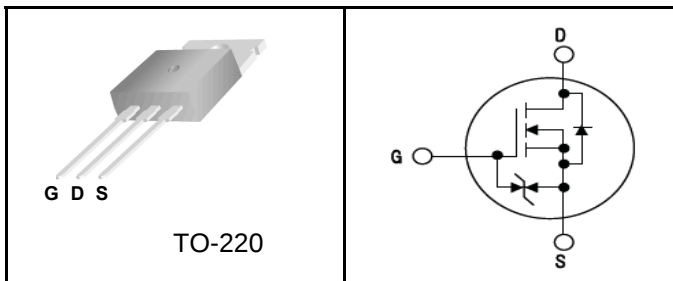


Features

- $BV_{DSS}=650V$, $I_D=30A$
- $R_{DS(on)}: 0.13\Omega$ (Max) @ $V_{GS}=10V$
- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Extremely low switching loss
- Excellent stability and uniformity
- 100% Avalanche Tested
- Built-in ESD Diode



Application

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- AC to DC Converters
- Telecom, Solar



Device Marking and Package Information

Ordering code	Package	Marking
WTM30N65AP	TO-220	WPM 30N65AP XXX YYWW

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

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$)	30 *	A
	Drain Current - Continuous ($T_C = 100^\circ C$)	15.8 *	A
$I_{DM}^{(1)}$	Drain Current - Pulsed	80 *	A
$E_{AS}^{(2)}$	Single Pulsed Avalanche Energy	454	mJ
I_{AR}	Avalanche Current	3.1	A
dv/dt	MOSFET dv/dt ruggedness, $V_{DS}=0 \dots 400V$	50	V/ns
dv/dt	Reverse diode dv/dt, $V_{DS}=0 \dots 400V$, $I_{DS} \leq I_D$	15	V/ns
P_D	Power Dissipation ($T_C = 25^\circ C$)	34	W
$V_{ESD(G-S)}$	Gate source ESD(HBM-C=100pF, R=1.5K Ω)	2000	V
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$

* Drain current limited by maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	3.65	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	80	$^\circ C/W$

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
On Characteristics						
V _{GS}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 1.1 mA	2.0	-	4.0	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 10.2 A	-	115	130	mΩ
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 1mA	650	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650 V, V _{GS} = 0	-	-	1	μA
		V _{DS} = 650 V, T _C = 150°C	-	-	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±1	μA
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 400 V, V _{GS} = 0 V, f = 1.0 MHz	-	2840	-	pF
C _{oss}	Output Capacitance		-	61	-	pF
C _{rss}	Reverse Transfer Capacitance		-	3.8	-	pF
Switching Characteristics						
t _{d(on)}	Turn-On Time	V _{DS} = 325 V, I _D = 14.3 A, R _G = 25 Ω (Note 3,4)	-	56	-	ns
t _r	Turn-On Rise Time		-	31	-	ns
t _{d(off)}	Turn-Off Delay Time		-	250	-	ns
t _f	Turn-Off Fall Time		-	20	-	ns
Q _{g(}	Total Gate Charge	V _{DS} = 520 V, I _D = 14.3 A, V _{GS} = 10 V (Note 3,4)	-	65	-	nC
Q _{gs}	Gate-Source Charge		-	12	-	nC
Q _{gd}	Gate-Drain Charge		-	19	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		-	-	30	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	80	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 14.3 A	-	-	1.3	V
trr	Reverse Recovery Time	V _R = 400 V, I _F = 14.3 A di _F /dt = 100 A/μs	-	450	-	ns
Qrr	Reverse Recovery Charge		-	7.8	-	μC

Notes :

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS} = 3.1\text{ A}$ $V_{DD} = 100\text{ V}$, $R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test : Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$
4. Essentially Independent of Operating Temperature

