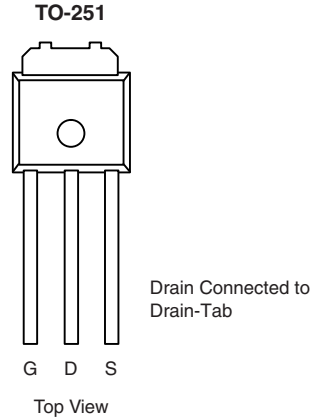
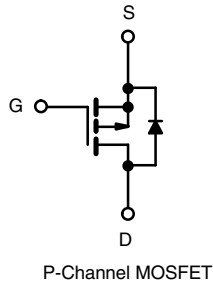
PRODUCT SUMMARY	
V _{DS} (V)	- 60
R _{DS(on)} (Ω) at V _{GS} = - 10 V	0.0135
R _{DS(on)} (Ω) at V _{GS} = - 4.5 V	0.017
I _D (A)	- 50
Configuration	Single

FEATURES

- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS (T _C = 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 ^a	T _C = 25 °C	I _D	- 50	A
	T _C = 125 °C		- 38	
Continuous Source Current (Diode Conduction) ^a		I _S	- 50	
Pulsed Drain Current ^b		I _{DM}	- 200	
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	- 52	
Single Pulse Avalanche Energy		E _{AS}	135	
Maximum Power Dissipation ^b	T _C = 25 °C	P _D	136	W
	T _C = 125 °C		45	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount ^c	R _{thJA}	50	°C/W
Junction-to-Case (Drain)		R _{thJC}	1.1	

Notes

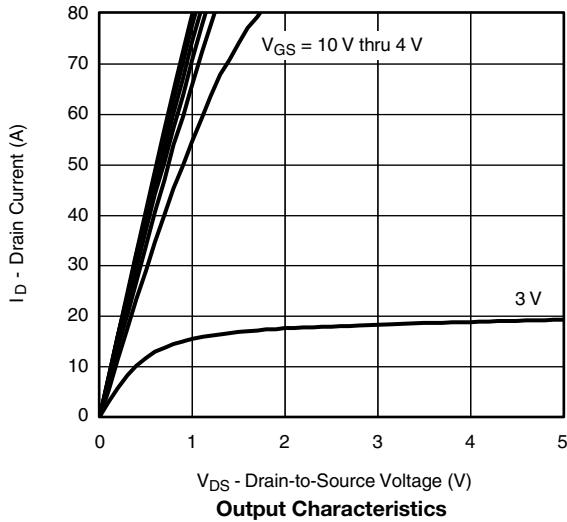
- Package limited.
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$		-60	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$		-1.5	-	-2.5	
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = -60\text{ V}$	-	-	-1	μA
		$V_{GS} = 0\text{ V}$	$V_{DS} = -60\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	-50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -60\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	-150	
On-State Drain Current ^a	$I_{D(on)}$	$V_{GS} = -10\text{ V}$	$V_{DS} \geq -5\text{ V}$	-50	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$	$I_D = -17\text{ A}$	-	0.0135	-	Ω
		$V_{GS} = -10\text{ V}$	$I_D = -50\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	0.026	-	
		$V_{GS} = -10\text{ V}$	$I_D = -50\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	0.032	-	
		$V_{GS} = -4.5\text{ V}$	$I_D = -14\text{ A}$	-	0.017	-	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -17\text{ A}$		-	50	-	S
Dynamic^b							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = -25\text{ V}, f = 1\text{ MHz}$	-	4730	5910	μF
Output Capacitance	C_{oss}			-	485	606	
Reverse Transfer Capacitance	C_{rss}			-	330	410	
Total Gate Charge ^c	Q_g	$V_{GS} = -10\text{ V}$	$V_{DS} = -30\text{ V}, I_D = -50\text{ A}$	-	98	150	nC
Gate-Source Charge ^c	Q_{gs}			-	15	23	
Gate-Drain Charge ^c	Q_{gd}			-	21	32	
Gate Resistance	R_g	f = 1 MHz		1.47	2.9	4.42	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong -50\text{ A}, V_{GEN} = -10\text{ V}, R_g = 6.0\text{ }\Omega$		-	15	18	ns
Rise Time ^c	t_r			-	12	16	
Turn-Off Delay Time ^c	$t_{d(off)}$			-	112	125	
Fall Time ^c	t_f			-	39	48	
Source-Drain Diode Ratings and Characteristics^p							
Pulsed Current ^a	I_{SM}			-	-	-200	A
Forward Voltage	V_{SD}	$I_F = -50\text{ A}, V_{GS} = 0\text{ V}$		-	-0.8	-1.5	V

