

## Description

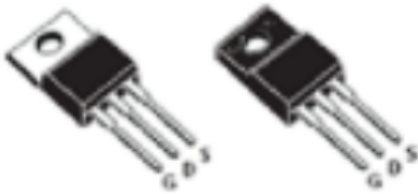
### EHV65250RNT N-channel Enhancement Mode Power MOSFET

#### Features

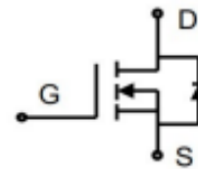
650V,4A  
 $R_{DS(ON)}=2.7\Omega@V_{GS}=10V$   
 Low  $R_{ds(on)}$   
 Low gate charge (typ. $Q_g=20.7nC$ )  
 100% UIS tested  
 ROHS compliant

#### Application

Power factor correction  
 LED Power  
 Switched mode power supplies



TO-220/220F



Schematic Diagram

## Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	TUBE (PCS)	Inner BOX (PCS)	Per Carton (PCS)
EHV65250RNT	EHV65250RNT	TAPING	TO-220/220F	13inch	2500	25000

## Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units
V <sub>DSS</sub>	Drain-Source Voltage	650	V
V <sub>GSS</sub>	Gate-Source Voltage	±30	V
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> =25°C	4 A
		T <sub>C</sub> = 100°C	2.5 A
I <sub>DM</sub>	Pulsed Drain Current	16	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy	198	mJ
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> = 25°C	TO-220F 32/TO-220 77 W
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	TO-220 1.62 TO-220F 3.8	°C/W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	-	-	1.0	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	-	4.0	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note3</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	-	2500	2700	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	600	-	pF
C <sub>oss</sub>	Output Capacitance		-	55	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	3.2	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =520V, I <sub>D</sub> =4A, V <sub>GS</sub> =10V	-	12	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3.2	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	5.1	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =325V, I <sub>D</sub> =4A, R <sub>GEN</sub> =10Ω	-	12	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	31	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	42	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	15	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =4A	-	-	1.5	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	V <sub>R</sub> =400V I <sub>F</sub> =4A, di/dt=100A/μs	-	282	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	1.4	-	uC
I <sub>rrm</sub>	Peak Reverse Recovery Current		-	10	-	A

