

**Description**

**EHV6581RNT N-channel Enhancement Mode Power MOSFET**

**Features**

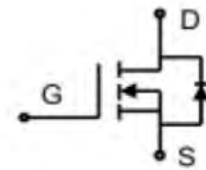
- 650V,10A
- $R_{DS(ON)}=1.0\Omega$  @  $V_{GS}=10V$
- Fast switching capability
- Robust design with better EAS performance
- Excellent stability and uniformity

**Application**

- Switched mode power supplies
- LED driver
- Power factor correction



TO-220\220F



N-Channel MOSFET

**Schematic Diagram**

**Package Marking and Ordering Information**

Device Marking	Device	OUTLINE	Device Package	TUBE (PCS)	Inner BOX (PCS)	Per Carton (PCS)
EHV6581RNT	EHV6581RNT	TAPING	TO-220\220F	13inch	2500	25000

**Absolute Maximum Ratings** ( $T_C=25^\circ C$  unless otherwise specified)

Symbol	Parameter	Max.	Units
$V_{DSS}$	Drain-Source Voltage	650	V
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$	10
		$T_C = 100^\circ C$	6.3
$I_{DM}$	Pulsed Drain Current	40	A
$E_{AS}$	Single Pulsed Avalanche Energy	500	mJ
$P_D$	Power Dissipation TO-220F $T_C = 25^\circ C$	40	W
	Derate above $25^\circ C$	0.32	W/ $^\circ C$
	Power Dissipation TO-220 $T_C = 25^\circ C$	130	W
	Derate above $25^\circ C$	1.04	W/ $^\circ C$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.13/220F 0.96/220	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	110/220F 62.5/220	$^\circ C/W$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55to+150	$^\circ C$

## 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	-	4	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =5A	-	810	1000	mΩ

<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	1622	-	pF
C <sub>oss</sub>	Output Capacitance		-	144.2	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	6.8	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =520V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V	-	34.2	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	8.8	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	12.89	-	nC

<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =325V, I <sub>D</sub> =10A, R <sub>GEN</sub> =10Ω	-	14.16	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	34.64	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	65.72	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	16.04	-	ns

### Drain-Source Diode Characteristics and Maximum Ratings

V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>F</sub> =10A	-	-	1.5	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	V <sub>R</sub> =325V I <sub>F</sub> =10A, di/dt=100A/μs	-	418.8	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	3.40	-	uC
I <sub>rrm</sub>	Peak Reverse Recovery Current		-	16.28	-	A

