Lonten N-channel 500V, 13A Power MOSFET

Description

The Power MOSFET is fabricated using the advanced planar VDMOS technology. The resulting device has low conduction resistance, superior switching performance and high avalanche energy.

Features

- Low $R_{DS(on)}$
- Low gate charge (typ. Q_g =33 nC)
- 100% UIS tested
- RoHS compliant

Applications

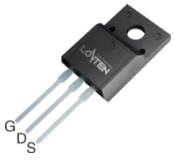
- Electronic ballast
- Switched mode power supplies.
- UPS.

Product Summary

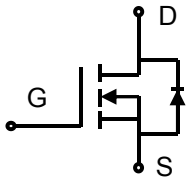
V_{DSS}	500V
I_D	13A
$R_{DS(on),max}$	0.46Ω
$Q_{g,typ}$	33 nC

Pin Configuration

TO-220



TO-220F



N-Channel MOSFET

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	500	V
Continuous drain current (T_C = 25°C)	I_D	13	A
(T_C = 100°C)		8	A
Pulsed drain current [1]	I_{DM}	52	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	845	mJ
Power Dissipation TO-220F (T_C = 25°C)	P_D	34	W
Power Dissipation TO-220 (T_C = 25°C)		212	W
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	13	A
Diode pulse current	$I_{S,pulse}$	52	A

Thermal Characteristics

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Thermal resistance, Junction-to-case	$R_{\theta JC}$	3.6	0.59	°C/W
Thermal resistance, Junction-to-ambient [3]	$R_{\theta JA}$	62.5	62.5	°C/W

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Tube
LNC13N50	TO-220	LNC13N50	50
LND13N50	TO-220F	LND13N50	50

Electrical Characteristics

T_c = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=0.25 mA	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25 mA	2	-	4	V
Drain cut-off current	I_{DSS}	V_{DS}=500 V, V_{GS}=0 V, T_j = 25°C T_j = 125°C	 - -	-	 1 100	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30 V, V_{DS}=0 V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30 V, V_{DS}=0 V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=6.5 A	-	0.37	0.46	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	-	1960	-	pF
Output capacitance	C_{oss}		-	185	-	
Reverse transfer capacitance	C_{rss}		-	3	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 250 V, I_D = 13 A R_G = 10 Ω, V_{GS}=15 V	-	13	-	ns
Rise time	t_r		-	36	-	
Turn-off delay time	$t_{d(off)}$		-	62	-	
Fall time	t_f		-	13	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=400 V, I_D=13 A, V_{GS}=0 to 10 V	-	8.5	-	nC
Gate to drain charge	Q_{gd}		-	10.3	-	
Gate charge total	Q_g		-	33	-	
Gate plateau voltage	$V_{plateau}$		-	5	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=13 A	-	-	1.3	V
Reverse recovery time	t_{rr}	V_R=250 V, I_F=13 A, dI_F/dt=100 A/μs	-	305	-	ns
Reverse recovery charge	Q_{rr}		-	3.4	-	μC
Peak reverse recovery current	I_{rrm}		-	22	-	A

Notes:

