Wuxi Unigroup Microelectronics CO.,LTD.

30V N-Channel Trench MOSFET(Preliminary)

General Description

- Trench Power technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability

Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

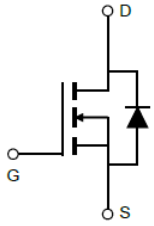
Product Summary

V_{DS}	30V
I_D (at V_{GS}=10V)	160A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 1.8mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 2.5mΩ

100% UIS Tested

RoHS

TO-220



Part Number	Package Type	Form	Marking
TTG160N03AT	TO-220	Tube	160N03AT

Absolute Maximum Ratings (T_A =25°C unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [A]	T_C =25°C	I_D	160	A
	T_C =100°C		110	
Pulsed Drain Current [A]		I_{DM}	480	A
Avalanche Current [A]		I_{AS}	56	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	470	mJ
Power Dissipation [C]	T_C =25°C	P_D	136	W
	T_C =100°C		68	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.1	°C/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	100	

Electrical Characteristics(T_J =25ºC unless otherwise noted)

Symbol	Parameter	Conditions		Value			Units
				Min	Typ	Max	
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D =250μA,V_{GS} =0V		30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =30V, V_{GS} =0V	T_J =25ºC			1	μA
			T_J =125ºC			100	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =250μA		1	1.6	2.4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =10V, I_D =30A			1.3	1.8	mΩ
		V_{GS} =4.5V, I_D =30A			2.0	2.5	mΩ
g_{FS}	Forward Transconductance	V_{DS} =10V, I_D =20A			61		S
V_{SD}	Diode Forward Voltage	I_S =30A, V_{GS} =0V				1	V
I_S	Maximum Body-Diode Continuous Current [B]					51	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =15V, f =1MH_Z			8826		pF
C_{oss}	Output Capacitance				1320		
C_{rss}	Reverse Transfer Capacitance				1386		
R_g	Gate Resistance	f =1MH_Z			1.7		Ω
SWITCHING PARAMETERS							
Q_g	Total Gate Charge	V_{GS} =10V,V_{DS} =15V, I_D =50A			177		nC
Q_{gs}	Gate Source Charge				29		
Q_{gd}	Gate Drain Charge				35		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =10V,V_{DS} =15V, I_D =50A, R_G =3Ω			30		ns
t_r	Turn-On Rise Time				29		
$T_{D(off)}$	Turn-Off Delay Time				101		
t_f	Turn-Off Fall Time				48		
t_{rr}	Body Diode Reverse Recovery Time	I_F =30A, di/dt =100A/μs			47		ns
Q_{rr}	Body Diode Reverse Recovery Charge				43		nC

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation P_D is based on $T_{J(MAX)}$ =175ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