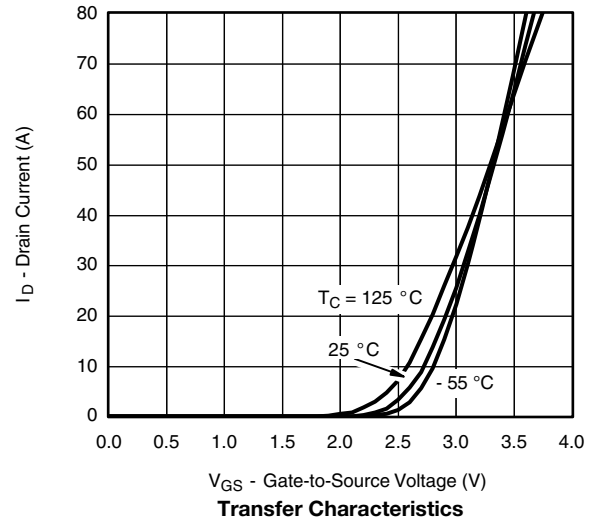
Notes

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

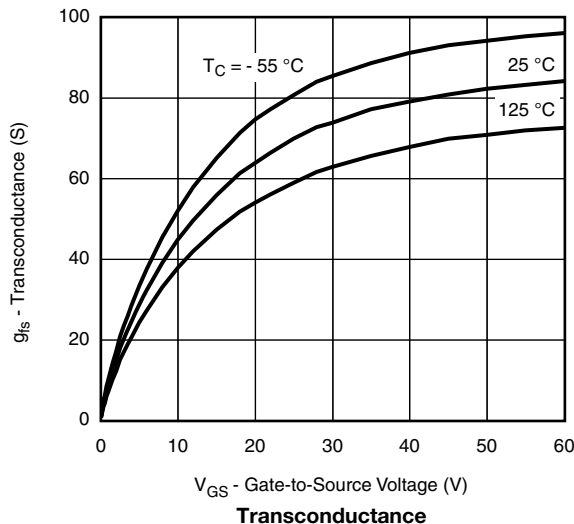
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



