
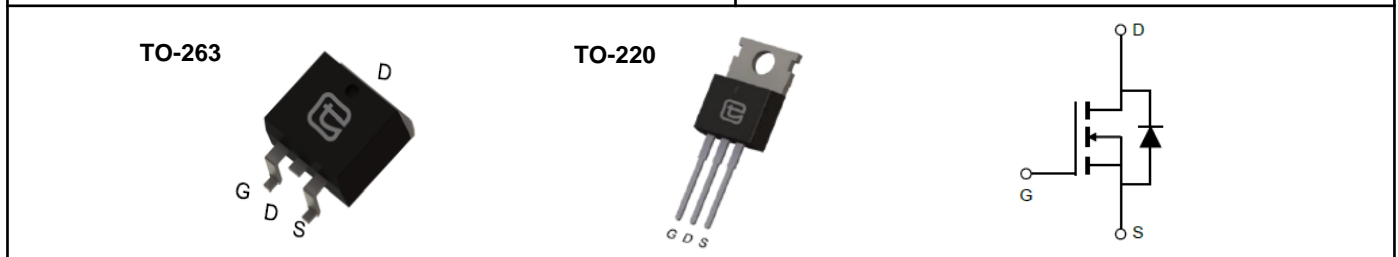




60V N-Channel Trench MOSFET

<p>General Description</p> <ul style="list-style-type: none"> ● Trench Power technology ● Low $R_{DS(ON)}$ ● Low Gate Charge ● Optimized for fast-switching applications <p>Applications</p> <ul style="list-style-type: none"> ● Synchronous Rectification in DC/DC and AC/DC Converters ● Isolated DC/DC Converters in Telecom and Industrial 	<p>Product Summary</p> <table border="0"> <tr> <td>V_{DS}</td> <td>60V</td> </tr> <tr> <td>I_D (at $V_{GS}=10V$)</td> <td>145A</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=10V$)</td> <td>< 4.8mΩ</td> </tr> </table> <p>100% UIS Tested</p> 	V_{DS}	60V	I_D (at $V_{GS}=10V$)	145A	$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 4.8m Ω
V_{DS}	60V						
I_D (at $V_{GS}=10V$)	145A						
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 4.8m Ω						



Part Number	Package Type	Form	Marking
TTB145N06A	TO-263	Tape & Reel	TTB145N06A
TTP145N06A	TO-220	Tube	TTP145N06A

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^B	I_D	$T_C = 25^\circ\text{C}$	105
		$T_C = 100^\circ\text{C}$	105
Pulsed Drain Current ^A	I_{DM}	435	A
Avalanche Current ^A	I_{AS}	57	A
Single Pulse Avalanche Energy $L = 0.3\text{mH}$ ^A	E_{AS}	487	mJ
Power Dissipation ^C	P_D	$T_C = 25^\circ\text{C}$	217
		$T_C = 100^\circ\text{C}$	108
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Case	$R_{\theta JC}$	0.69	$^\circ\text{C/W}$
Maximum Junction-to-Ambient	$R_{\theta JA}$	100	



Electrical Characteristics($T_J = 25^\circ\text{C}$ unless otherwise noted)							
Symbol	Parameter	Conditions	Value			Units	
			Min	Typ	Max		
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	60	--	--	V	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$	$T_J = 25^\circ\text{C}$	--	--	1	μA
			$T_J = 125^\circ\text{C}$	--	--	100	
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	--	--	± 100	nA	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2	3	4	V	
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{V}, I_D = 30\text{A}$	--	3.8	4.8	m Ω	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{V}, I_D = 20\text{A}$	--	38	--	S	
V_{SD}	Diode Forward Voltage	$I_S = 30\text{A}, V_{GS} = 0\text{V}$	--	--	1	V	
I_S	Maximum Body-Diode Continuous Current ^B		--	--	105	A	
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 30\text{V}, f = 1\text{MHz}$	--	6819	--	μF	
C_{oss}	Output Capacitance		--	481	--		
C_{rss}	Reverse Transfer Capacitance		--	461	--		
R_g	Gate Resistance	$f = 1\text{MHz}$	--	1.6	--	Ω	
SWITCHING PARAMETERS							
Q_g	Total Gate Charge	$V_{GS} = 10\text{V}, V_{DS} = 30\text{V}, I_D = 20\text{A}$	--	125	--	nC	
Q_{gs}	Gate Source Charge		--	31.6	--		
Q_{gd}	Gate Drain Charge		--	36.7	--		
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 30\text{V}, I_D = 20\text{A}, R_G = 2.5\Omega$	--	25	--	ns	
t_r	Turn-On Rise Time		--	20	--		
$T_{D(off)}$	Turn-Off Delay Time		--	72	--		
t_f	Turn-Off Fall Time		--	31	--		
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$	--	36	--	ns	
Q_{rr}	Body Diode Reverse Recovery Charge		--	60	--	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 $T_{J(MAX)} = 175^\circ\text{C}$, 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