1. Pulse width limited by maximum junction temperature.

2. L=10mH, I_{AS} = 13A, Starting T_j= 25°C.

3: The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

Electrical Characteristics Diagrams

Figure 1. Typical Output Characteristics

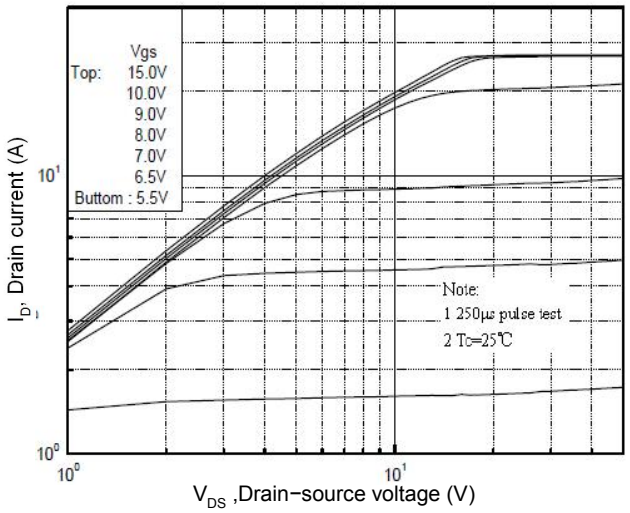


Figure 2. Transfer Characteristics

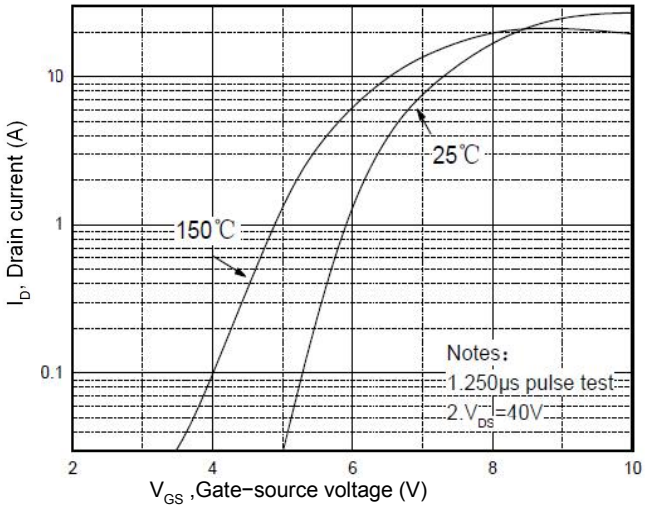


Figure 3. On-Resistance Variation vs. Drain Current

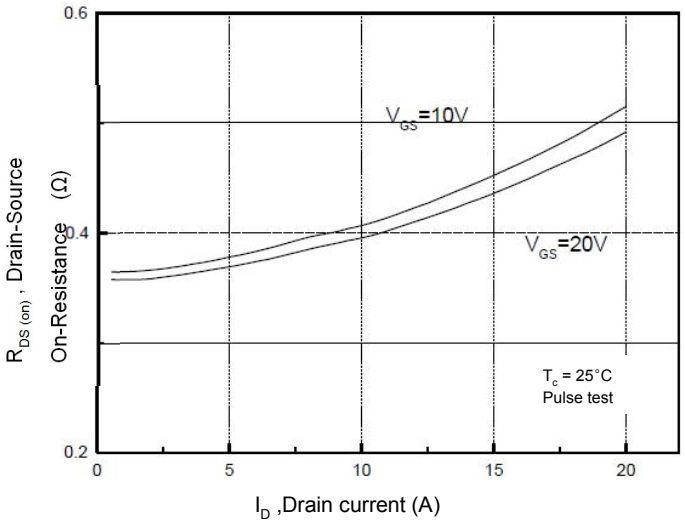