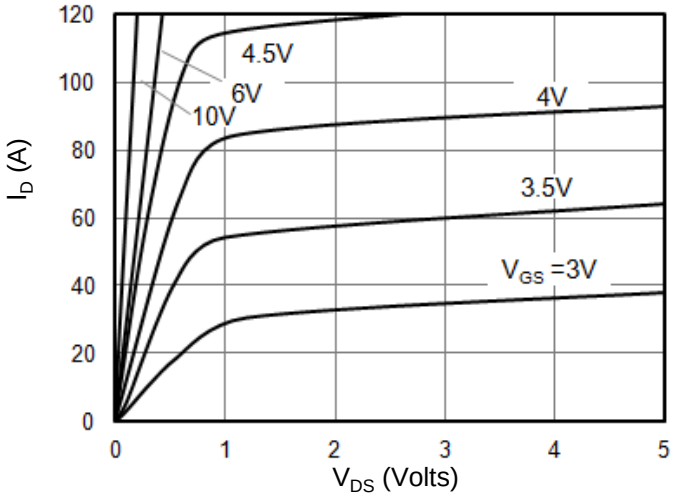


Figure 1: On-Region Characteristics

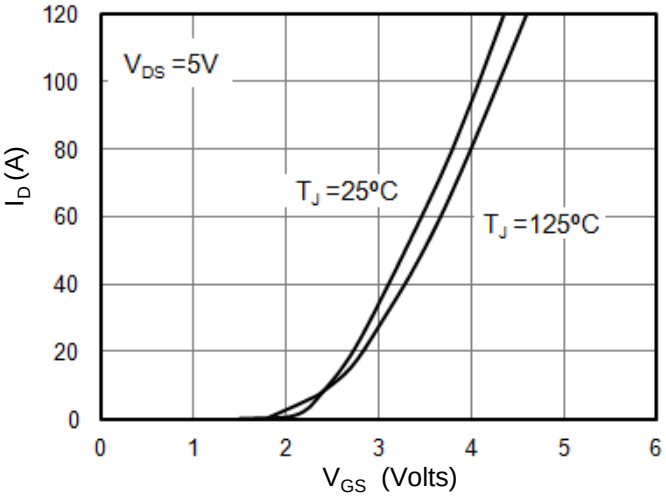


Figure 2: Transfer Characteristics

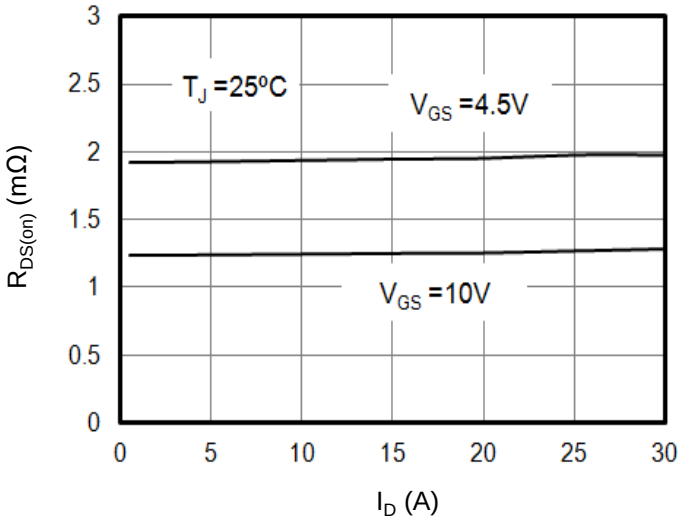


Figure 3: On-Resistance vs. Drain Current

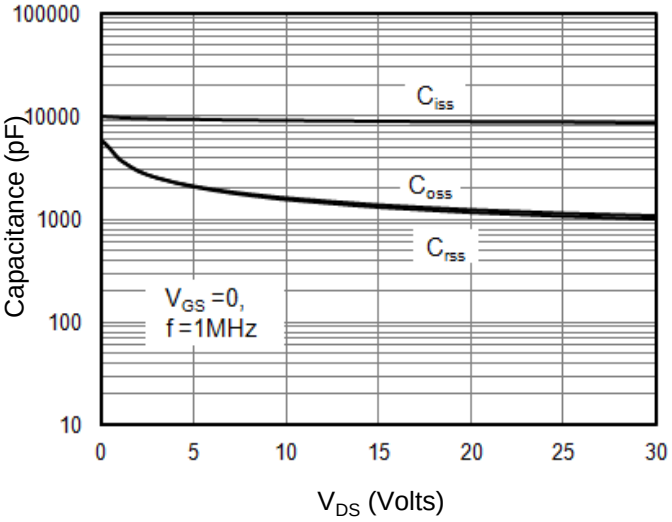


Figure 4: Capacitance Characteristics

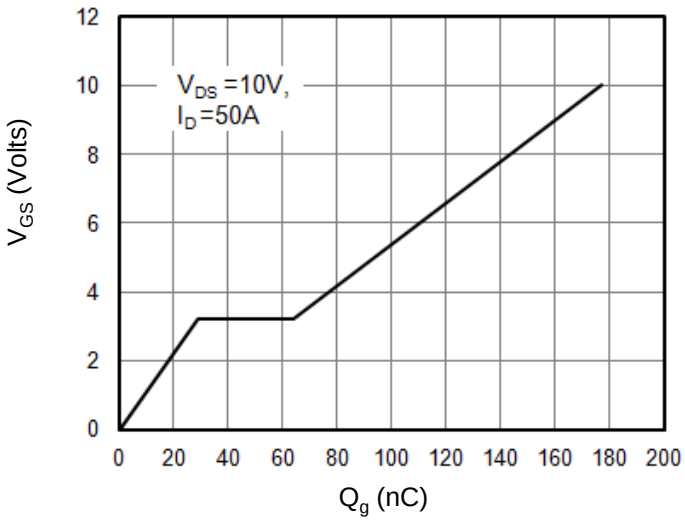