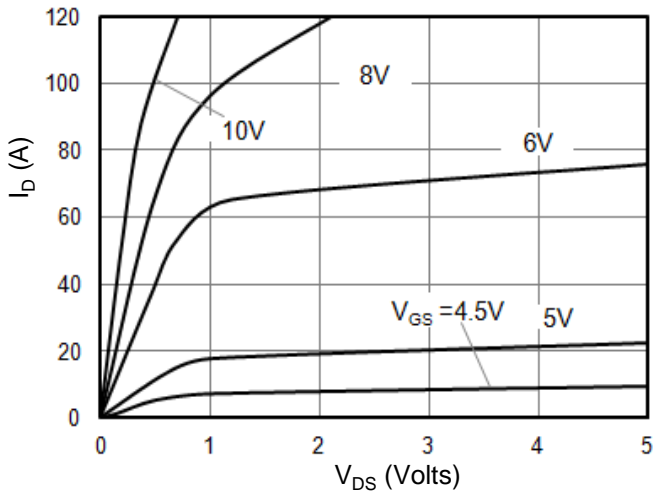


Figure 1: On-Region Characteristics

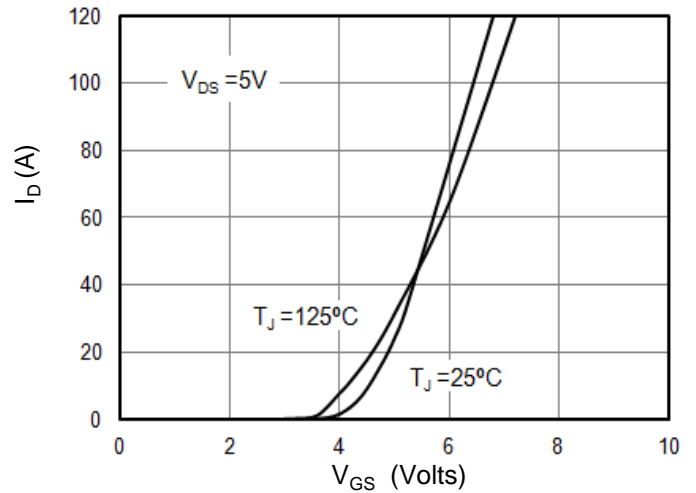


Figure 2: Transfer Characteristics

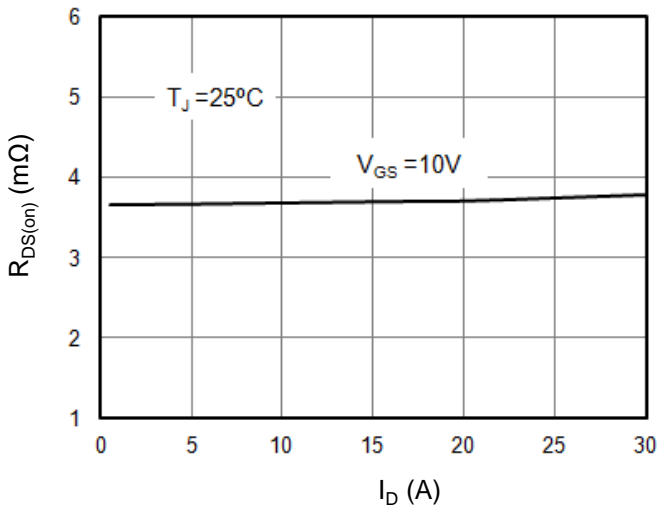


Figure 3: On-Resistance vs. Drain Current