Typical Characteristics

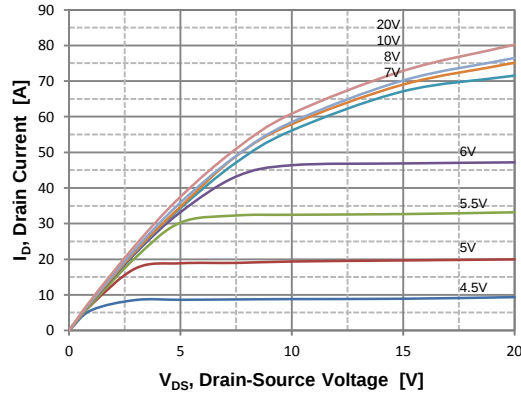


Figure 1. On Region Characteristics

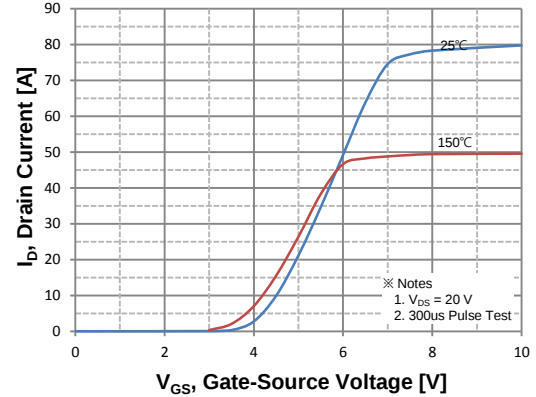


Figure 2. Transfer Characteristics

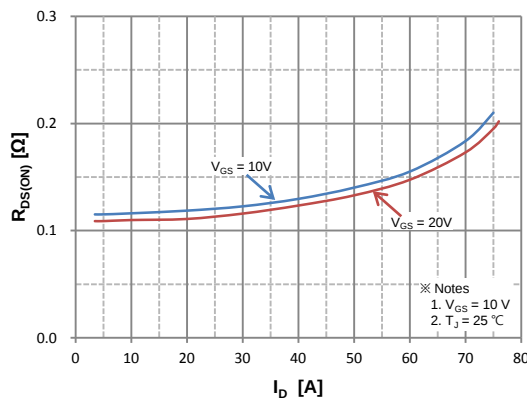


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

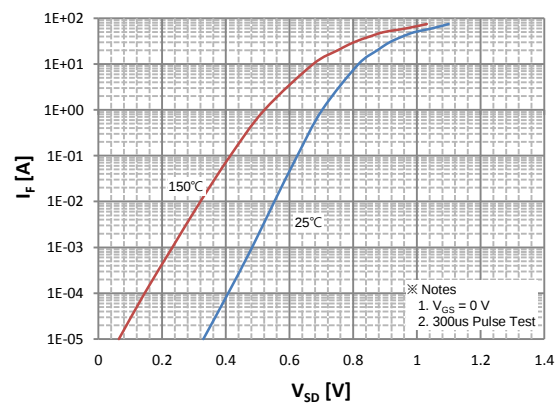


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