Figure 4. Threshold Voltage vs. Temperature

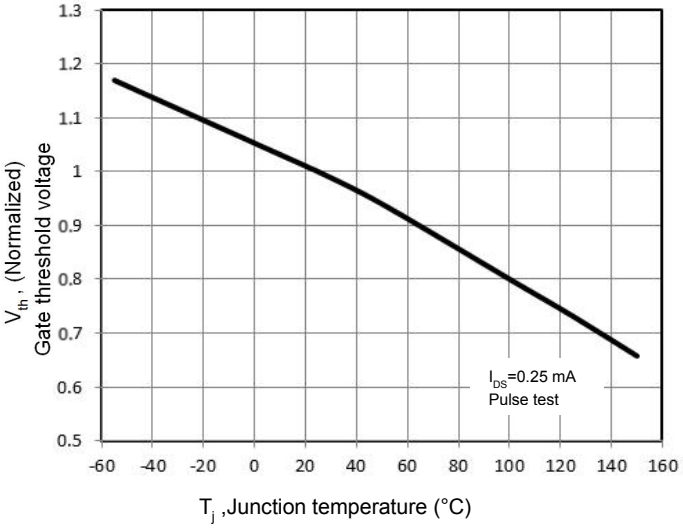


Figure 5. Breakdown Voltage vs. Temperature

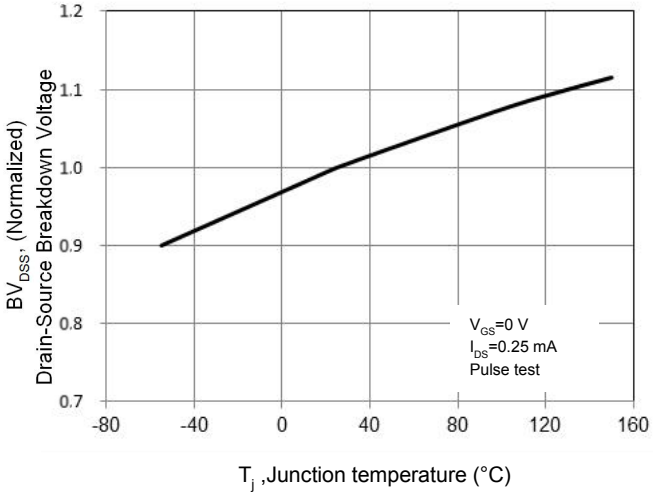


Figure 6. On-Resistance vs. Temperature

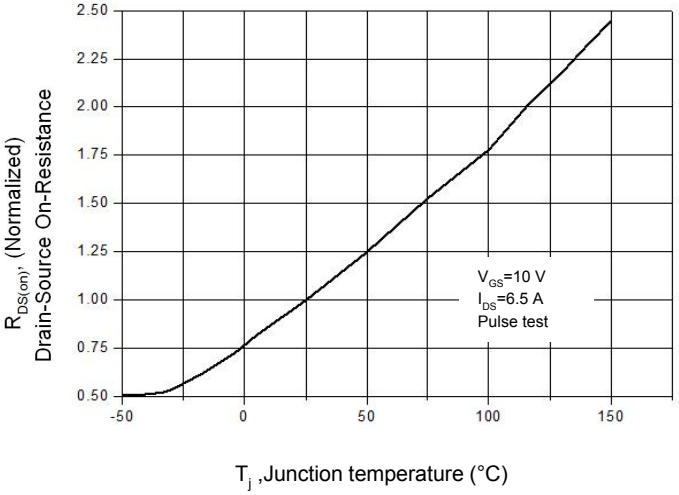


Figure 7. Capacitance Characteristics

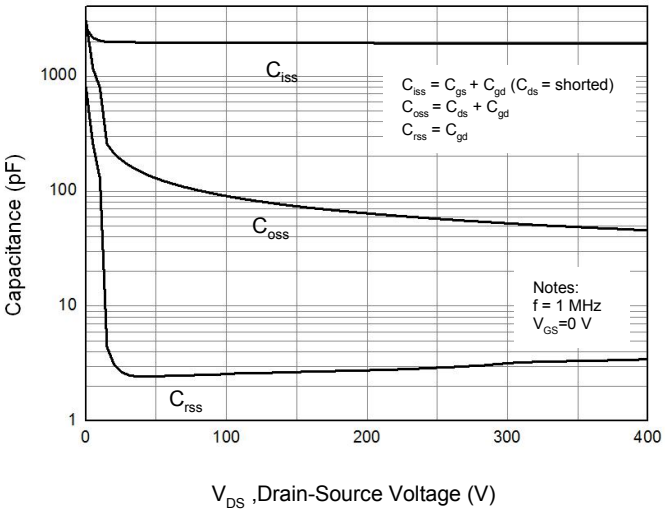


Figure 8. Gate Charge Characteristics

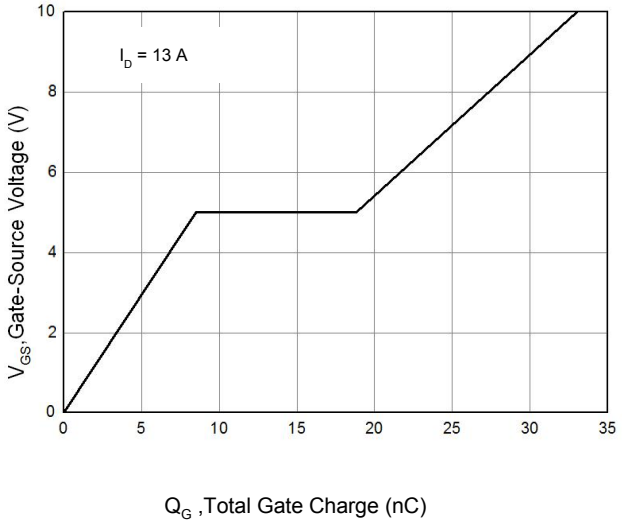


Figure 9: Safe Operating Area (TO-220F)

