

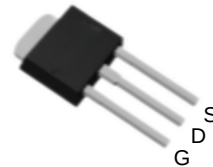
Features

- 60V/20A,
 $R_{DS(ON)} = 24m\Omega$ (typ.) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 28m\Omega$ (typ.) @ $V_{GS} = 5V$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)
- 100% UIS + R_g Tested

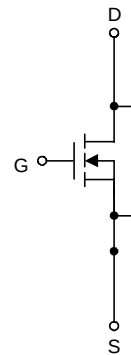
Applications

- Switching Application for Actuator.
- Converter Application in LED TV.
- Switching Application in Industry.

Pin Configuration



Top View of TO-251



N-Channel MOSFET

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V _{DSS}	Drain-Source Voltage		60	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		175	°C
T _{STG}	Storage Temperature Range		-55 to 175	°C
I _S	Diode Continuous Forward Current	T _C =25°C	20	A
I _{DP}	Pulse Drain Current Tested	T _C =25°C	96	A
		T _C =100°C	68	
I _D	Continuous Drain Current	T _C =25°C	20	A
		T _C =100°C	8	
P _D	Maximum Power Dissipation	T _C =25°C	60	W
		T _C =100°C	30	
R _{θJC}	Thermal Resistance-Junction to Case		2.5	°C/W
R _{θJA}	Thermal Resistance-Junction to Ambient		50	°C/W
E _{AS}	Drain-Source Avalanche Energy	L=0.5mH	22	mJ

Electrical Characteristics (T_A = 25°C unless otherwise noted)

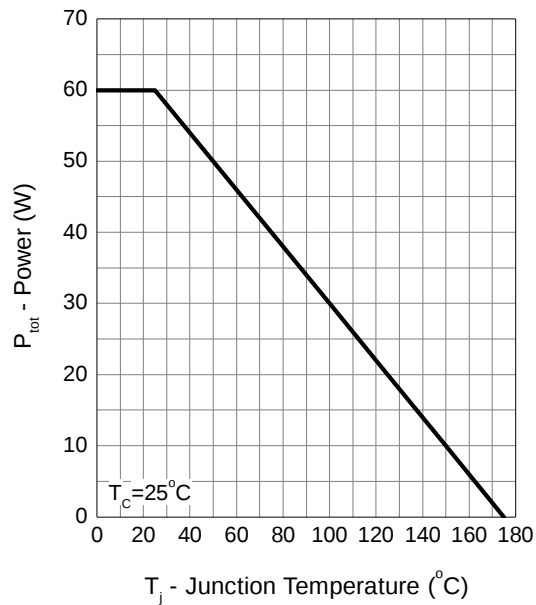
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V T _J =125°C	-	-	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	2	3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±16V, V _{DS} =0V	-	-	±10	μA
R _{DS(ON)} ^a	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =12A V _{GS} =5V, I _{DS} =11A	-	24 28	30 35	mΩ
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} =12A, V _{GS} =0V	-	0.8	1.3	V
t _{rr}	Reverse Recovery Time	I _{DS} =12A, dI _{SD} /dt=100A/μs	-	30	-	ns
Q _{rr}	Reverse Recovery Charge		-	35	-	nC
Dynamic Characteristics ^b						
C _{iSS}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Frequency=1.0MHz	-	530	-	pF
C _{oSS}	Output Capacitance		-	85	-	
C _{rSS}	Reverse Transfer Capacitance		-	40	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	8	15	ns
T _r	Turn-on Rise Time		-	8	15	
t _{d(OFF)}	Turn-off Delay Time		-	28	51	
T _f	Turn-off Fall Time		-	22	41	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _{DS} =12A	-	12	17	nC
Q _{gs}	Gate-Source Charge		-	3	-	
Q _{gd}	Gate-Drain Charge		-	3	-	

Note a : Pulse test ; pulse width≤300μs, duty cycle≤2%.