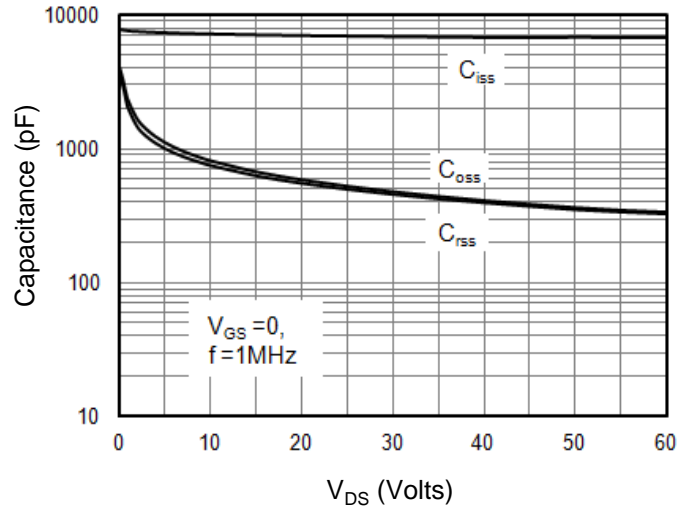


Figure 4: Capacitance Characteristics

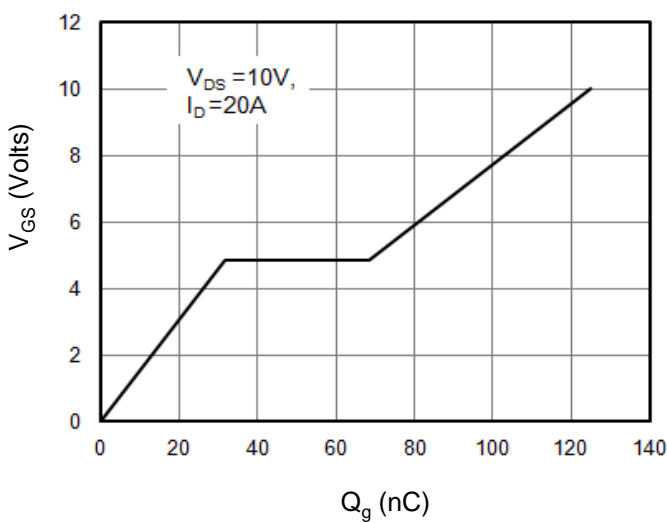


Figure 5: Gate Charge Characteristics

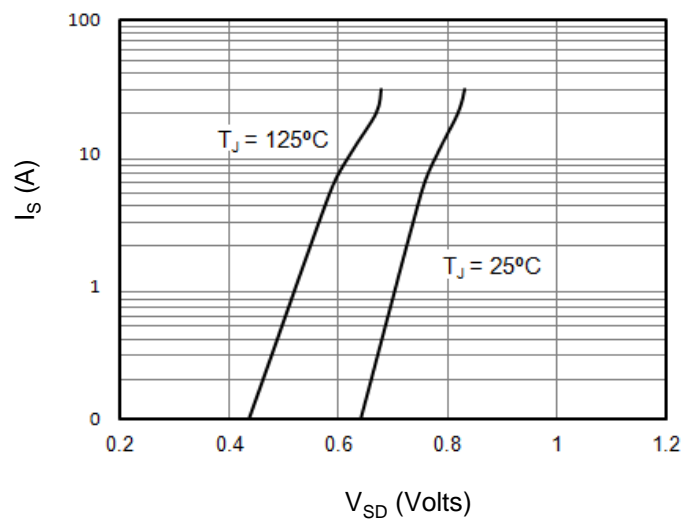


Figure 6: Body Diode Forward Voltage