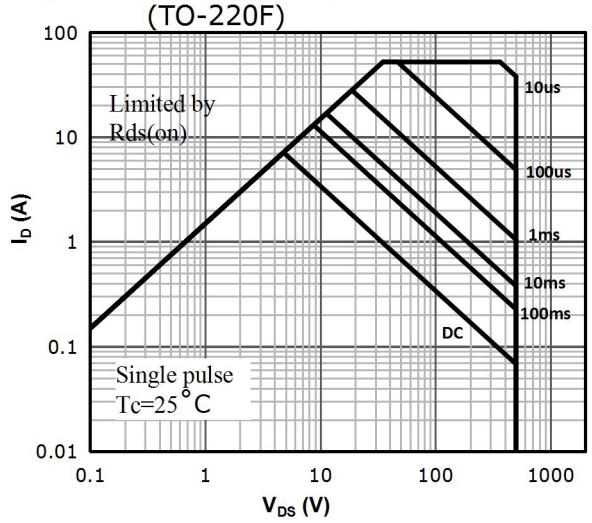


Figure 10. Maximum Safe Operating Area (TO-220)

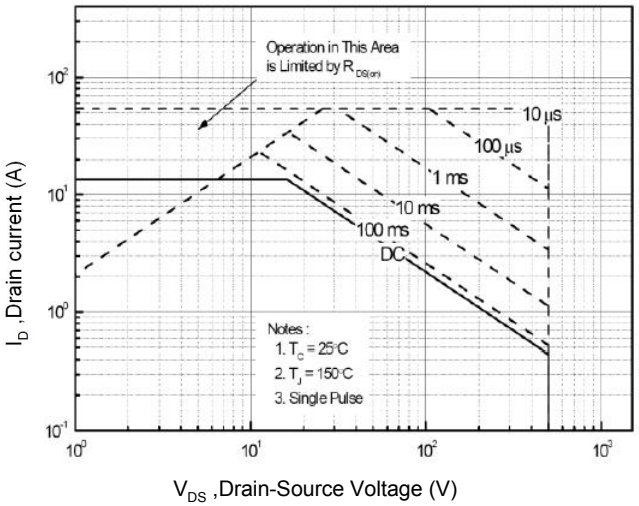


Figure 11. Power Dissipation vs. Temperature TO-220F

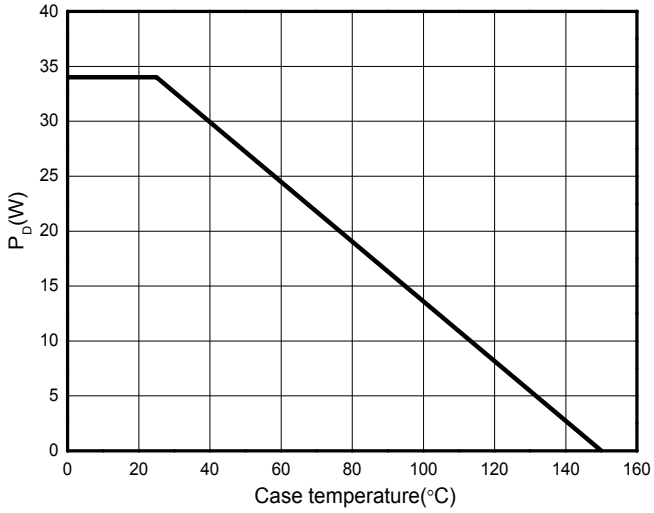