## Typical Performance Characteristics

Figure 1. Typical Output Characteristics

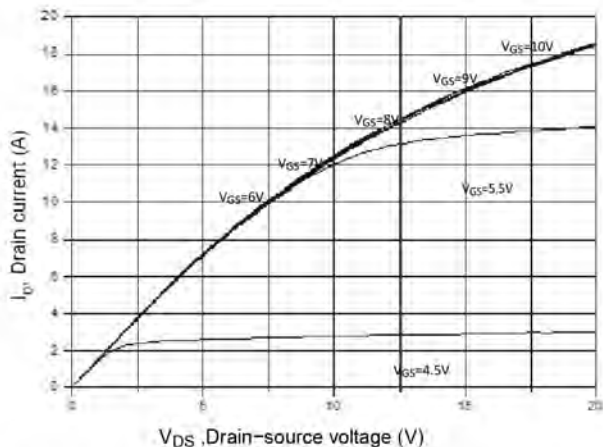


Figure 2. Transfer Characteristics

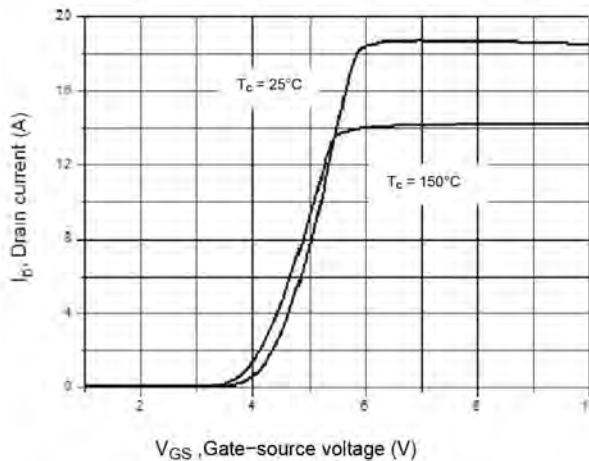


Figure 3. On-Resistance Variation vs. Drain Current

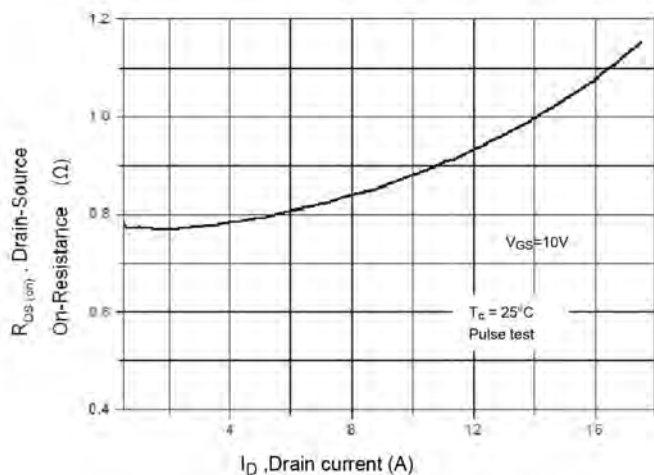


Figure 4. Threshold Voltage vs. Temperature

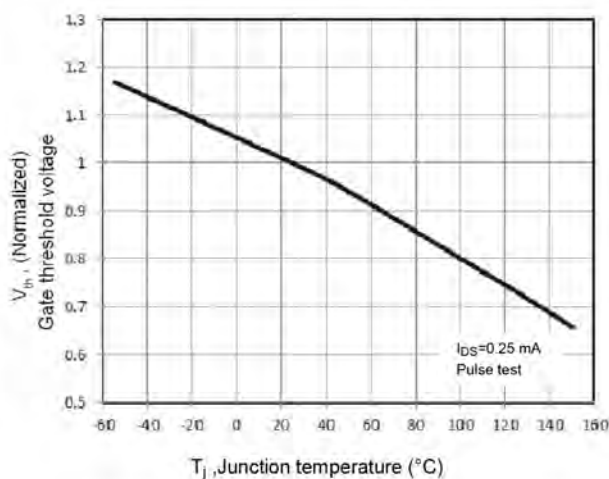


Figure 5. Breakdown Voltage vs. Temperature

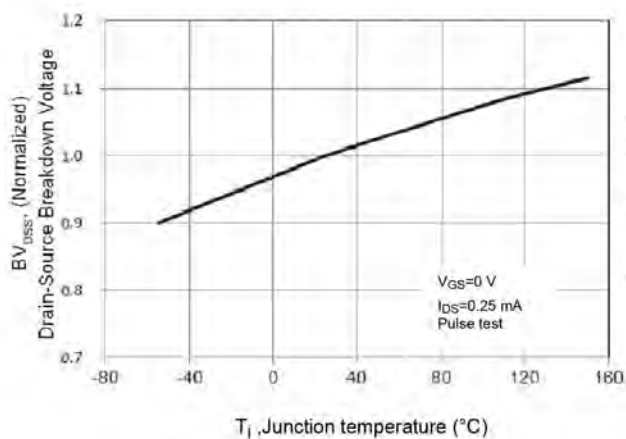