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

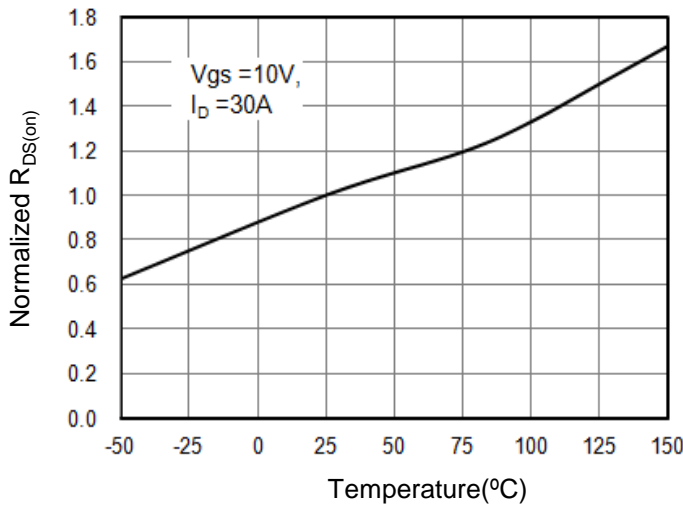


Figure 7: On-Resistance vs. Junction Temperature

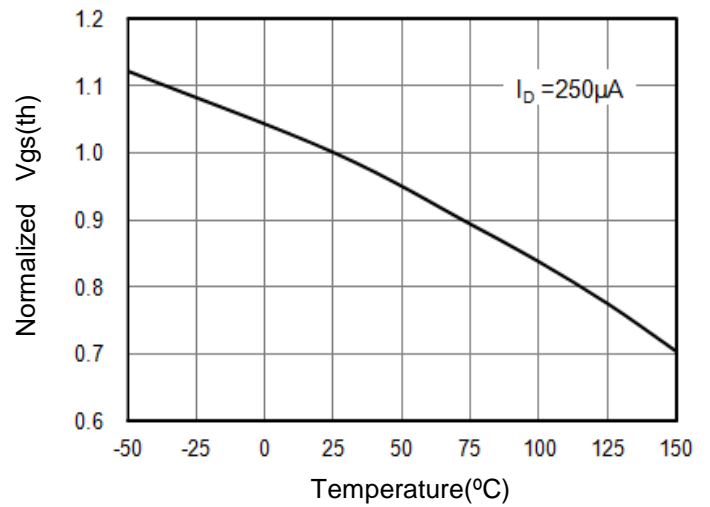


Figure 8: $V_{GS(th)}$ vs. Junction Temperature

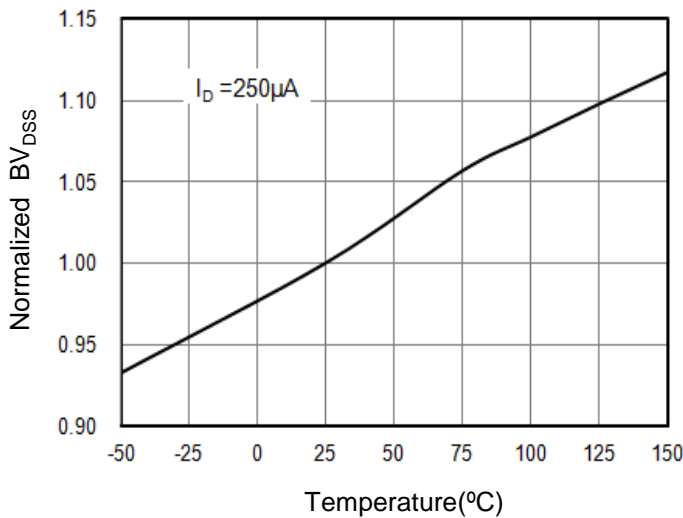


