

P-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ)
- 60	0.053 at $V_{GS} = - 10$ V	- 25	26
	0.062 at $V_{GS} = - 4.5$ V	- 20	

FEATURES

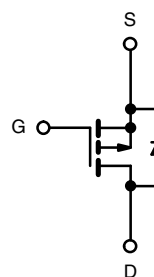
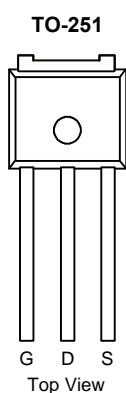
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- High Side Switch for Full Bridge Converter
- DC/DC Converter for LCD Display



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise note)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	- 60	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	- 25	A
		$T_C = 125$ °C	- 20	
Pulsed Drain Current	I_{DM}	- 100		
Avalanche Current, Single Pulse	I_{AS}	- 22		
Repetitive Avalanche Energy, Single Pulse ^a	E_{AS}	24.2	mJ	
Power Dissipation	P_D	$T_C = 25$ °C	38.5 ^c	W
		$T_A = 25$ °C	2.3 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^b	R_{thJA}	$t \leq 10$ s	17	21	°C/W
		Steady State	45	55	
Maximum Junction-to-Case	R_{thJC}	2.7	3.25		

Notes:

- Duty cycle ≤ 1 %.
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.
- Based up on $T_C = 25$ °C.

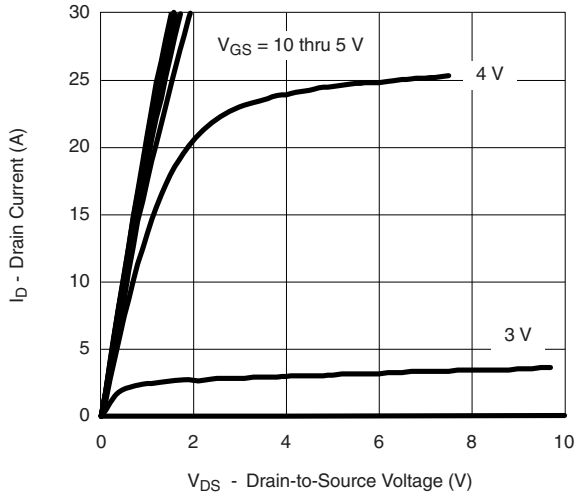
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise note)						
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 3	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			- 50	
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			- 125	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		0.053	0.060	Ω
		$V_{GS} = -10\text{ V}, I_D = -10\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.102	
		$V_{GS} = -10\text{ V}, I_D = -10\text{ A}, T_J = 150\text{ }^\circ\text{C}$			0.120	
		$V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$		0.062	0.070	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -10\text{ A}$		22		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$		1140	1710	pF
Output Capacitance	C_{oss}			130		
Reverse Transfer Capacitance	C_{rss}			90		
Total Gate Charge ^c	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		26	40	nC
Gate-Source Charge ^c	Q_{gs}			4.5		
Gate-Drain Charge ^c	Q_{gd}			7		
Gate Resistance	R_g	$f = 1\text{ MHz}$		7		Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong -19\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\text{ }\Omega$		8	15	ns
Rise Time ^c	t_r			9	15	
Turn-Off Delay Time ^c	$t_{d(off)}$			65	100	
Fall Time ^c	t_f			30	45	
Drain-Source Body Diode and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) ^b						
Continuous Current	I_S				- 30	A
Pulsed Current	I_{SM}				- 30	
Forward Voltage ^a	V_{SD}	$I_F = -19\text{ A}, V_{GS} = 0\text{ V}$		- 1	- 1.5	V
Reverse Recovery Time	t_{rr}	$I_F = -19\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		41	61	ns

Notes:

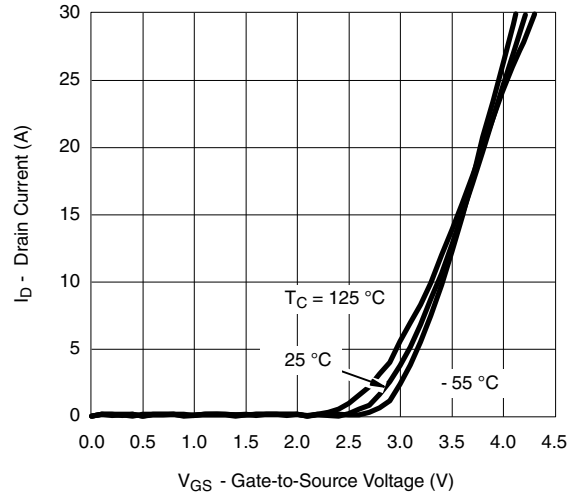
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