Figure 6. On-Resistance vs. Temperature

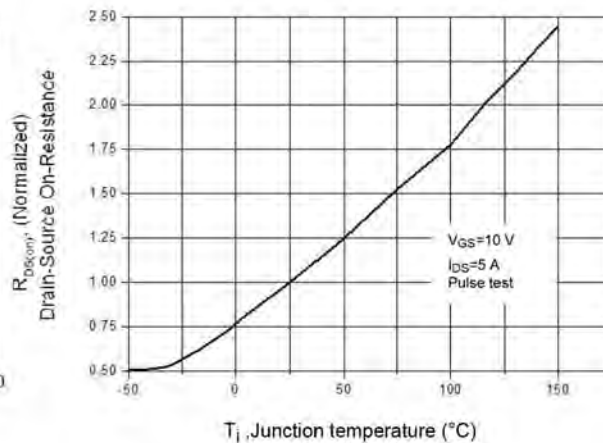


Figure 7. Capacitance Characteristics

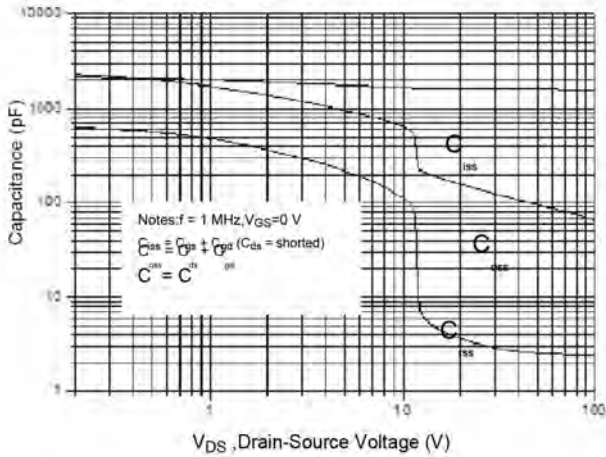


Figure 8. Gate Charge Characteristics

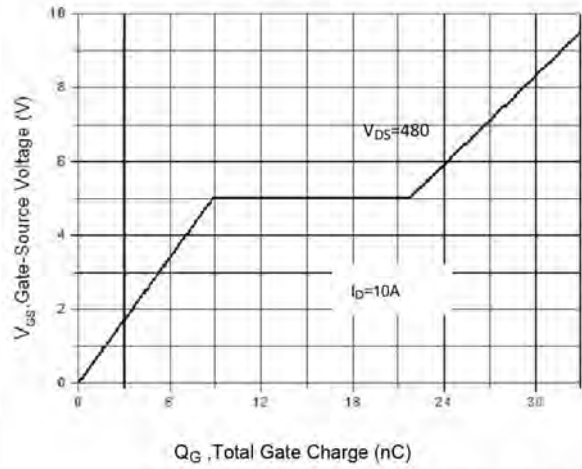


Figure 9. Maximum Safe Operating Area TO-220F/TO-220F Narrow Pin

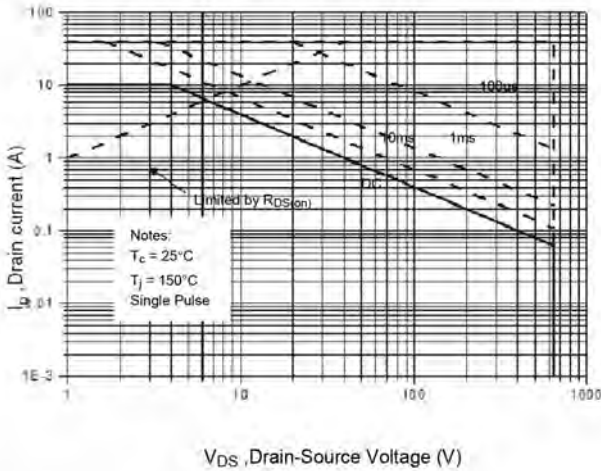


Figure 10. Maximum Safe Operating Area TO-220/ TO-262/TO-263

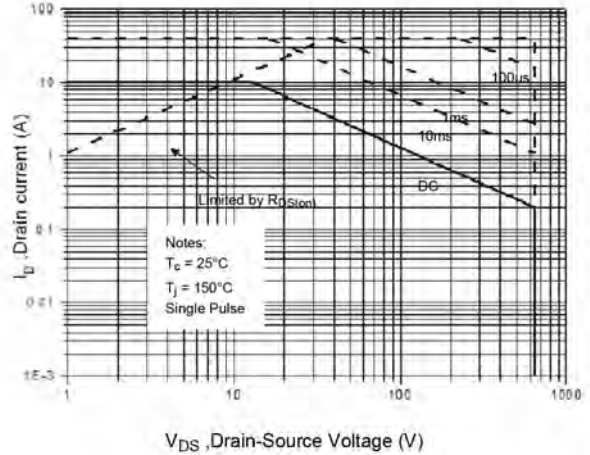