Figure 9: BV_{DS} vs. Junction Temperature

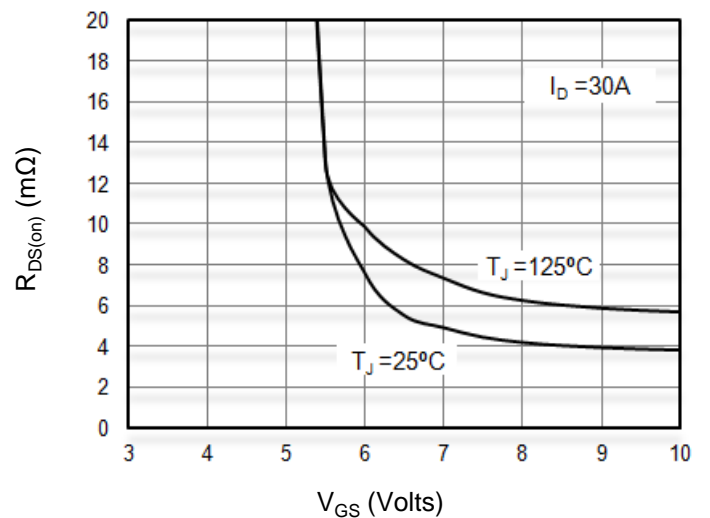


Figure 10: On-Resistance vs. Gate-Source Voltage

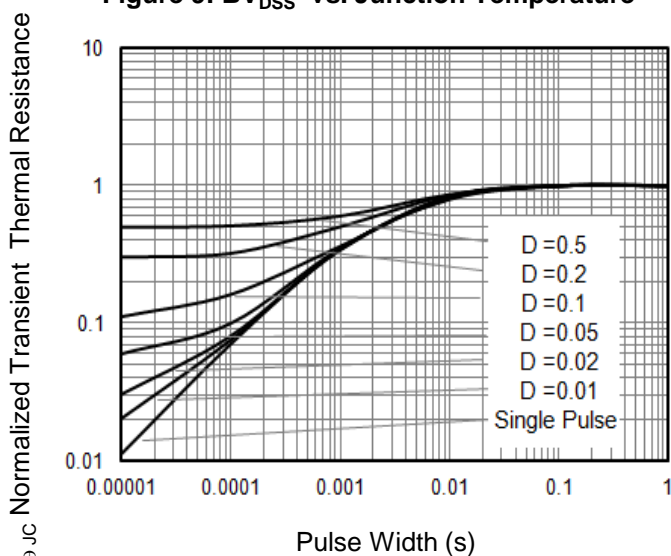


Figure 11: Normalized Transient Thermal Resistance