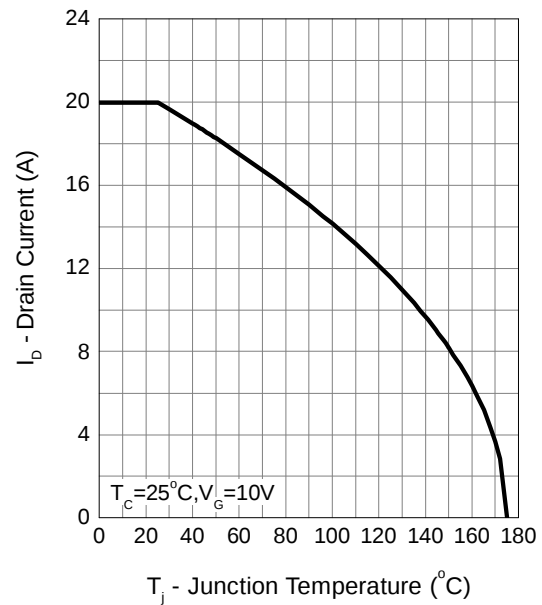
Note b : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

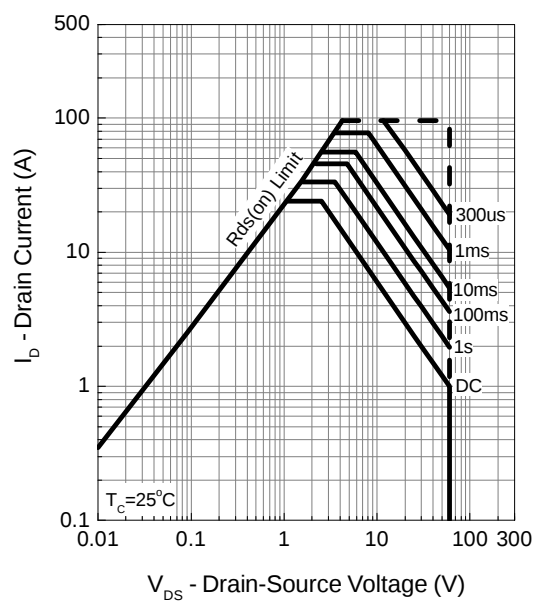
Power Dissipation



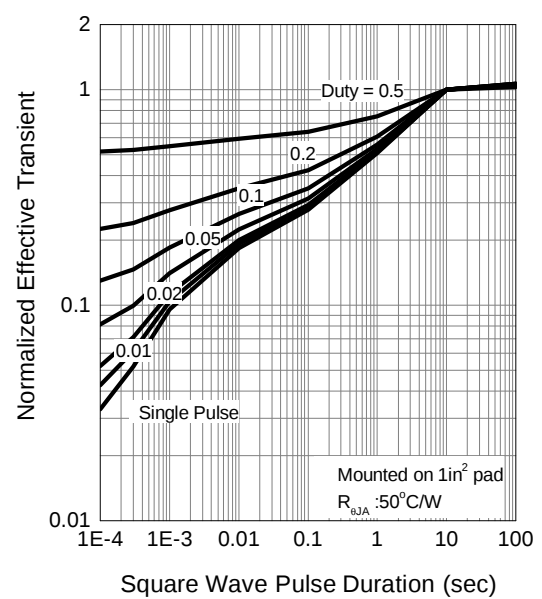
Drain Current



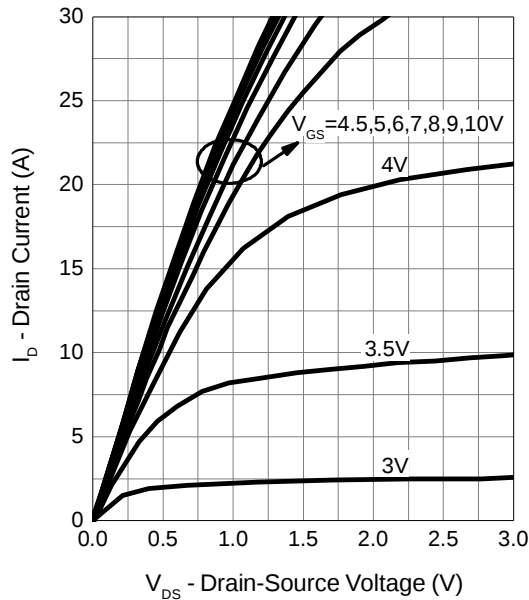
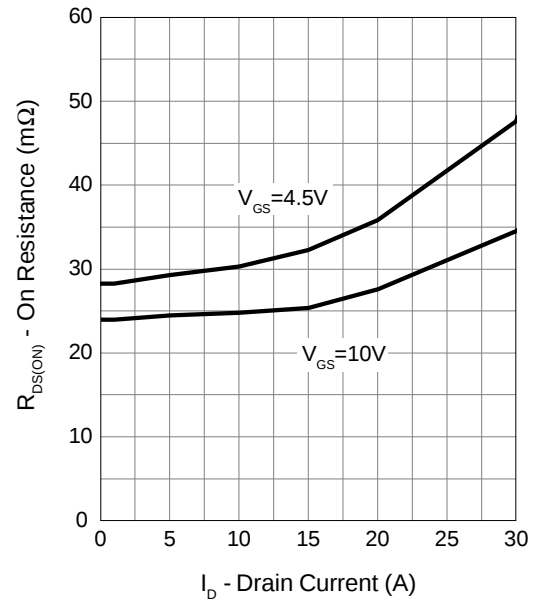
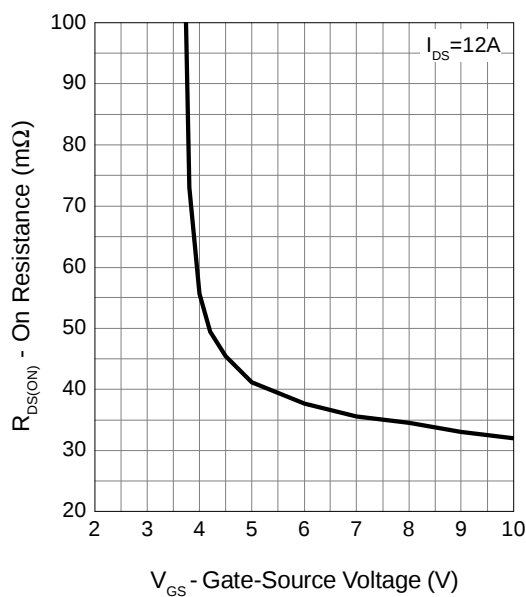