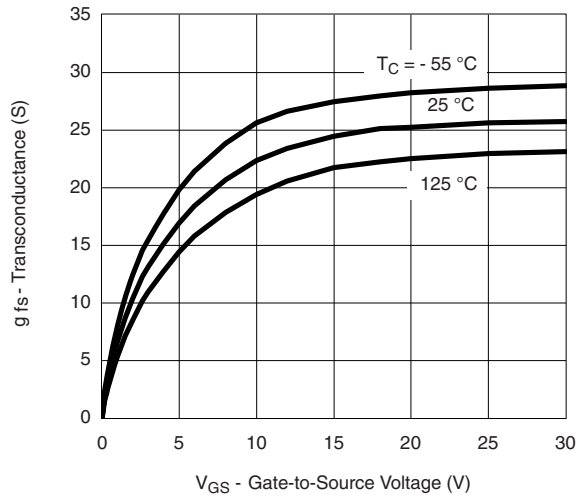
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



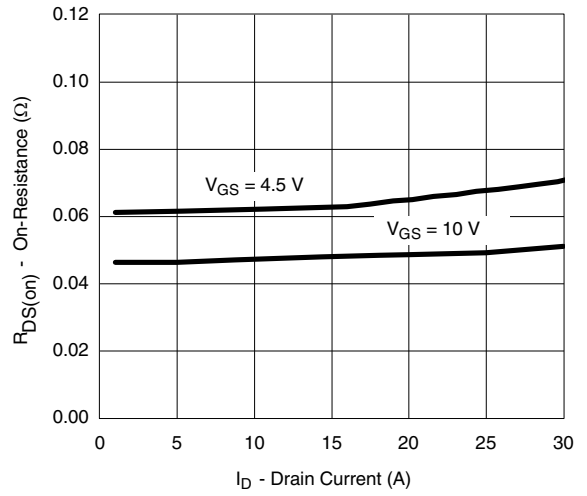
Output Characteristics



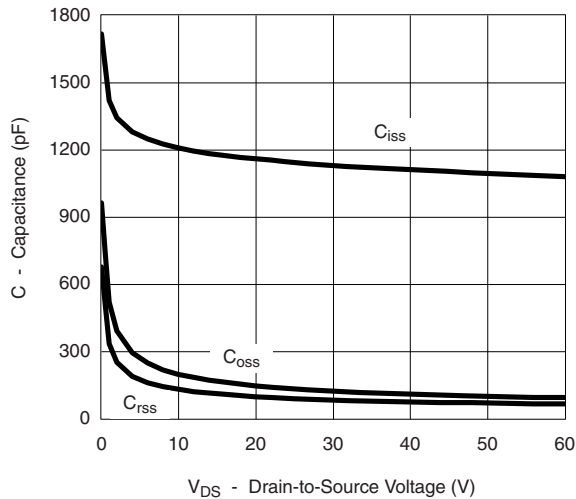
Transfer Characteristics



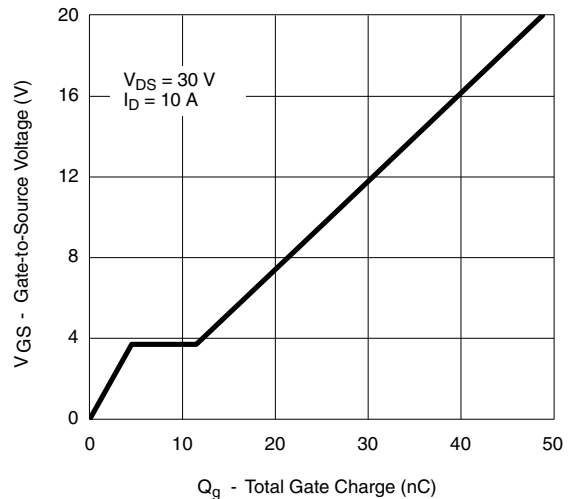
Transconductance



On-Resistance vs. Drain Current

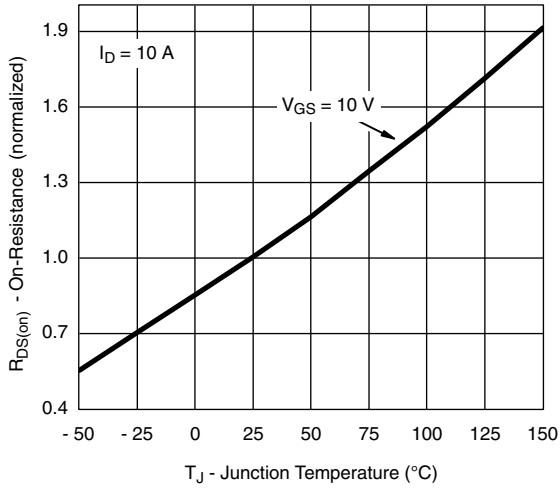


Capacitance