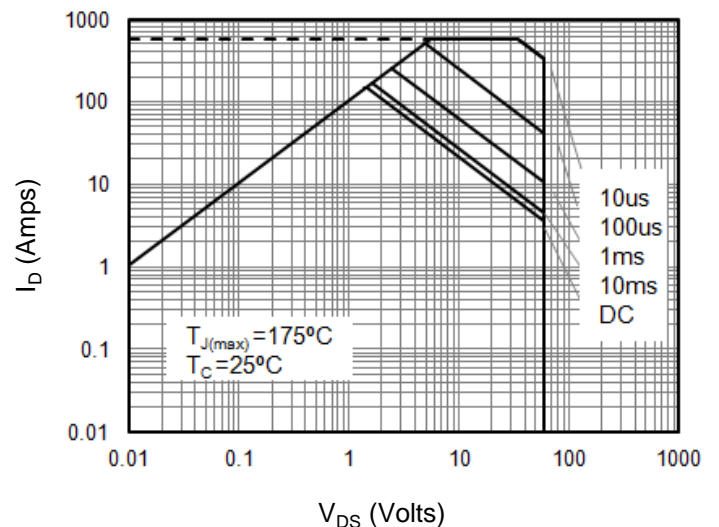


Figure 12: Safe Operating Area



Figure A: Gate Charge Test Circuit and Waveforms

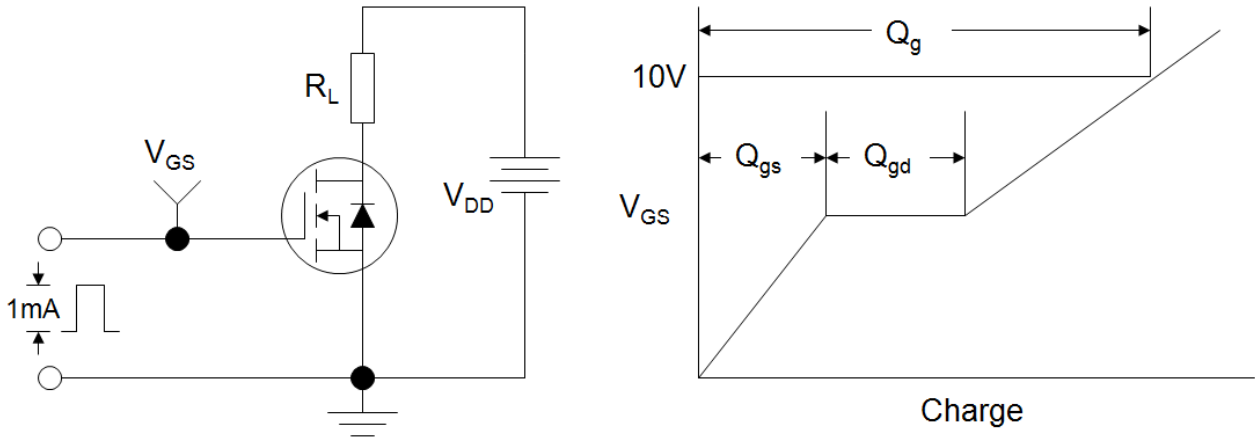


Figure B: Resistive Switching Test Circuit and Waveforms

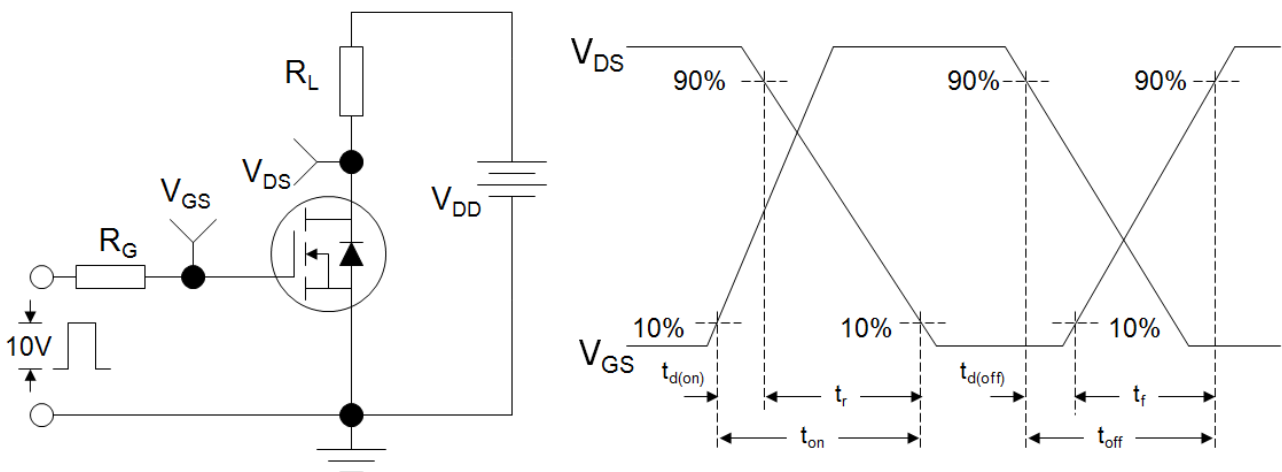