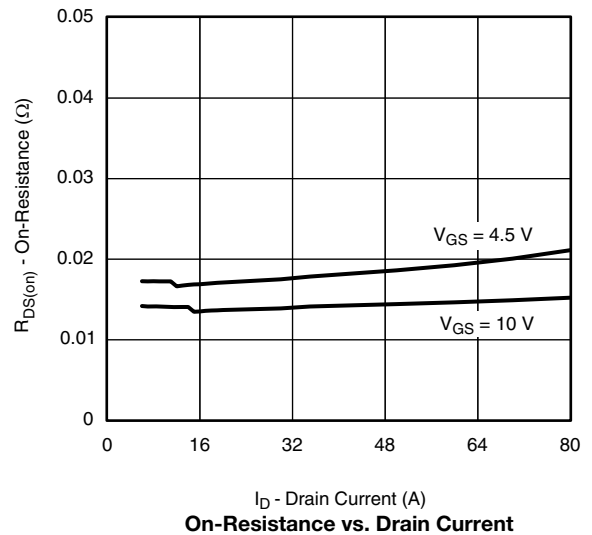
Output Characteristics



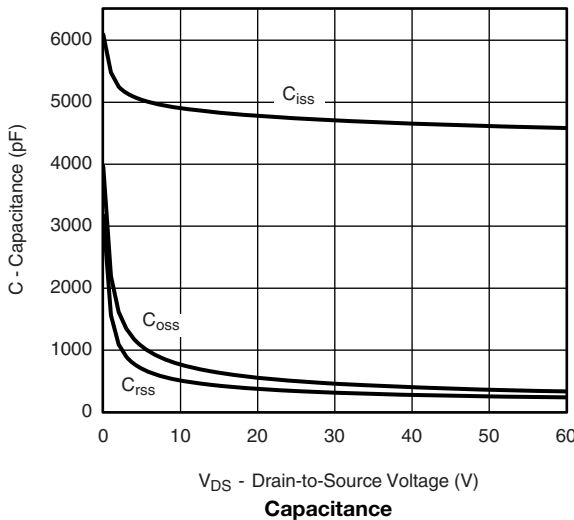
Transfer Characteristics



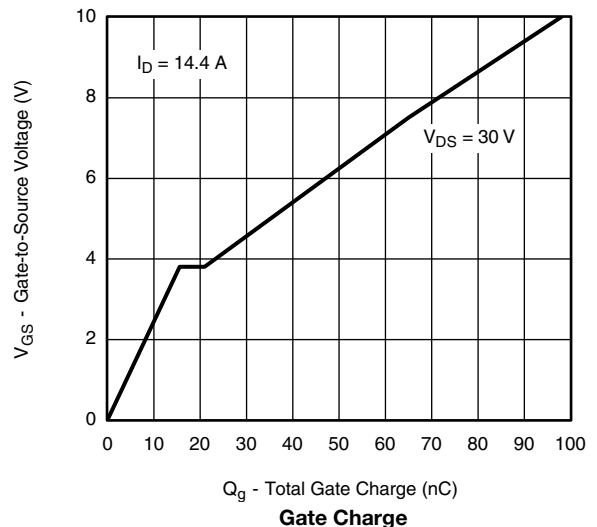
Transconductance



On-Resistance vs. Drain Current

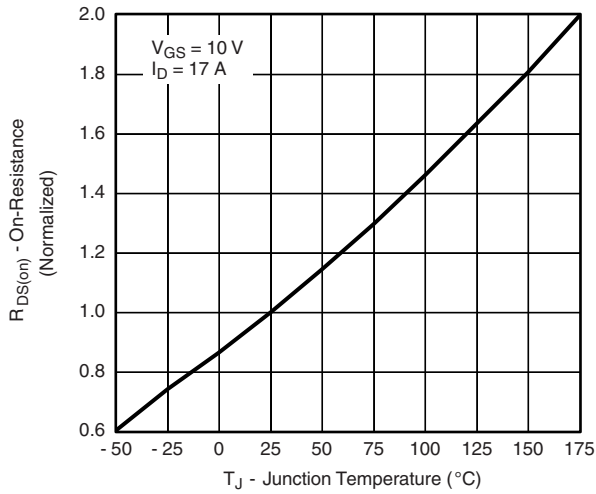


Capacitance

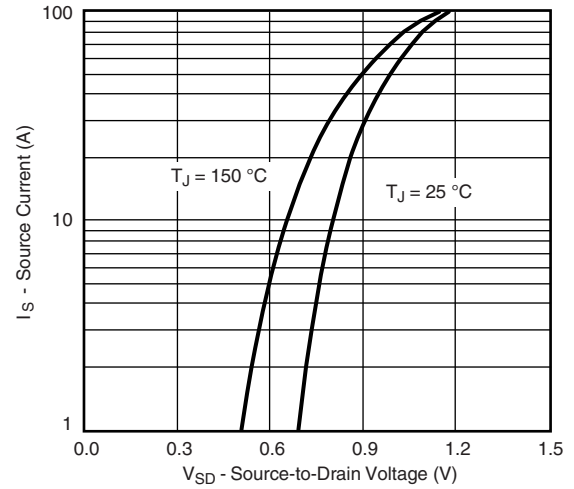


Gate Charge

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

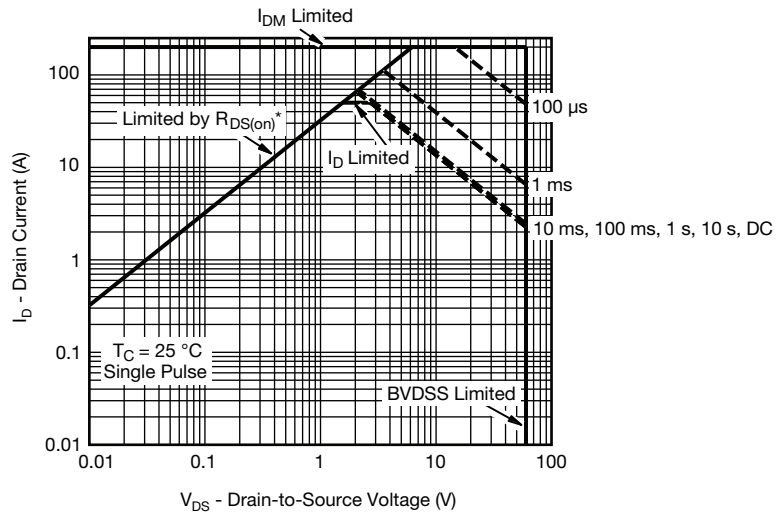


On-Resistance vs. Junction Temperature



Source Drain Diode Forward Voltage

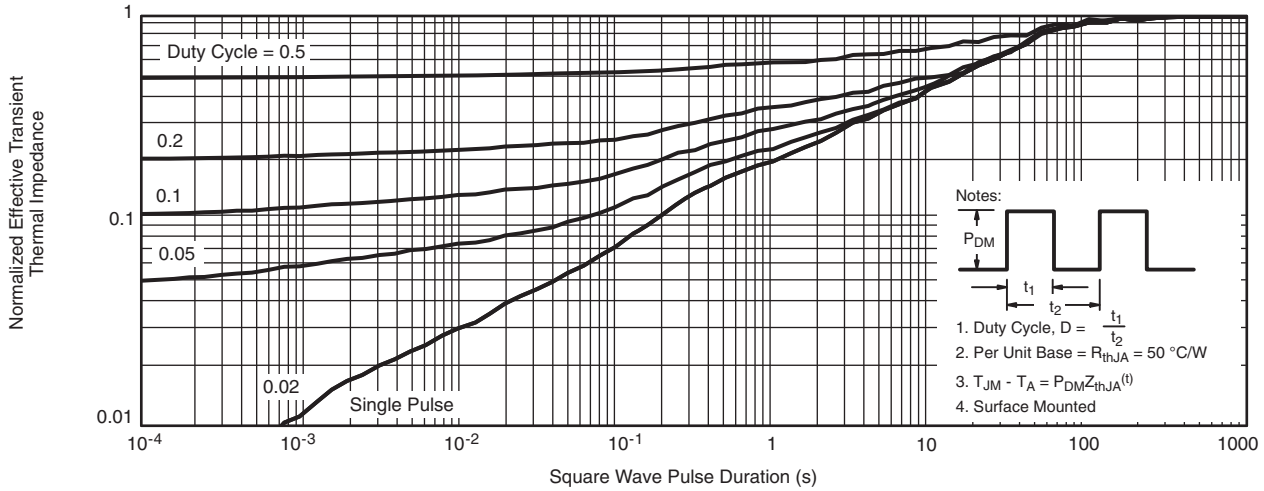
THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



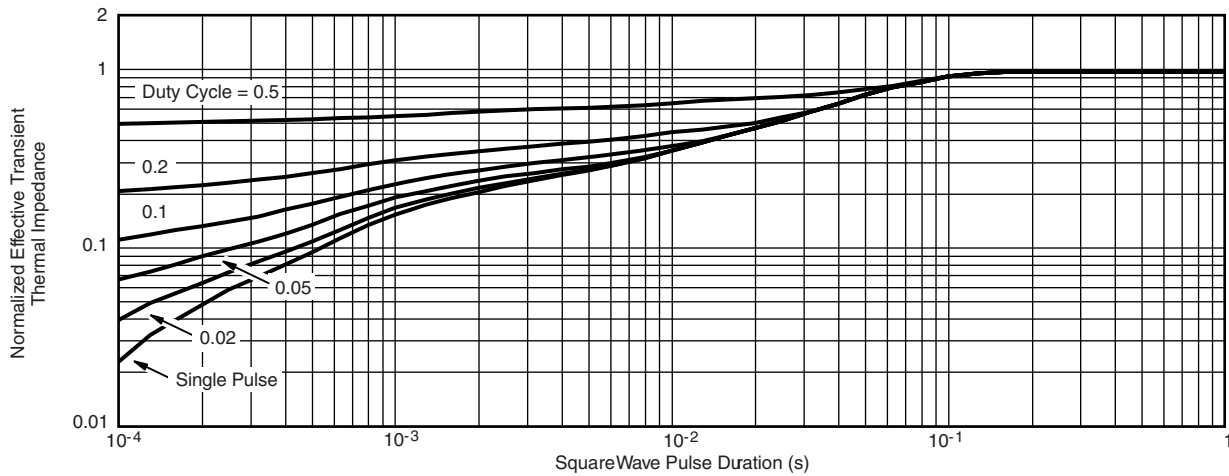
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient

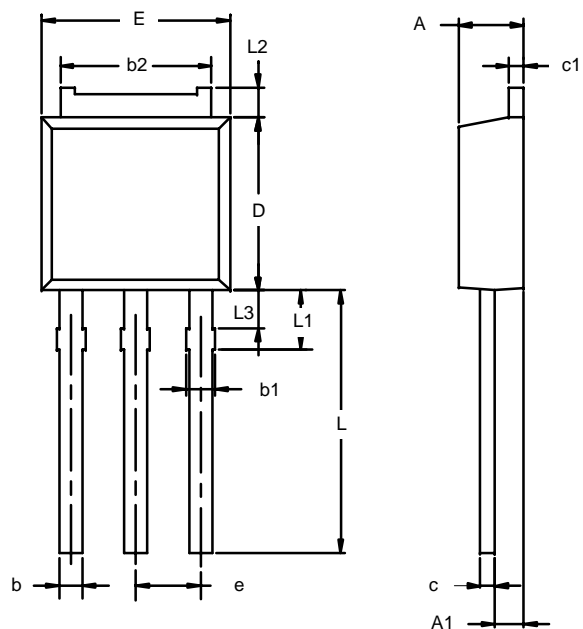


Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^\circ\text{C}$)
 - Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^\circ\text{C}$)
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

TO-251AA



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	3.89	9.53	0.153	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060

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