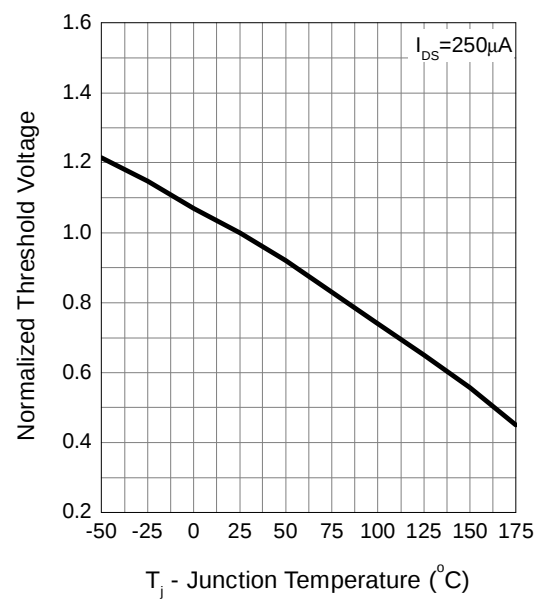
Safe Operation Area



Thermal Transient Impedance

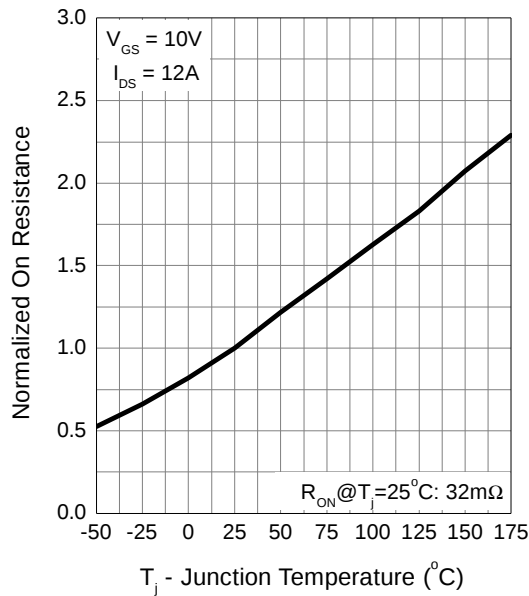


Typical Operating Characteristics (Cont.)

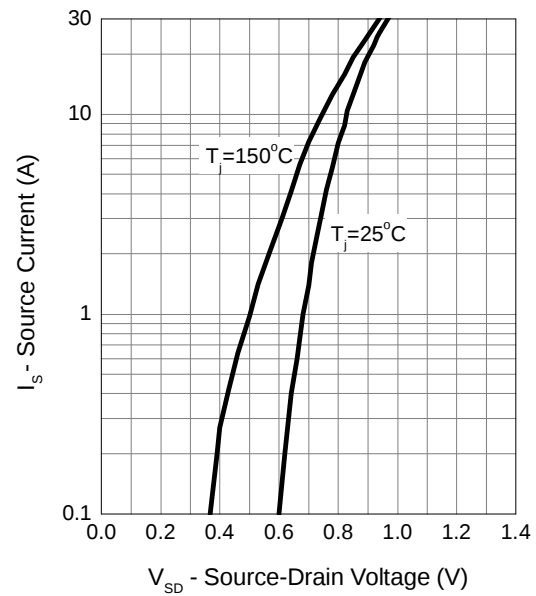
Output Characteristics

Drain-Source On Resistance

Gate-Source On Resistance

Gate Threshold Voltage


Typical Operating Characteristics (Cont.)