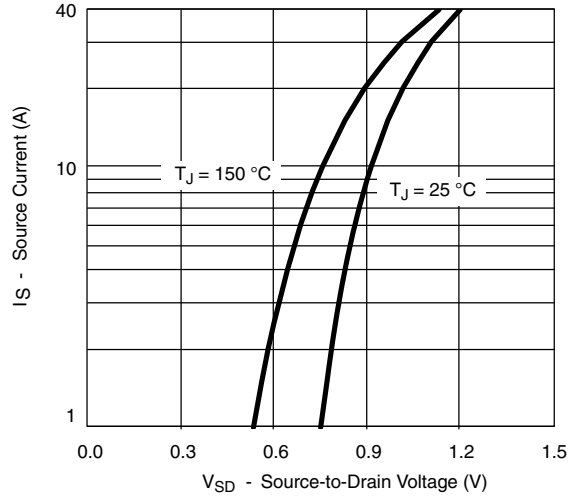


Gate Charge

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

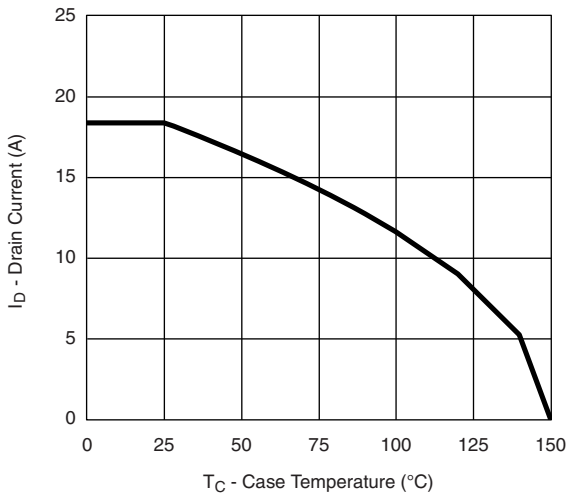


On-Resistance vs. Junction Temperature

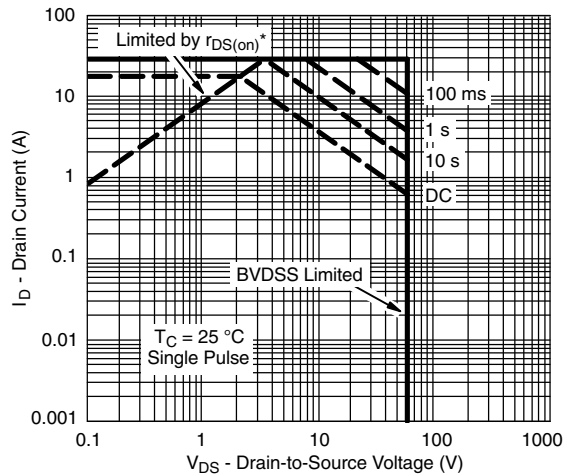


Source-Drain Diode Forward Voltage

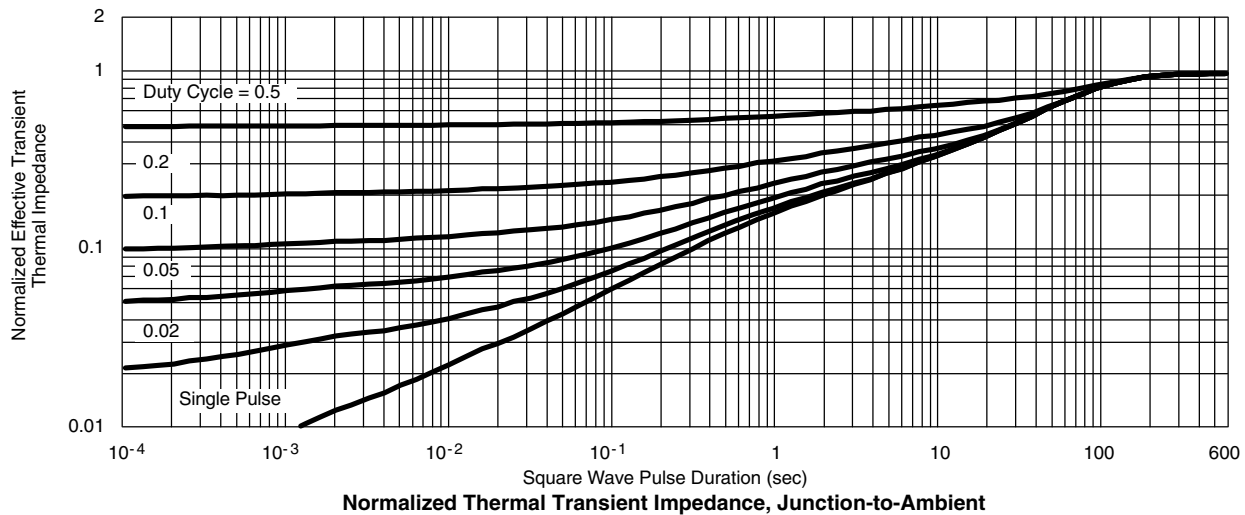
THERMAL RATINGS



Maximum Drain Current vs. Case Temperature