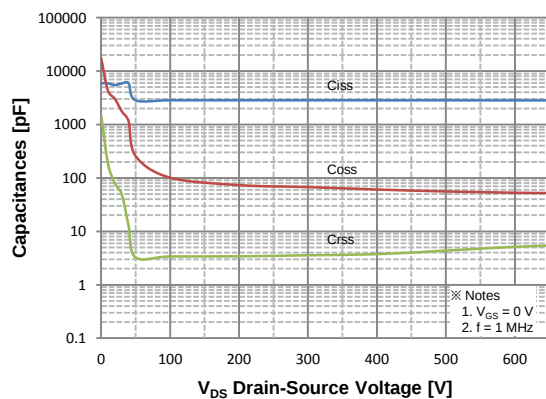


Figure 5. Capacitance Characteristics

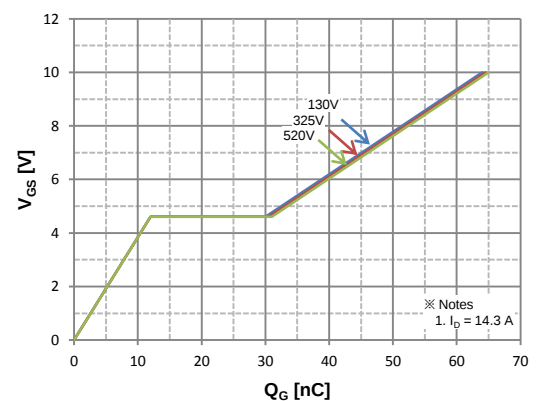


Figure 6. Gate Charge Characteristics

Typical Characteristics

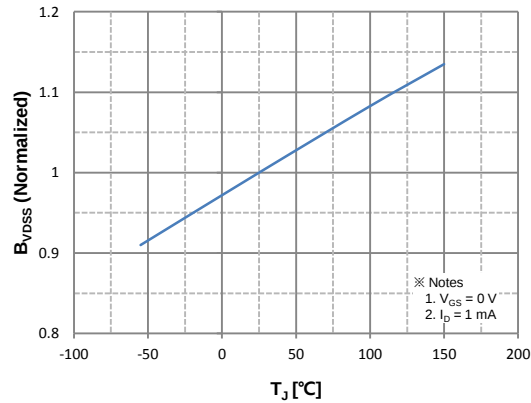


Figure 7. Breakdown Voltage Variation vs. Temperature

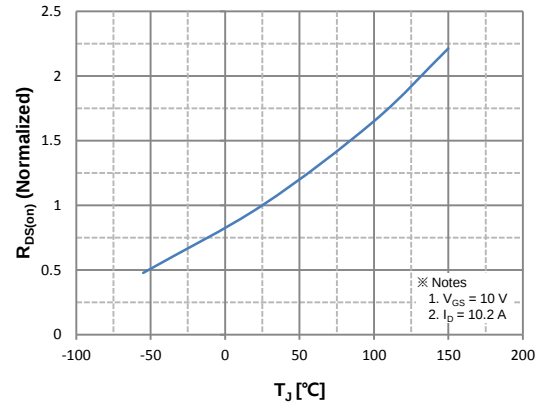


Figure 8. On-Resistance Variation vs. Temperature