Figure 11. Power Dissipation vs. Temperature TO-220F/TO-220F Narrow Pin

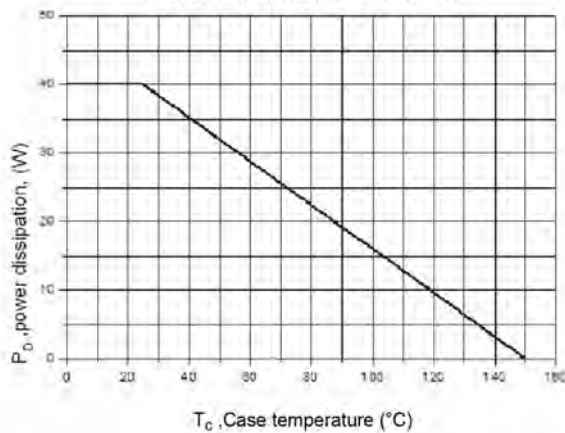


Figure 12. Power Dissipation vs. Temperature TO-220/ TO-262/TO-263

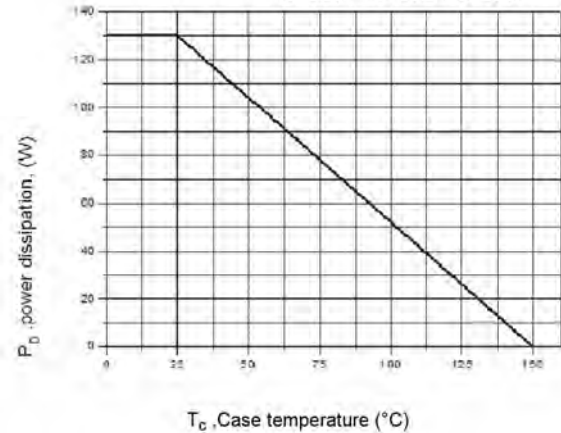




Figure 13. Continuous Drain Current vs. Temperature

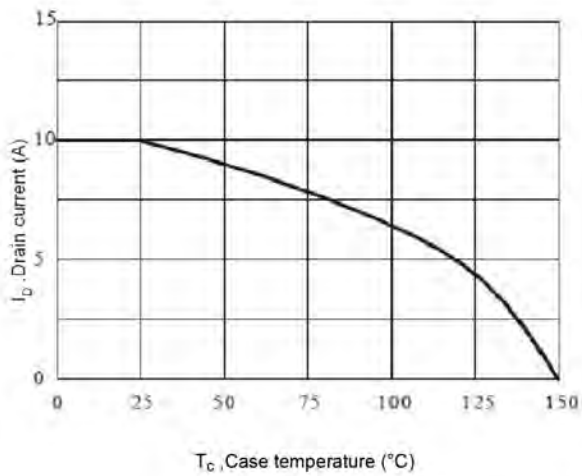


Figure 14. Body Diode Transfer Characteristics

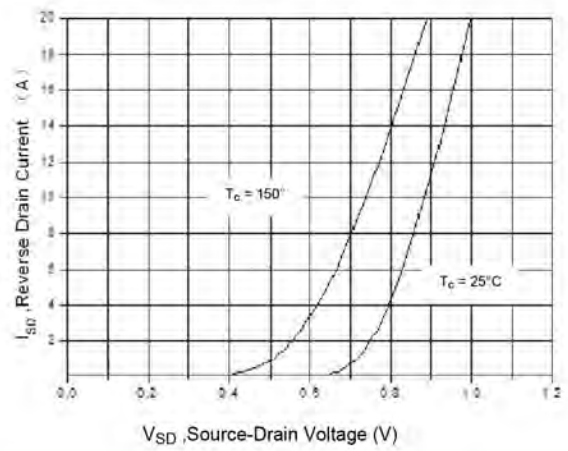


Figure 15 Transient Thermal Impedance, Junction to Case, TO-220F/TO-220F Narrow Pin