Figure 5: Gate Charge Characteristics

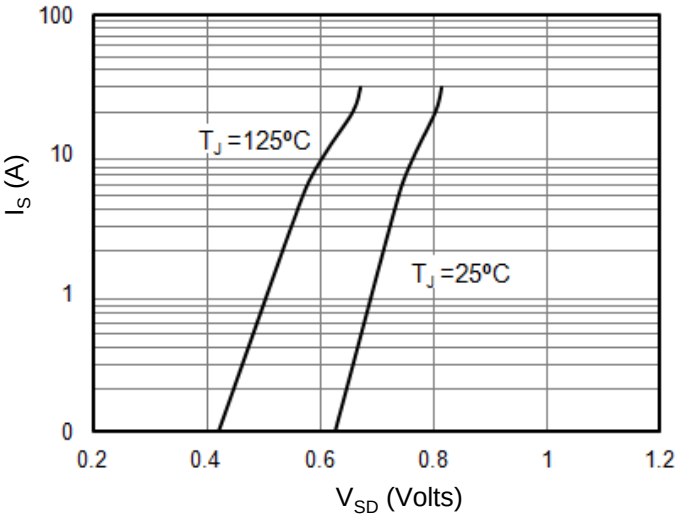


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

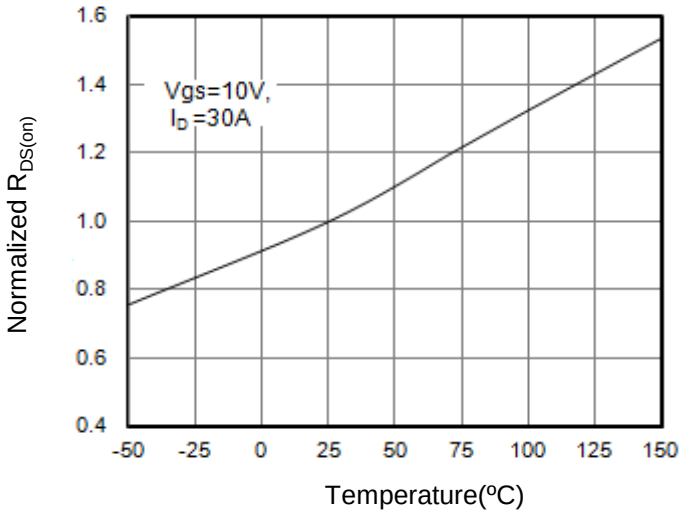


Figure 7: On-Resistance vs. Junction Temperature

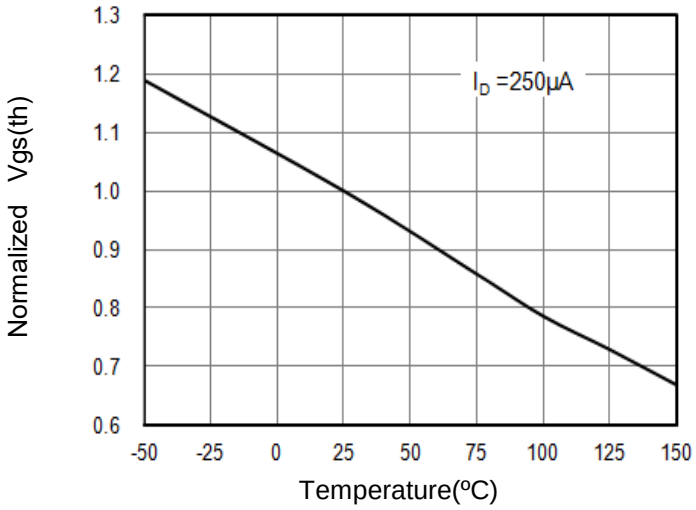


Figure 8: Vgs(th) vs. Junction Temperature

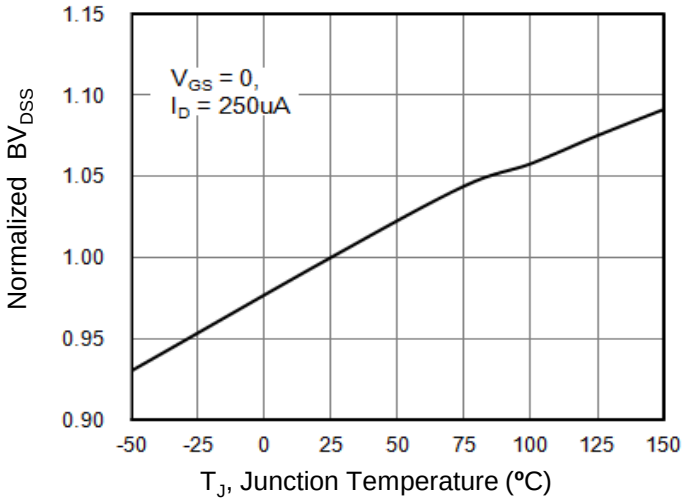


Figure 9: BV_{DSS} vs. Junction Temperature