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

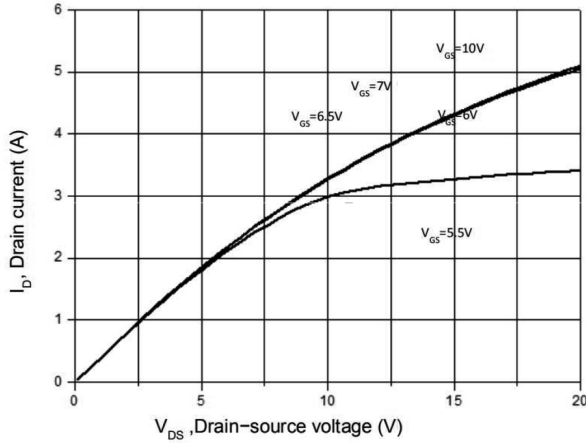


Figure 3. On-Resistance Variation vs. Drain Current

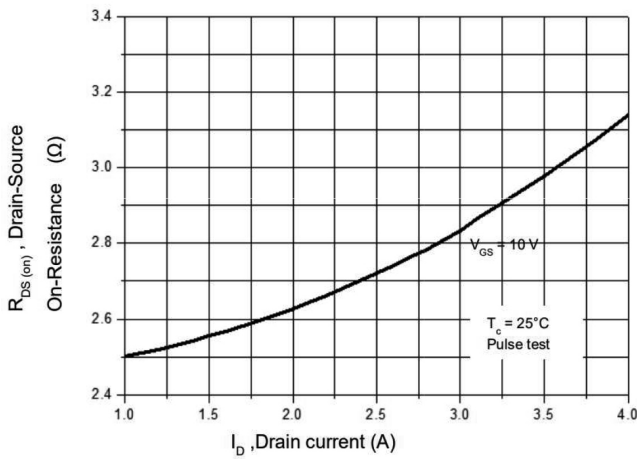


Figure 5. Breakdown Voltage vs. Temperature

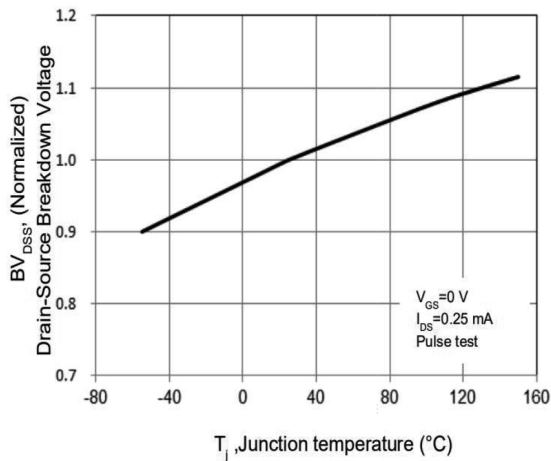


Figure 2. Transfer Characteristics

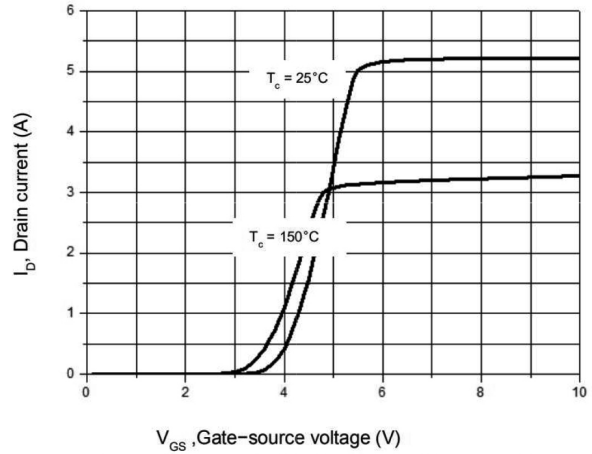


Figure 4. Threshold Voltage vs. Temperature