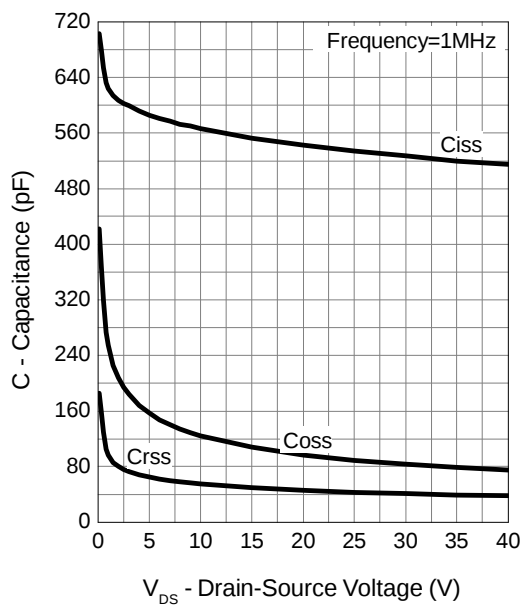
Drain-Source On Resistance



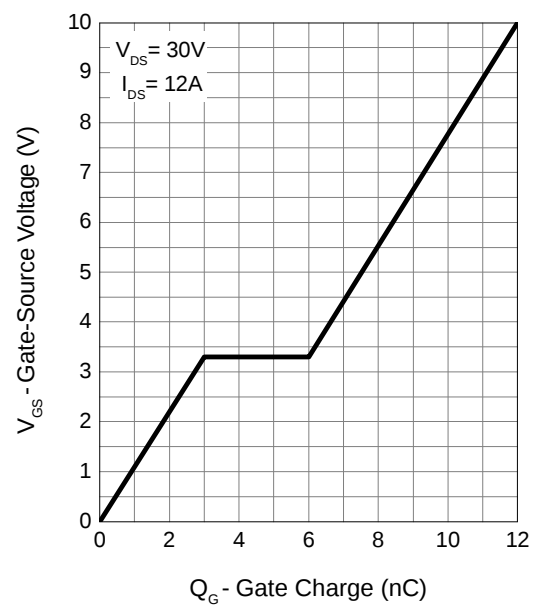
Source-Drain Diode Forward



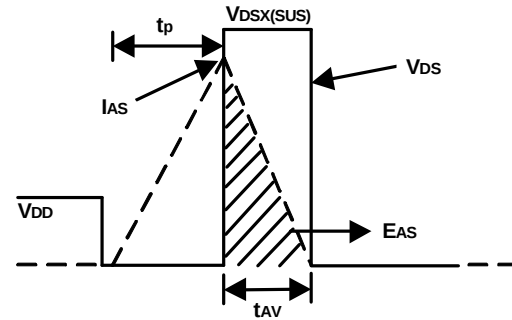
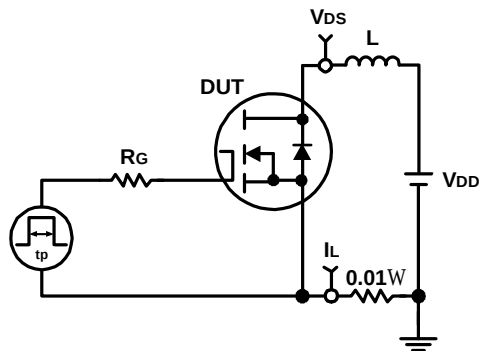
Capacitance