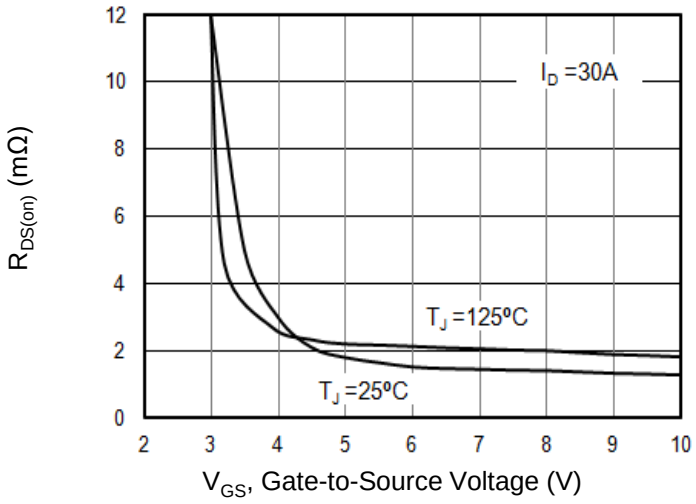


Figure 10: On-Resistance vs. Gate-Source Voltage

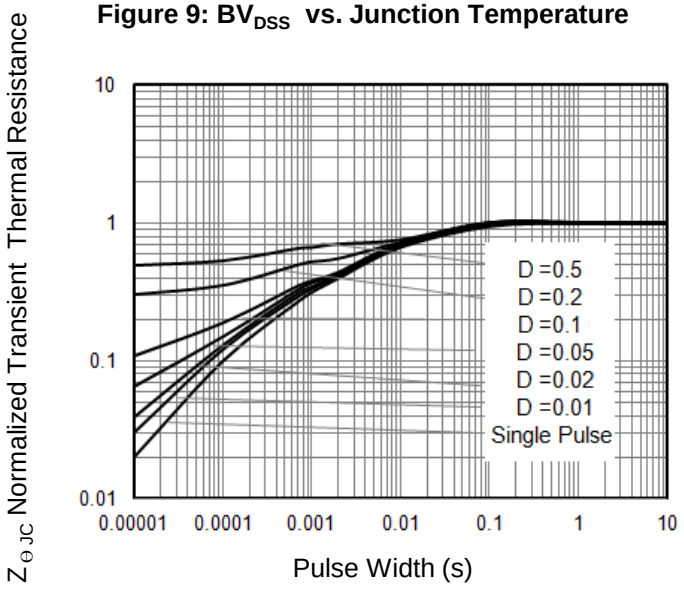


Figure 11: Normalized Transient Thermal Resistance

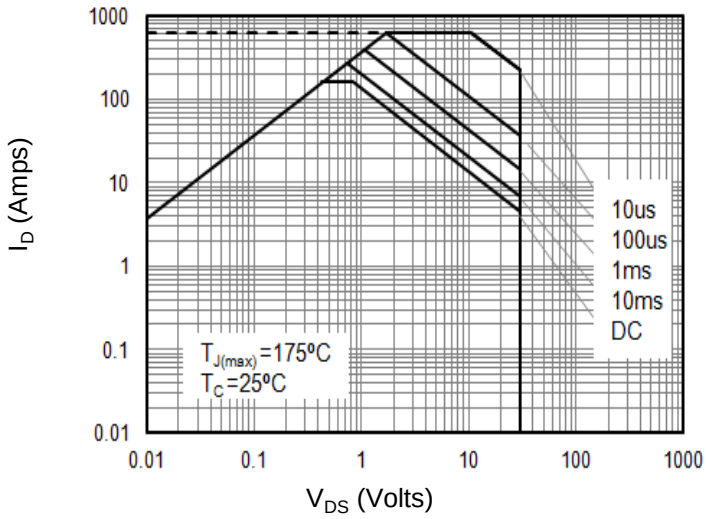


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveforms

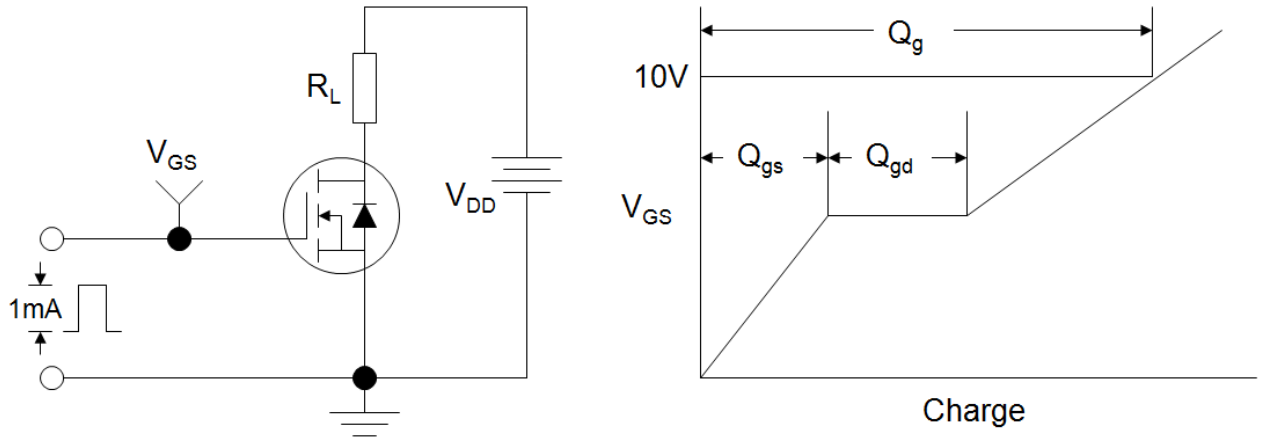


Figure B：Resistive Switching Test Circuit and Waveforms