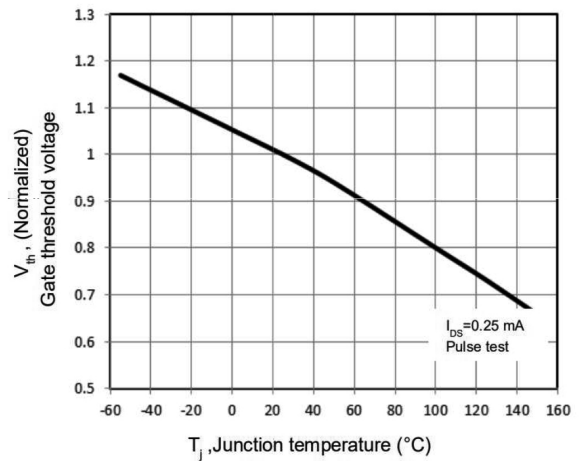


Figure 6. On-Resistance vs. Temperature

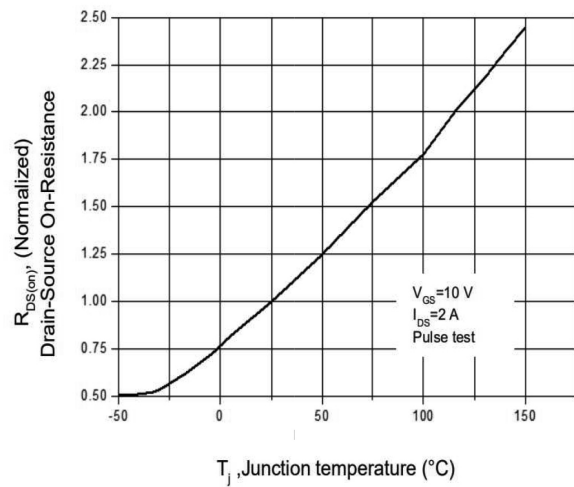


Figure 7. Capacitance Characteristics

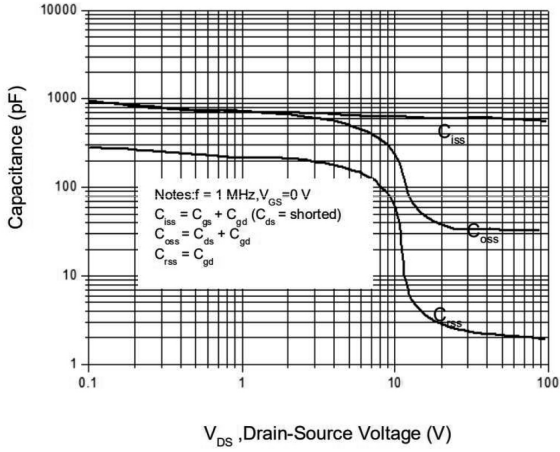


Figure 8. Gate Charge Characterist

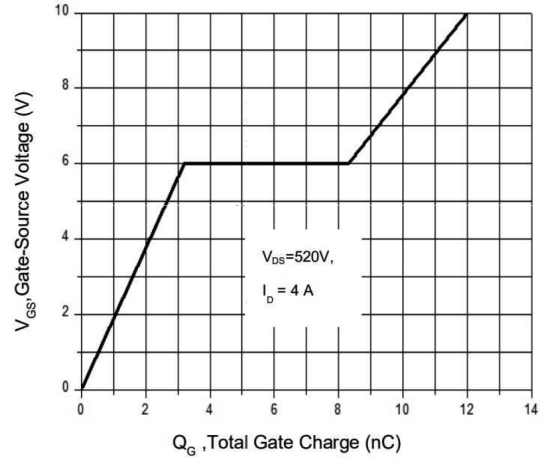


Figure 9. Maximum Safe Operating Area  
TO-220F

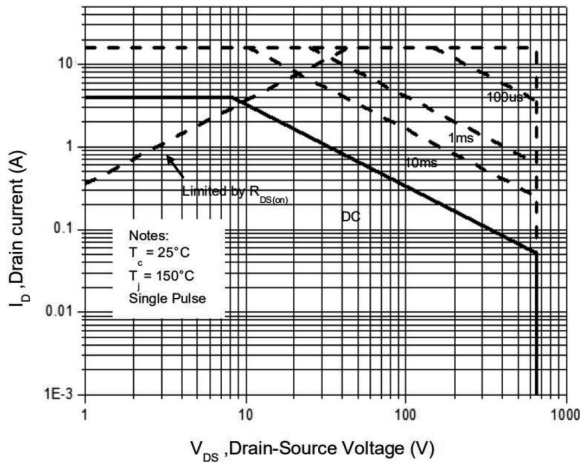