Figure 12. Power Dissipation vs. Temperature TO-220

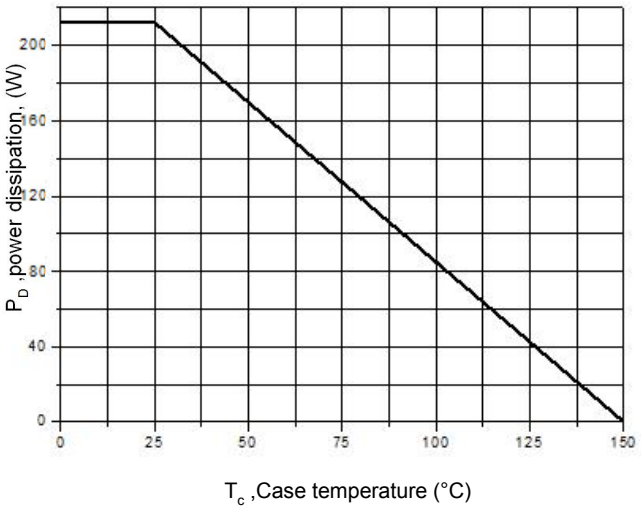


Figure 13. Continuous Drain Current vs. Temperature

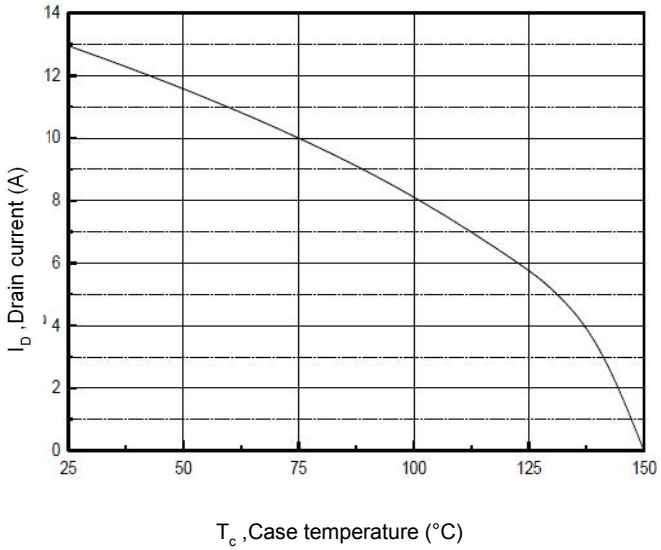


Figure 14. Body Diode Transfer Characteristics