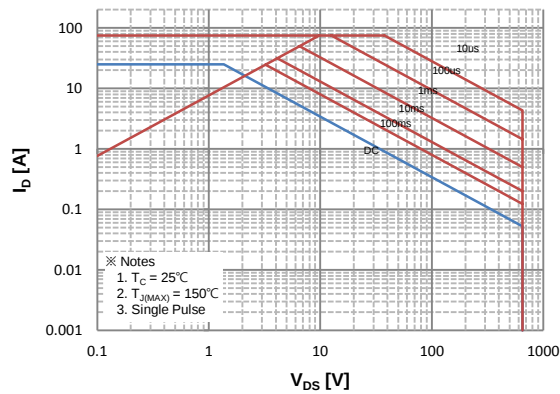


Figure 9. Maximum Safe Operating Area

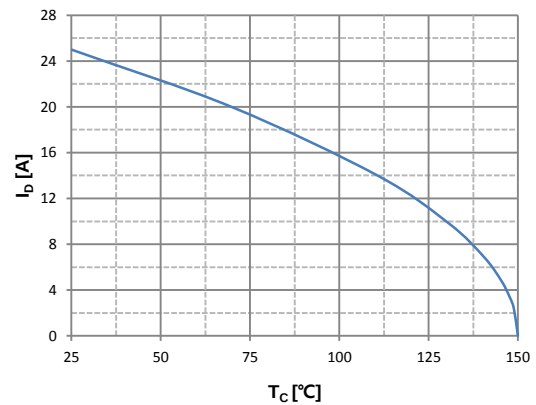


Figure 10. Maximum Drain Current vs. Case Temperature

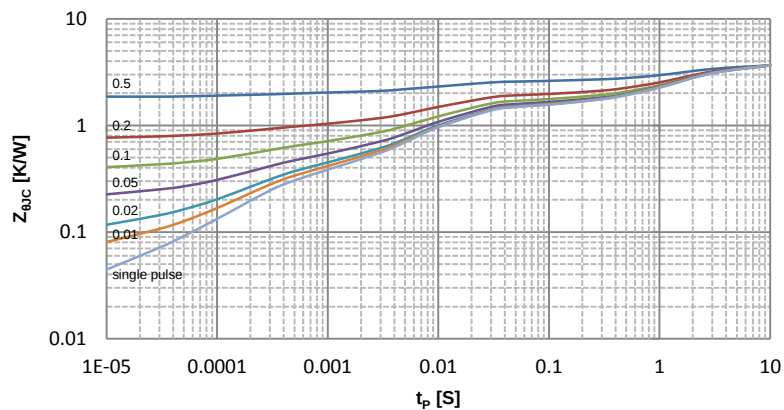


Figure 11. Transient Thermal Response Curve

Fig 12. Gate Charge Test Circuit & Waveform

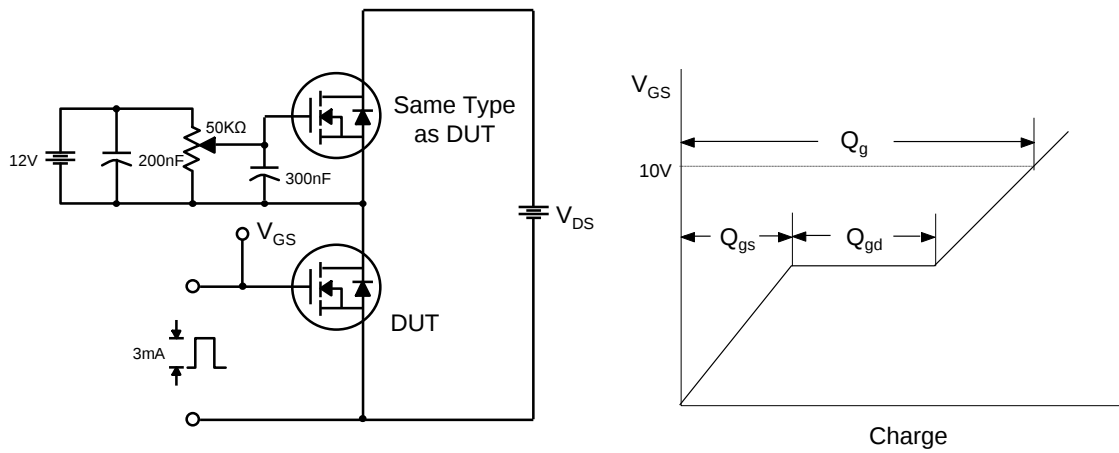


Fig 13. Resistive Switching Test Circuit & Waveforms