Figure 10. Maximum Safe Operating Area  
TO-220/ TO-251/TO-252/TO-262

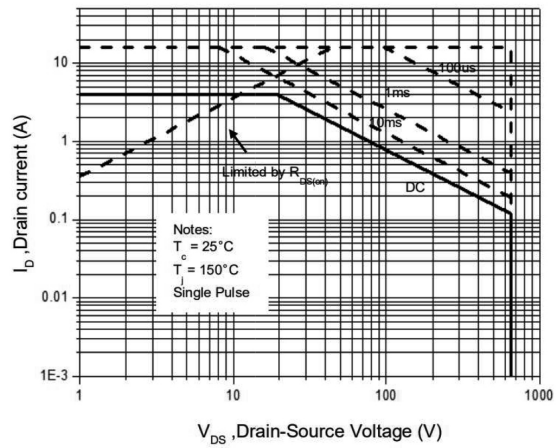


Figure 11. Power Dissipation vs. Temperature  
TO-220F

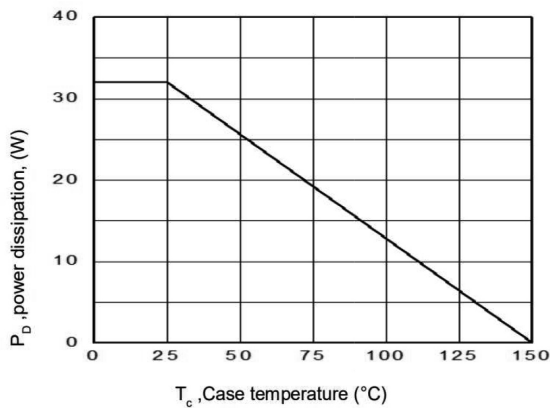


Figure 12. Power Dissipation vs. Temperature  
TO-220/ TO-251/TO-252/TO-262

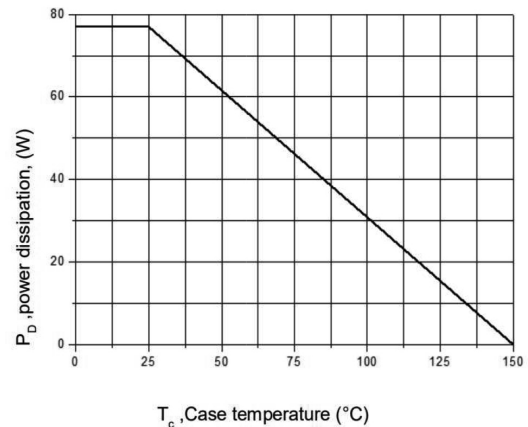


Figure 13. Continuous Drain Current vs. Temperature