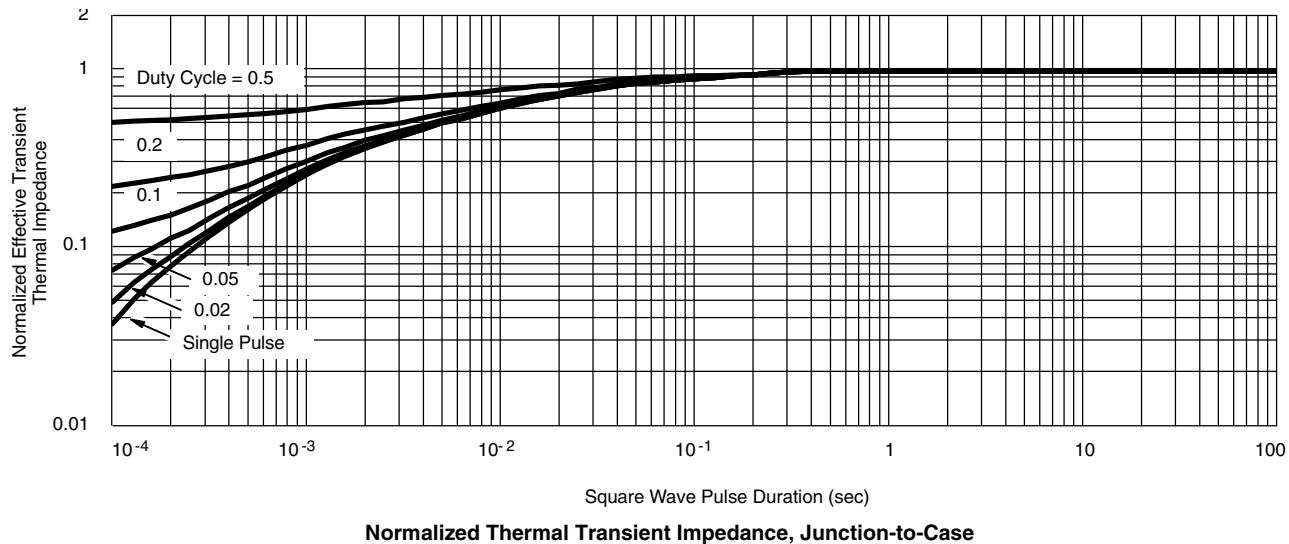


Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified

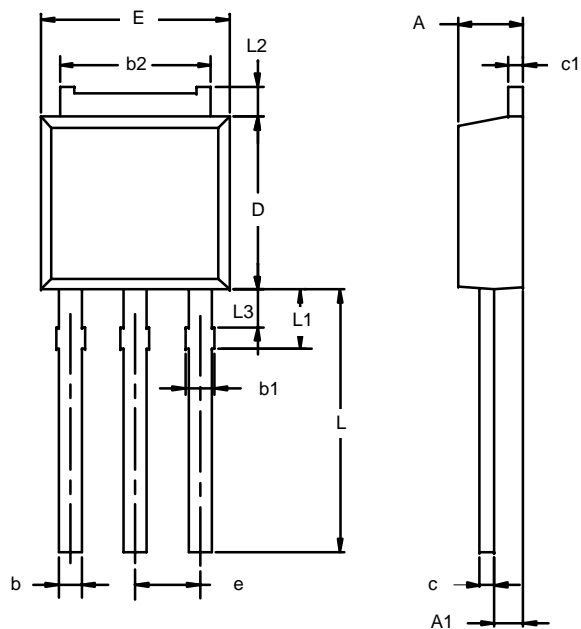


Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS



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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DWG: 5346

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