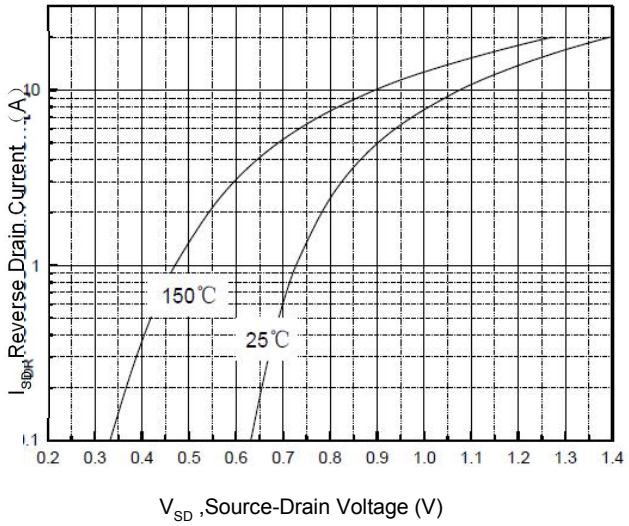


Figure 15 Transient Thermal Impedance, Junction to Case, TO-220F

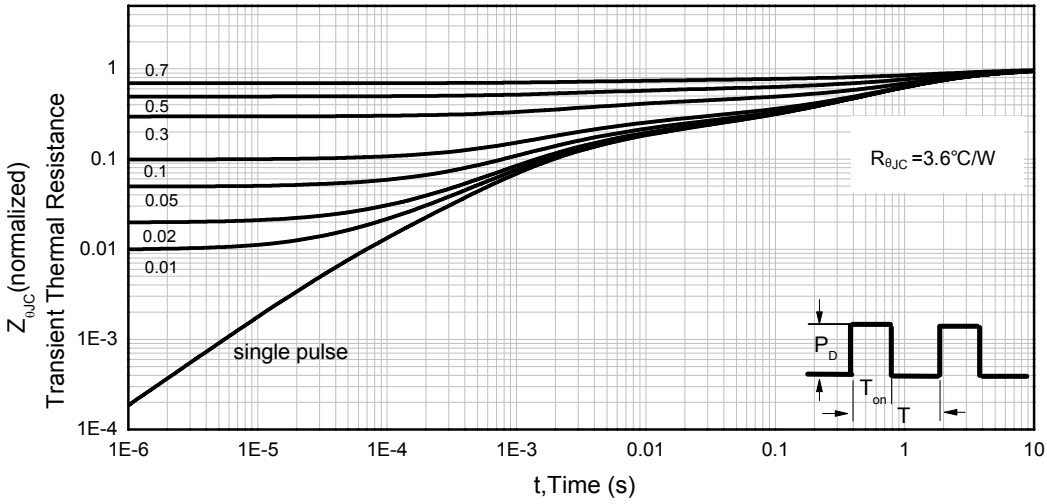
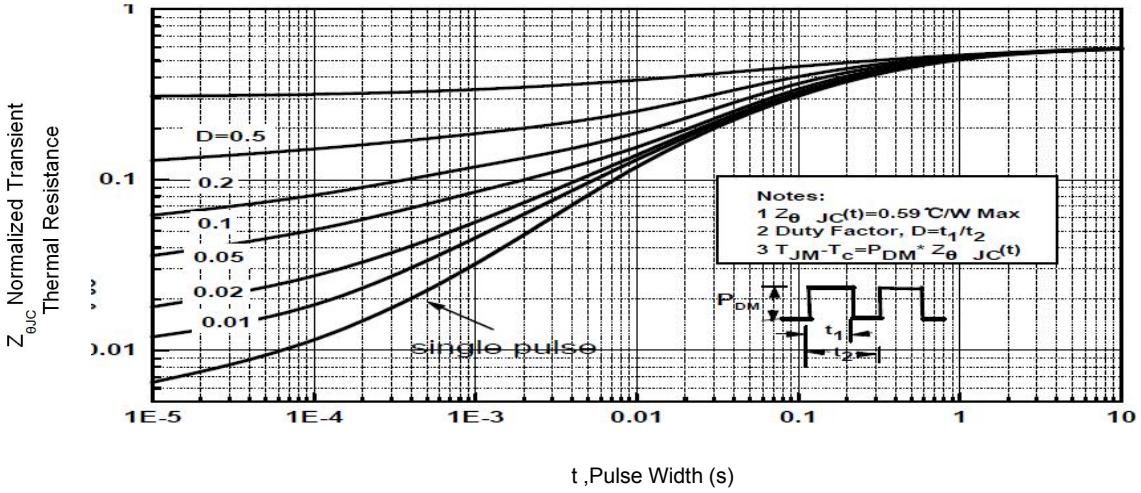
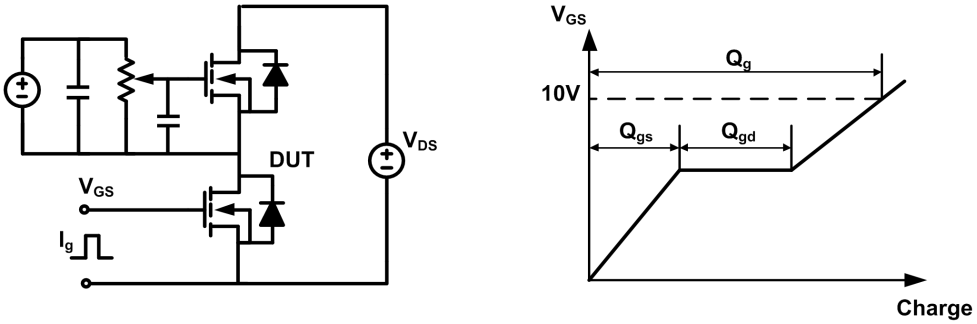