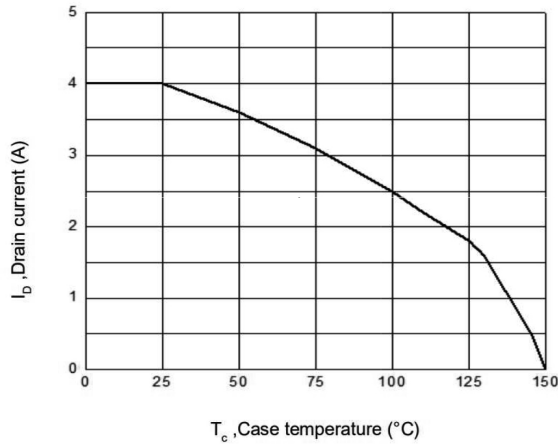


Figure 14. Body Diode Transfer Characteristics

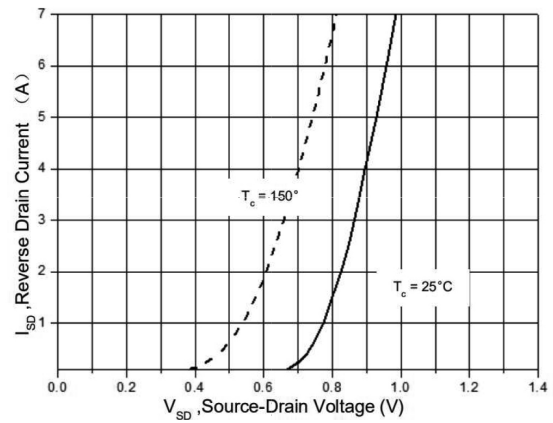


Figure 15 Transient Thermal Impedance, Junction to Case, TO-220F

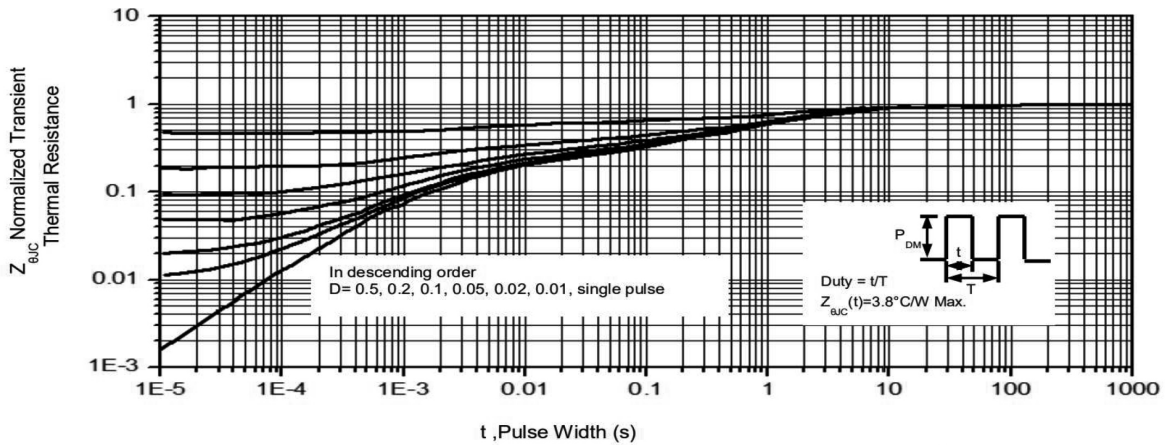
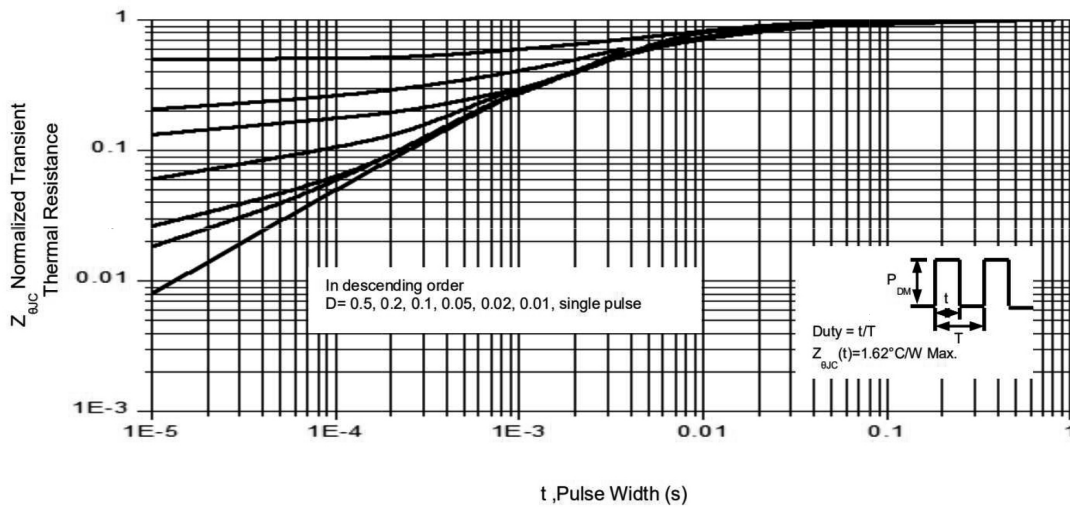
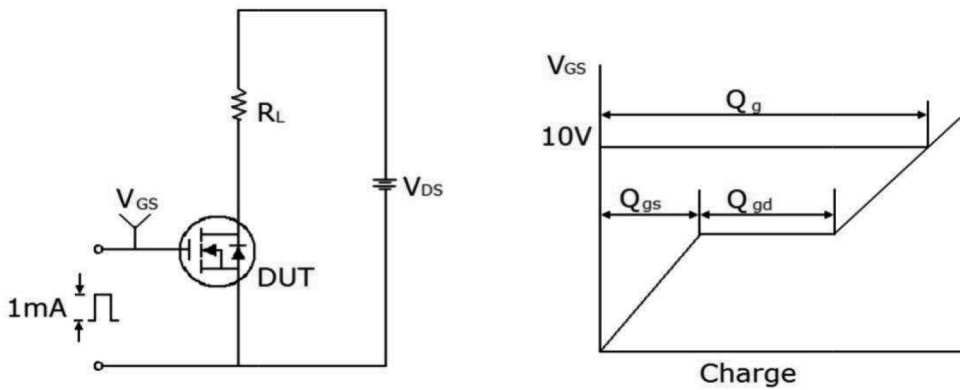


Figure 16. Transient Thermal Impedance, Junction to Case, TO-220/ TO-251/TO-252/TO-262