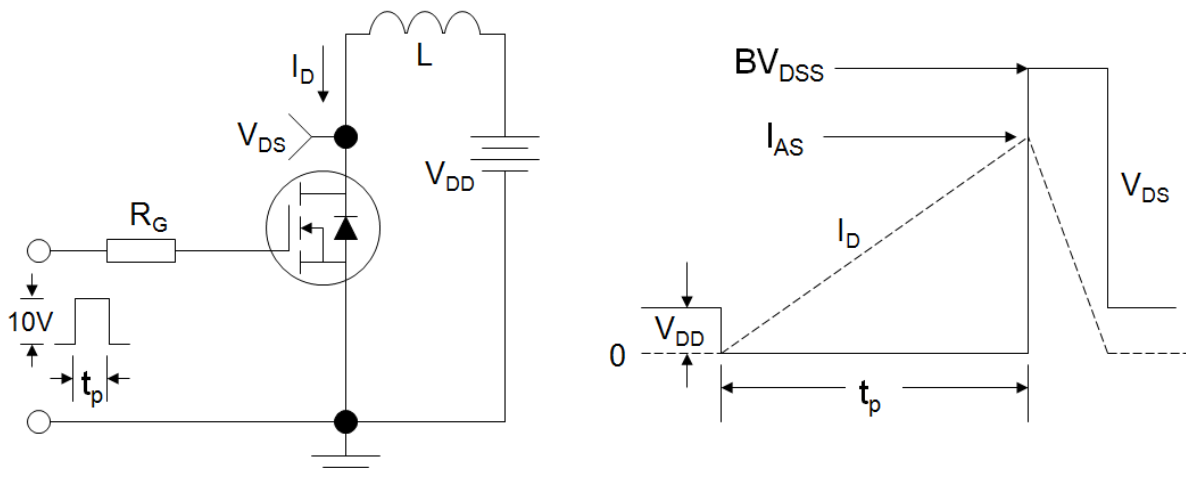
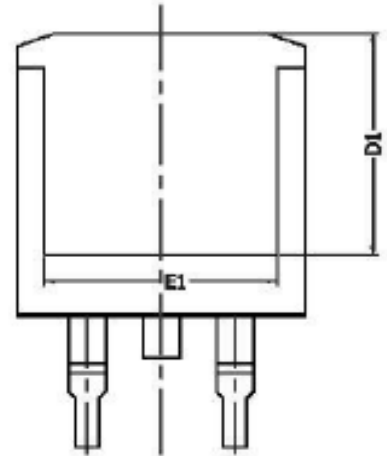
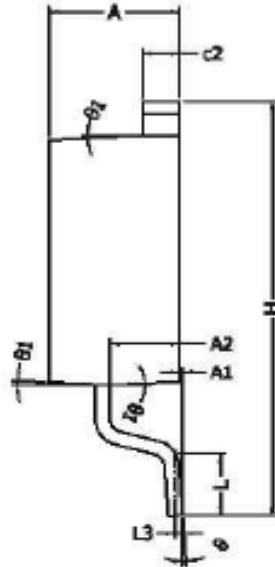
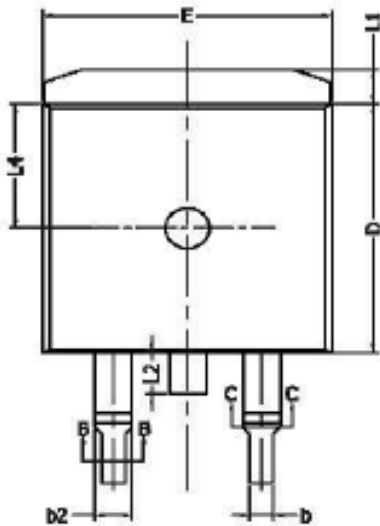


Figure C: Unclamped Inductive Switching (UIS) Test Circuit and Waveforms





TO-263(集佳)