Figure 16. Transient Thermal Impedance, Junction to Case, TO-220

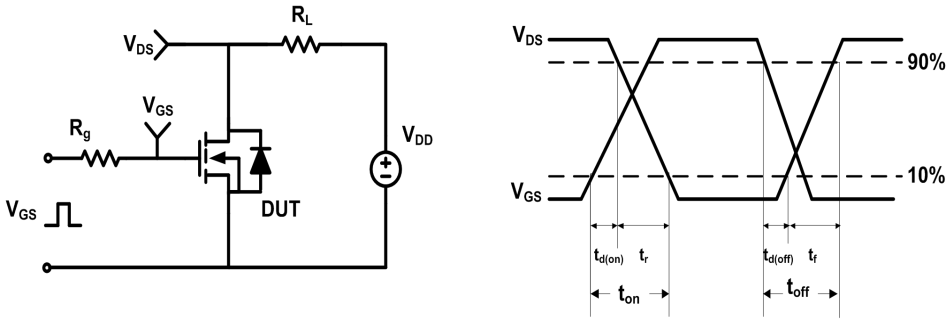


Test Circuit & Waveforms

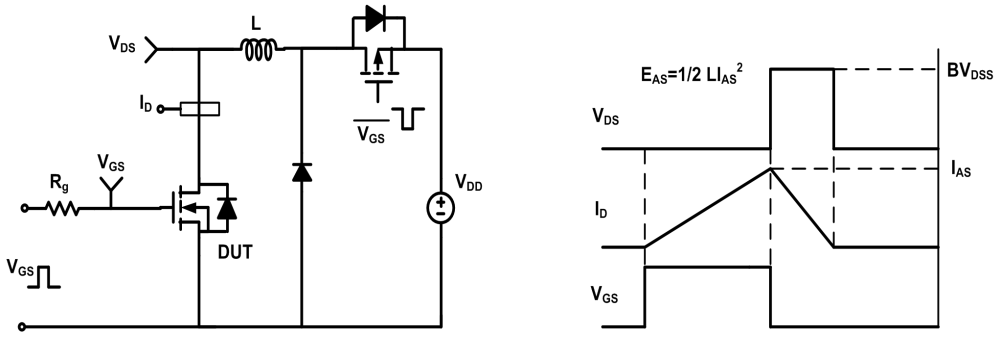
Gate Charge Test Circuit & Waveform



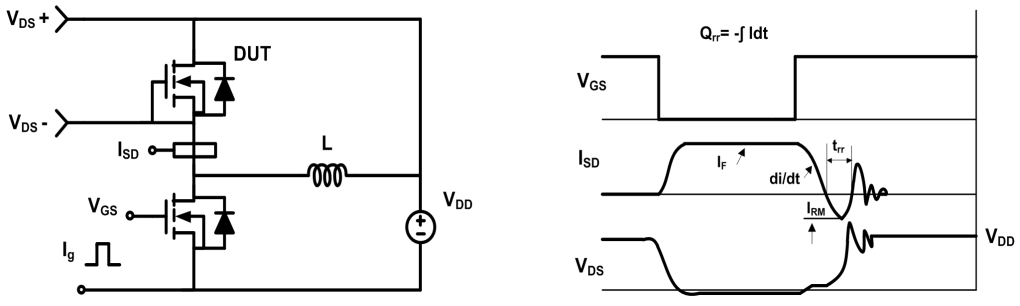
Resistive Switching Test Circuit & Waveform



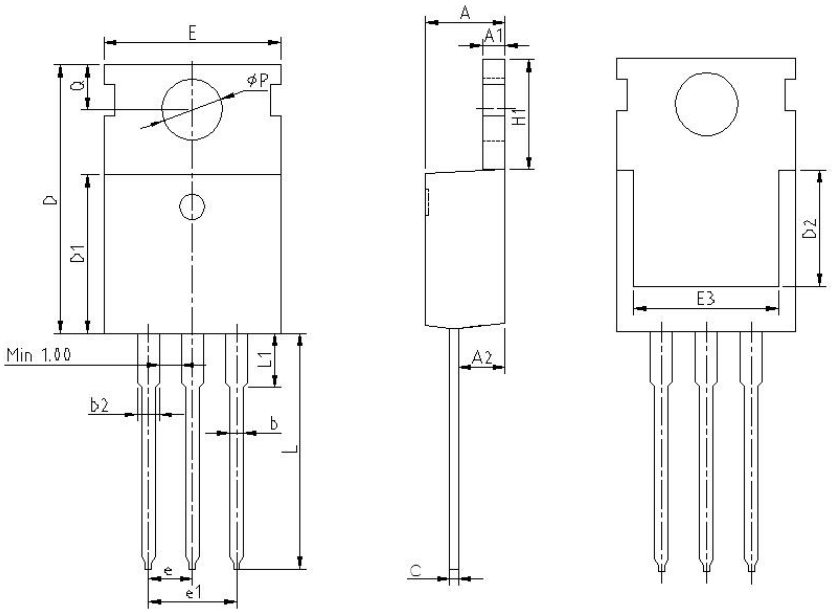
Unclamped Inductive Switching (UIS) Test Circuit & Waveform