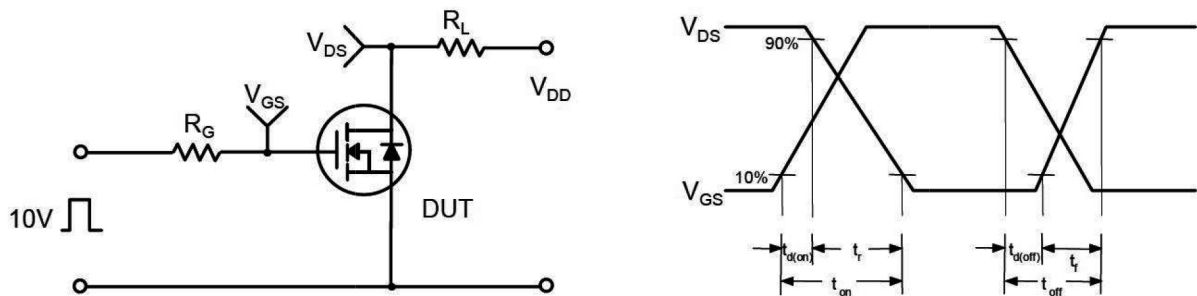


Test Circuit

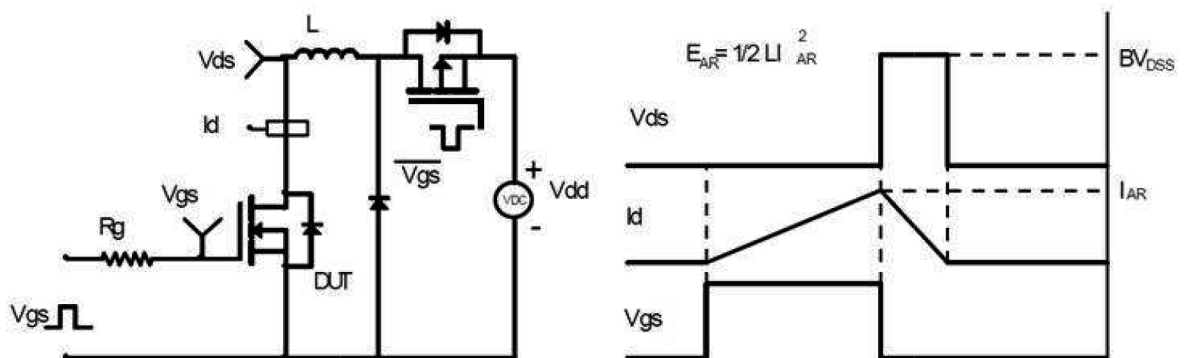
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

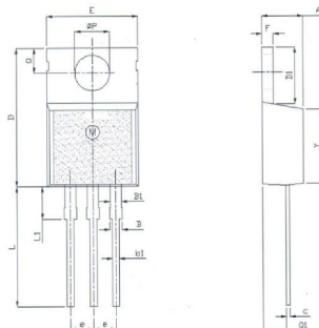


Unclamped Inductive Switching Test Circuit & Waveforms



Package Mechanical Data-TO-220/220F

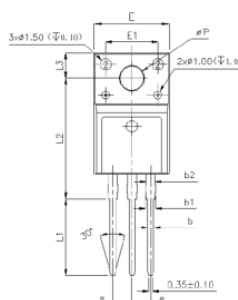
Mechanical Dimensions for TO-220



UNIT: mm

SYMBOL	MIN	NOM	MAX	SYMBOL	MIN	NOM	MAX
A	4		4.8	e	2.44	2.54	2.64
B	1.2		1.4	F	1.1		1.4
B1	1		1.4	L	12.5		14.5
b1	0.75		0.95	L1	3	3.5	4
c	0.4		0.55	ØP	3.7	3.8	3.9
D	15		16.5	Q	2.5		3
D1	5.9		6.9	Q1	2		2.9
E	9.9		10.7	Y	8.02	8.12	8.22

Mechanical Dimensions for TO-220F



UNIT: mm

SYMBOL	MIN	NOM	MAX	SYMBOL	MIN	NOM	MAX
A	4.5		4.9	E1	6.5	7	7.5
A1	2.3		2.9	e	2.44	2.54	2.64
b	0.65		0.9	L	12.5		14.3
b1	1.1		1.7	L1	9.45		10.05
b2	1.2		1.4	L2	15		16
c	0.35		0.65	L3	3.2		4.4
D	14.5		16.5	ØP	3		3.3
D1	6.1		6.9	Q	2.5		2.9
E	9.6		10.3				

## Product Naming Rules