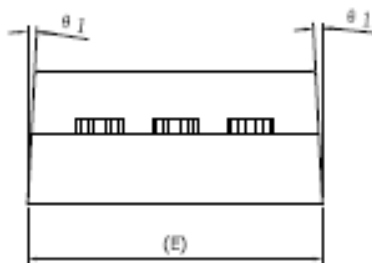
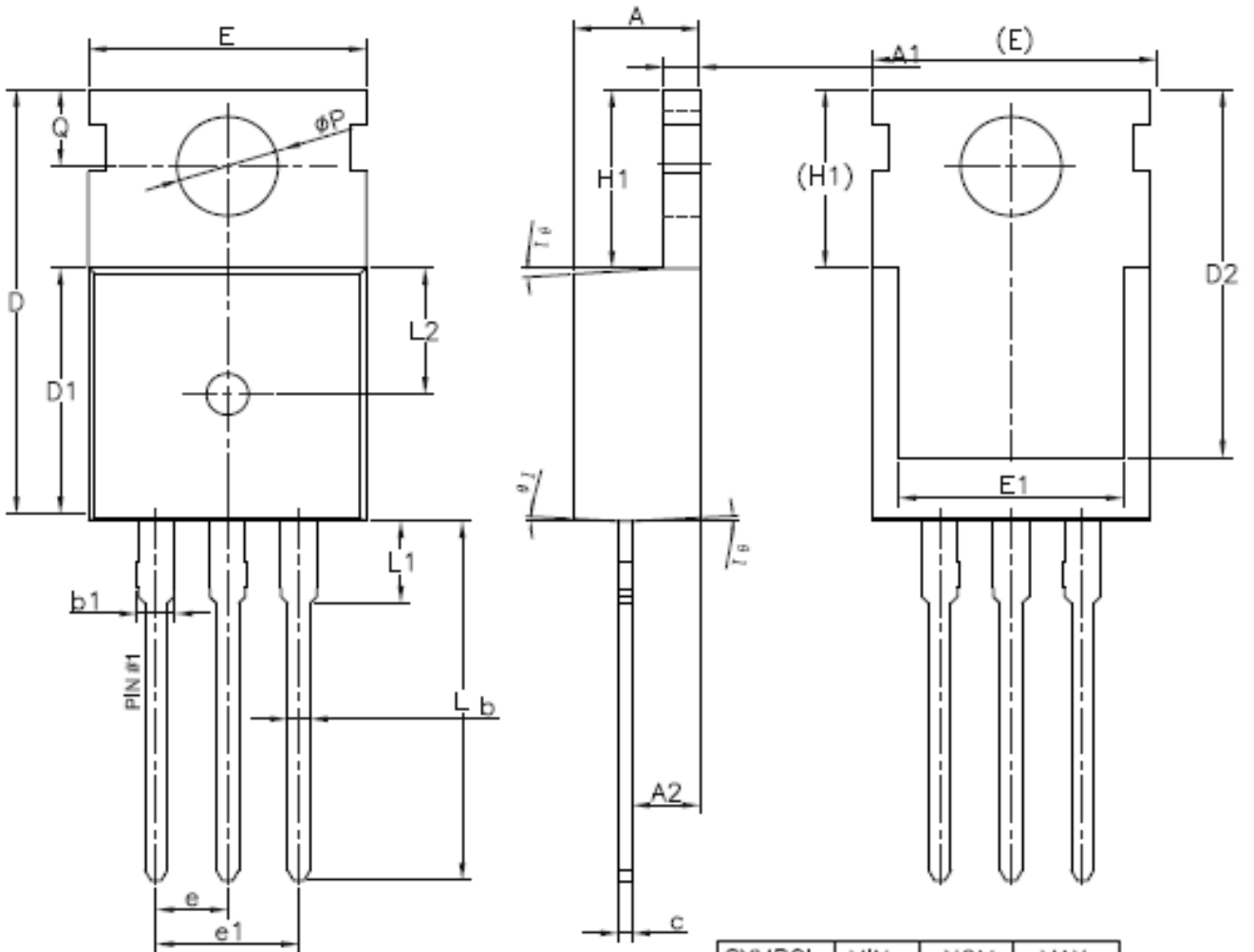
COMMON DIMENSIONS
(UNITS OF MEASURE -MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	0	0.10	0.25
A2	2.20	2.40	2.60
b	0.76	—	0.89
b1	0.75	0.80	0.85
b2	1.23	—	1.37
b3	1.22	1.27	1.32
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	1.25	1.30	1.35
D	9.10	9.20	9.30
D1	8.00	—	—
E	9.80	9.90	10.00
E1	7.80	—	—
e	2.54 BSC		
H	14.90	15.30	15.70
L	2.00	2.30	2.60
L1	1.17	1.27	1.40
L2	—	—	1.75
L3	0.25BSC		
L4	4.60 REF		
θ	0°	—	8°
θ1	1°	3°	5°





TO-220 (集佳)



SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	-	0.90
b1	1.27	-	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	-	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	-	-	3.50
L2	4.60REF		
ϕP	3.55	3.60	3.65
Q	2.73	-	2.87
$\theta 1$	1°	3°	5°



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