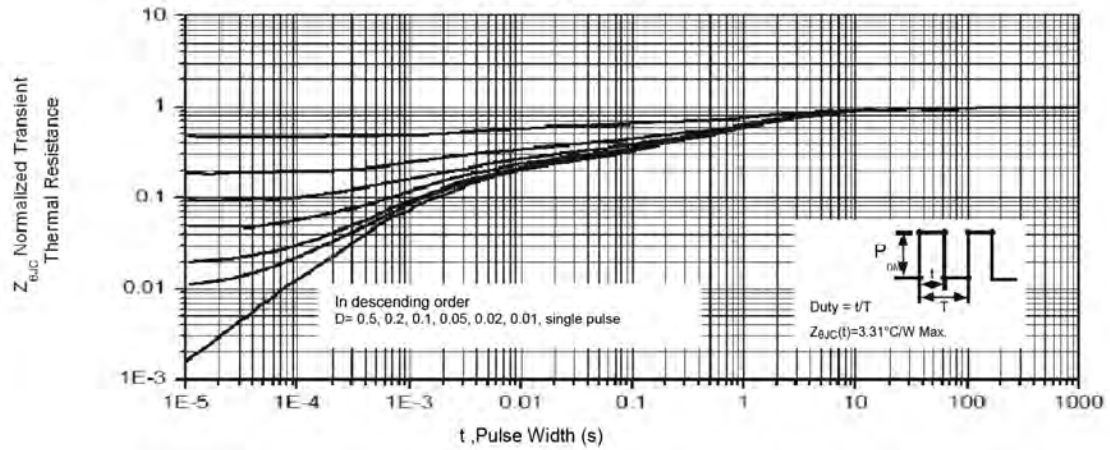
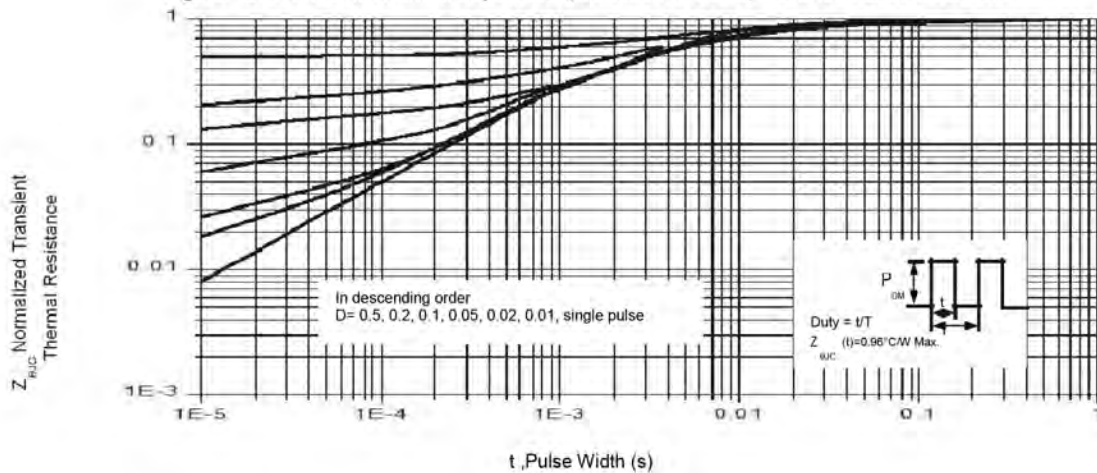
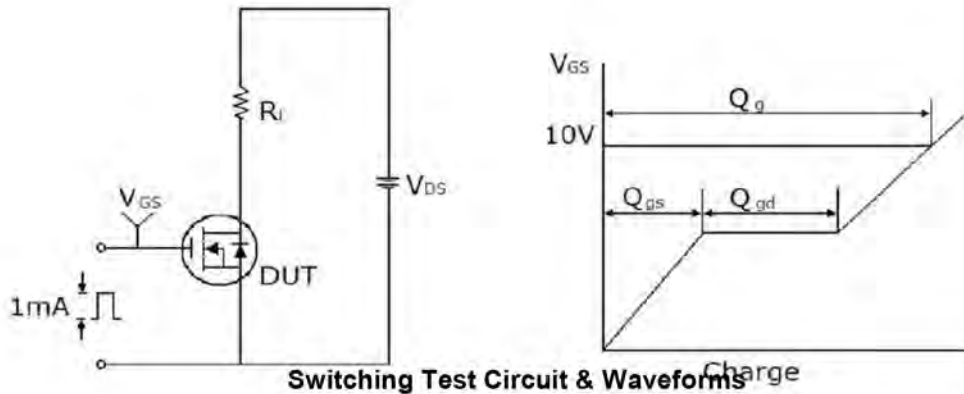