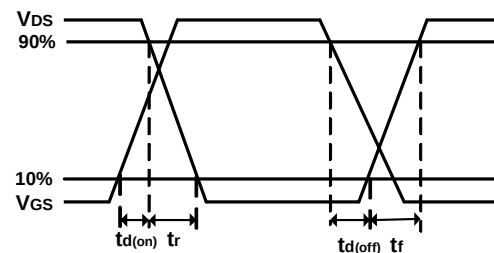
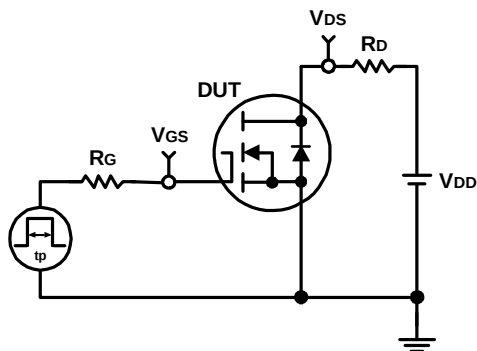
Gate Charge



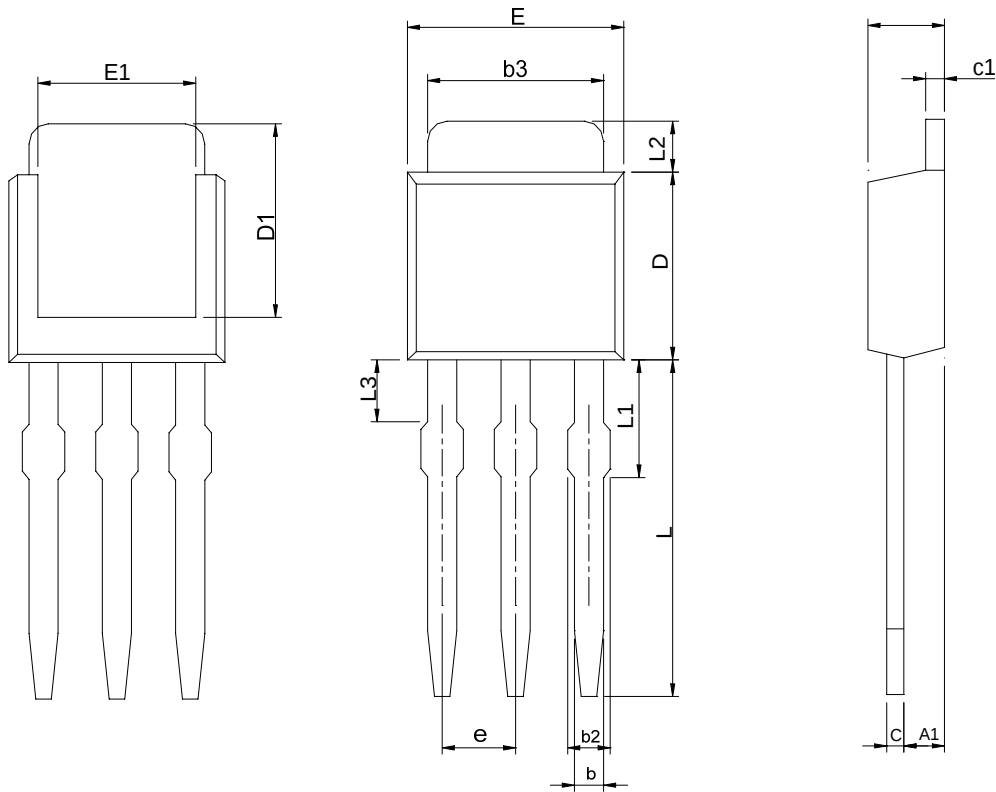
Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms

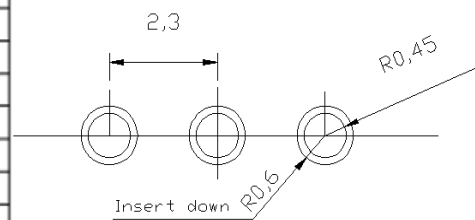


Package Information



SYMBOL	TO-251			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.184	2.388	0.086	0.094
A1	0.890	1.143	0.035	0.045
b	0.635	0.890	0.025	0.035
b2	0.910	1.143	0.036	0.045
b3	4.953	5.460	0.195	0.215
c	0.457	0.610	0.018	0.024
c1	0.457	0.890	0.018	0.035
D	5.334	6.223	0.210	0.245
D1	5.207	-	0.205	-
E	6.350	6.730	0.250	0.265
E1	4.320	-	0.170	-
e	2.29 BSC		0.090 BSC	
L	7.000	9.650	0.280	0.380
L1	1.905	2.290	0.075	0.090
L2	0.890	1.270	0.035	0.050
L3	1.143	1.520	0.045	0.060

RECOMMENDED LAND PATTERN



UNIT: mm