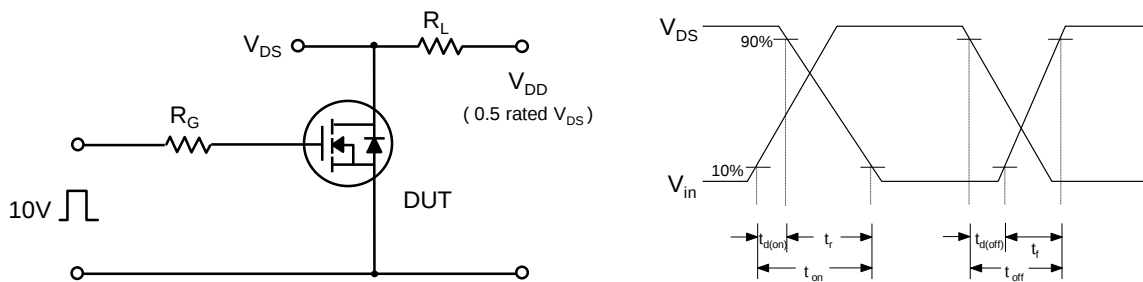


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

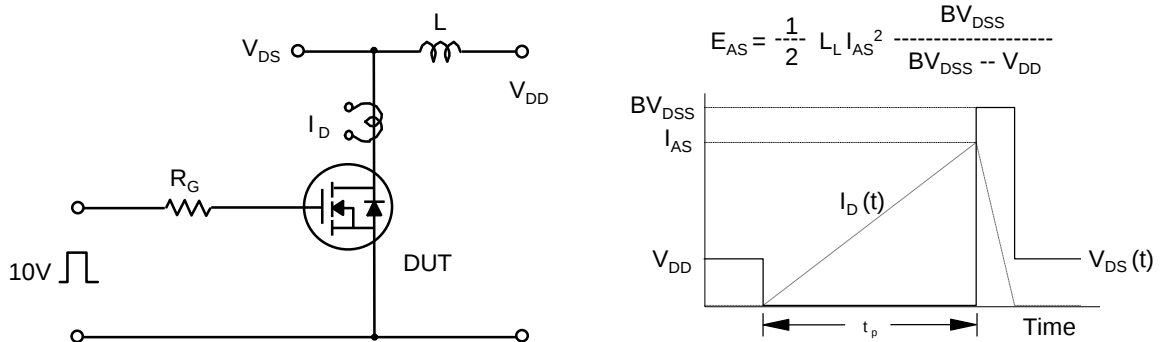
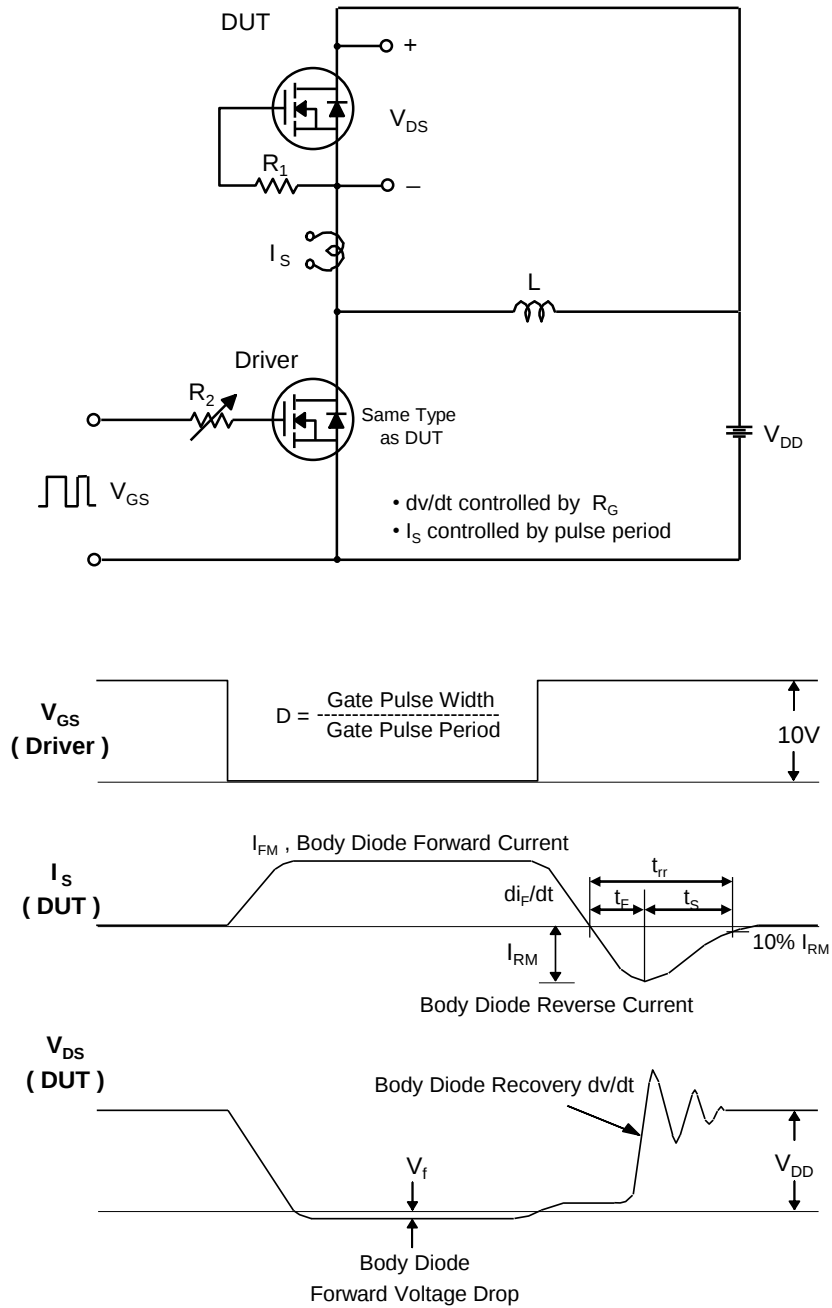
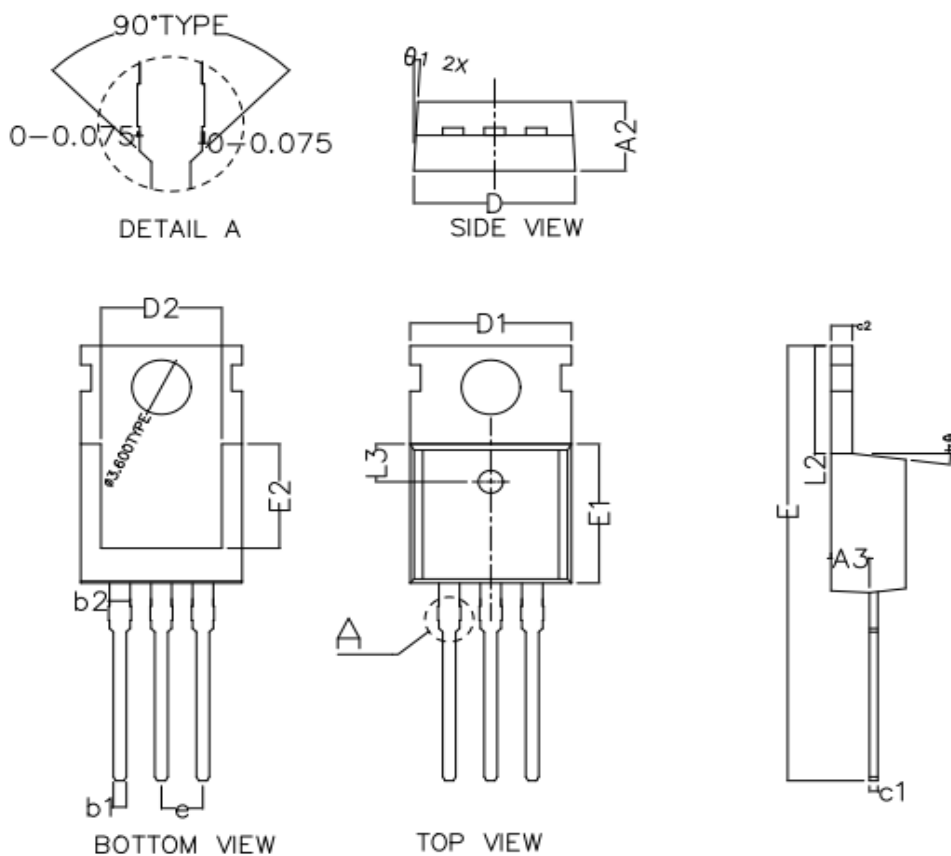


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO220 Outline



COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A2	4.470	4.570	4.670
A3	2.300	2.350	2.400
b1	0.750	0.800	0.850
b2	1.27 TYPE		
c1	0.450	0.500	0.550
c2	1.250	1.300	1.380
▲ D	9.900	10.000	10.100
▲ D1	10.000TYPE		
▲ D2	8.000TYPE		
▲ E	28.660	28.860	29.060
▲ E1	9.000	9.100	9.200
▲ E2	7.000TYPE		
e	2.540TYPE		
L2	6.350	6.500	6.650
L3	2.50TYPE		
θ1	3° TYPE		
θ2	3° TYPE		
θ3	7° TYPE		
θ4	7° TYPE		

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