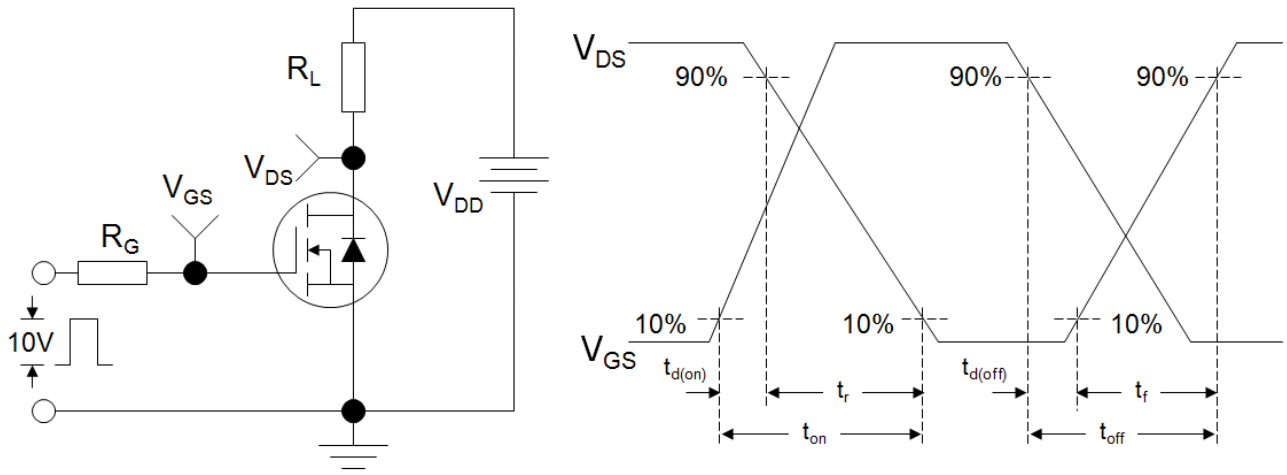
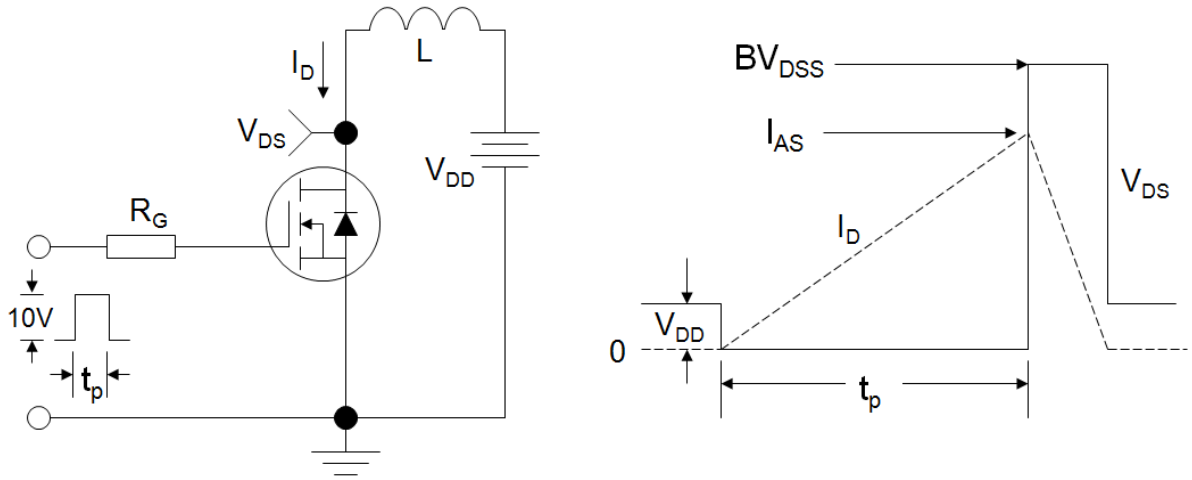
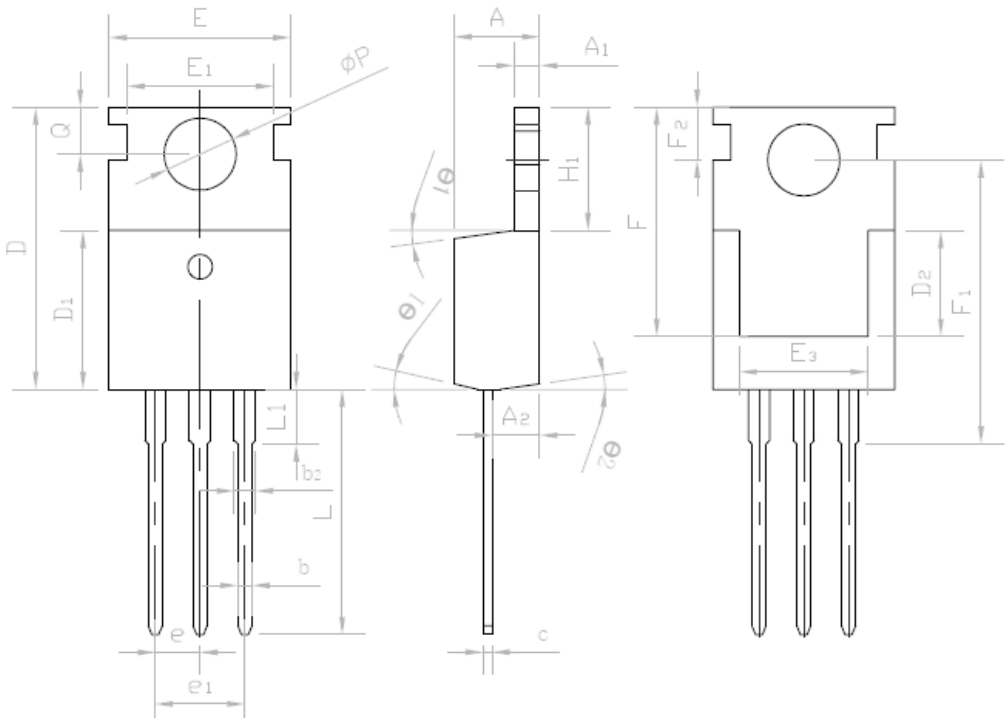


Figure C：Unclamped Inductive Switching (UIS) Test Circuit and Waveforms



TO-220(E)



SYMBOL	MIN	NOM	MAX
A	4.27	4.57	4.87
A_1	1.15	1.30	1.45
A_2	2.10	2.40	2.70
b	0.70	0.80	1.00
b_2	1.17	1.27	1.50
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D_1	8.80	9.10	9.40
D_2	5.70	6.70	7.00
E	9.70	10.00	10.30
E_1	–	8.70	–
E_2	9.63	10.00	10.35
E_3	7.00	8.00	8.40
e	2.54 BSC		
e_1	5.08 BSC		
H_1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	–	3.10	3.40
øP	3.45	3.60	3.75
Q	2.60	2.80	3.00
θ_1	4°	7°	10°
θ_2	0°	3°	6°
F	13.30	13.50	13.70
F_1	15.50	15.90	16.30
F_2	2.80	3.00	3.20

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