Figure 16. Transient Thermal Impedance, Junction to Case, TO-220/ TO-262/TO-263

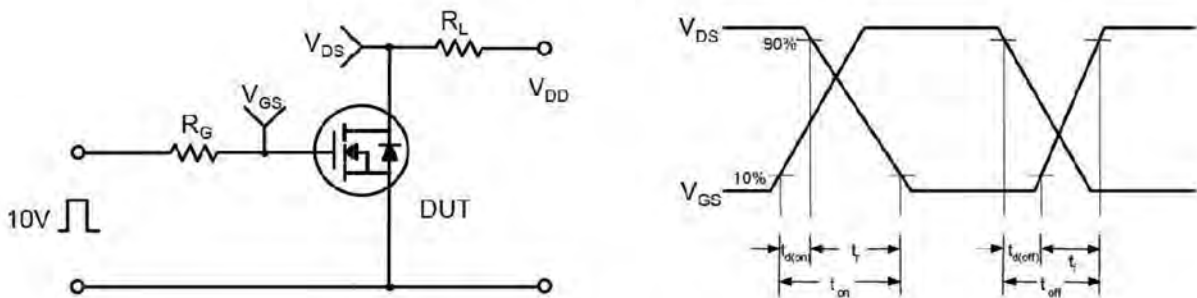


Test Circuit

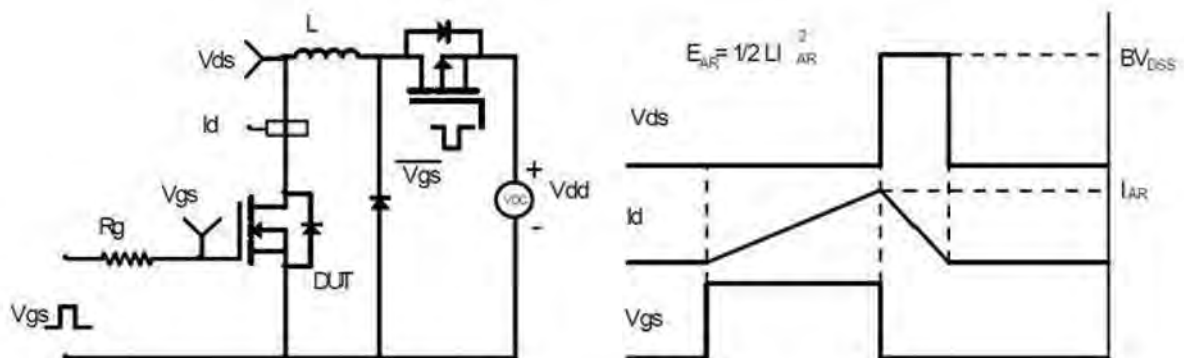
Gate Charge Test Circuit & Waveform



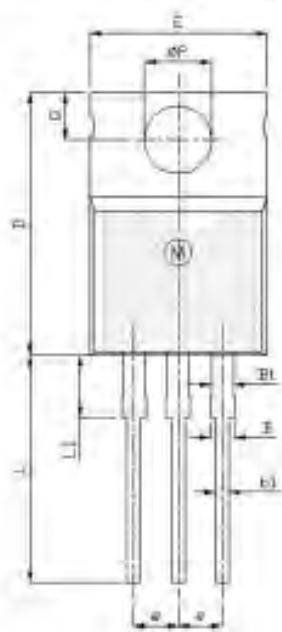
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



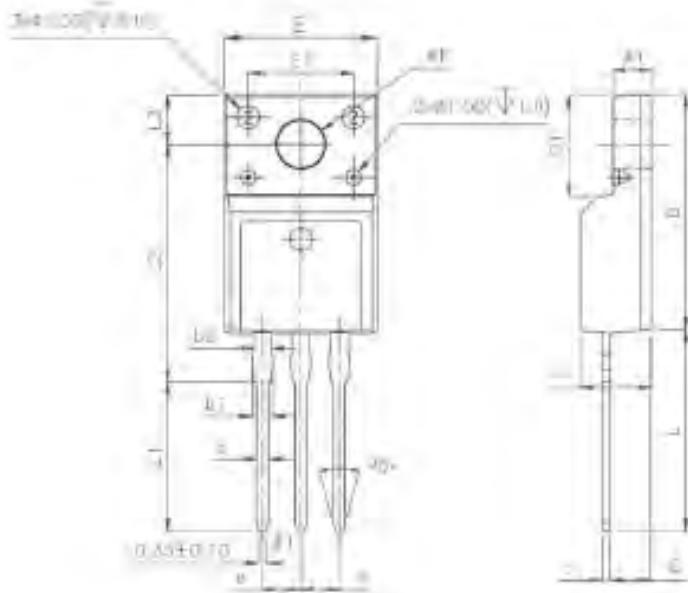
Package Mechanical Data-TO-220



UNIT: mm

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

**Package Mechanical Data-TO-220F**



UNIT: mm

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



## Product Naming Rules