Diode Recovery Test Circuit & Waveform

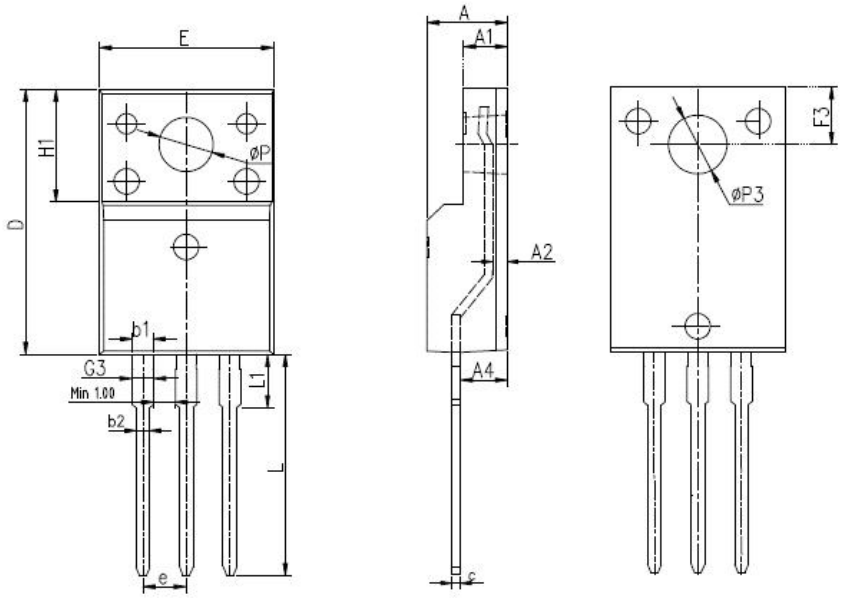


Mechanical Dimensions for TO-220



DIMENSIONS IN MILLITMETERS			DIMENSIONS IN INCHES	
SYMBOL	MIN	MAX	MIN	MAX
A	4.25	4.7	0.167	0.185
A1	1.2	1.4	0.047	0.055
A2	2.2	2.92	0.087	0.115
b	0.7	0.97	0.028	0.038
b2	1.14	1.78	0.045	0.070
c	0.4	0.8	0.016	0.031
D	14.32	16.15	0.564	0.636
D1	8.39	9.4	0.330	0.370
D2	5.5	7	0.217	0.276
E	9.7	10.36	0.382	0.408
E3	7	8.78	0.276	0.346
e	2.54BSC		0.1BSC	
e1	5.08BSC		0.2BSC	
H1	6.25	6.85	0.246	0.270
L	12.58	14.4	0.495	0.567
L1	-	4.05	-	0.159
ΦP	3.4	3.8	0.134	0.150
Q	2.54	3.35	0.100	0.132

Mechanical Dimensions for TO-220F



DIMENSIONS IN MILLITMETERS			DIMENSIONS IN INCHES	
SYMBOL	MIN	MAX	MIN	MAX
A	4.4	4.9	0.173	0.193
A1	2.34	2.74	0.092	0.108
A2	0.3	0.7	0.012	0.028
A4	2.5	2.96	0.098	0.117
c	0.4	0.7	0.016	0.028
D	15.57	16.4	0.613	0.646
E	9.96	10.4	0.392	0.409
H1	6.48	6.95	0.255	0.274
e	2.54BSC		0.1BSC	
L	12.64	14.2	0.498	0.559
L1	2.88	3.6	0.113	0.142
ΦP	3	3.38	0.118	0.133
ΦP3	3.15	3.65	0.124	0.144
F3	3.15	3.45	0.124	0.136
G3	1.15	1.58	0.045	0.062
b1	1.18	1.43	0.046	0.056
b2	0.7	1	0.028	0.039

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