Wuxi Unigroup Microelectronics CO.,LTD.

100V N-Channel SGT MOSFET

General Description

- **Trench Power SGT technology**
- Very low on-resistance $R_{DS(ON)}$
- Low Gate Charge
- Excellent Gate Charge x $R_{DS(ON)}$ Product

Applications

- High Frequency Switching and Synchronous Rectification

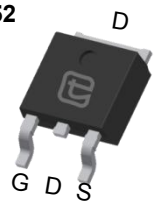
Product Summary

V_{DS}	100V
I_D (at V_{GS} =10V)	55A
$R_{DS(ON)}$ (at V_{GS} =10V)	< 12mΩ
$R_{DS(ON)}$ (at V_{GS} =4.5V)	< 15mΩ

100% UIS Tested
100% DVDS Tested

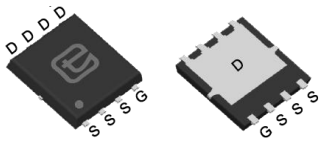
RoHS

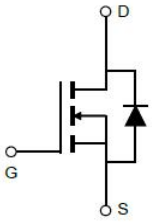
TO-252



TO-220

DFN5x6





Part Number	Package Type	Form	Marking
TSD120N10AT	TO-252	Tape&Reel	TSD120N10AT
TSP120N10AT	TO-220	Tube	TSP120N10AT
TSG120N10AT	DFN5x6	Tape&Reel	TSG120N10AT

Absolute Maximum Ratings (T_A =25ºC unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current B	T_C =25ºC	I_D	55	A
	T_C =100ºC		39	
Pulsed Drain Current A		I_{DM}	220	A
Avalanche Current A		I_{AS}	20	A
Single Pulse Avalanche Energy L =0.3mH A		E_{AS}	60	mJ
Power Dissipation C	T_C =25ºC	P_D	83.3	W
	T_C =100ºC		41.7	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	ºC

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.8	ºC/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	50	

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		100			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =100V, 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	1.6	2.4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =10V, I_D =30A			10	12	mΩ
		V_{GS} =4.5V, I_D =30A			12	15	mΩ
g_{FS}	Forward Transconductance	V_{DS} =5V, I_D =20A			32		S
V_{SD}	Diode Forward Voltage	I_S =30A, V_{GS} =0V				1	V
I_S	Maximum Body-Diode Continuous Current B					55	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =50V, f =1MH_Z			1766		pF
C_{oss}	Output Capacitance				201		
C_{rss}	Reverse Transfer Capacitance				4.1		
R_g	Gate Resistance	f =1MH_Z			2.3		Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =10V,V_{DS} =50V, I_D =20A			25.7		nC
Q_g(4.5V)	Gate Source Charge				13		
Q_{gs}	Gate Source Charge				4.3		
Q_{gd}	Gate Drain Charge				5.3		
Q_{oss}	Output Charge	V_{GS} =0V,V_{DS} =50V			34.2		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =10V,V_{DS} =50V, I_D =20A, R_G =1.8Ω			33		ns
t_r	Turn-On Rise Time				4		
$t_{D(off)}$	Turn-Off Delay Time				55		
t_f	Turn-Off Fall Time				3.1		
t_{rr}	Body Diode Reverse Recovery Time	I_F =20A, di/dt =100A/μs			49		ns
Q_{rr}	Body Diode Reverse Recovery Charge				71		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

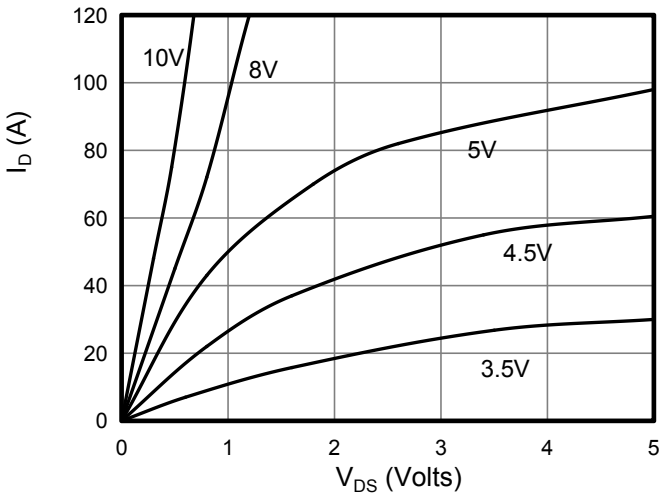


Figure 1: On-Region Characteristics

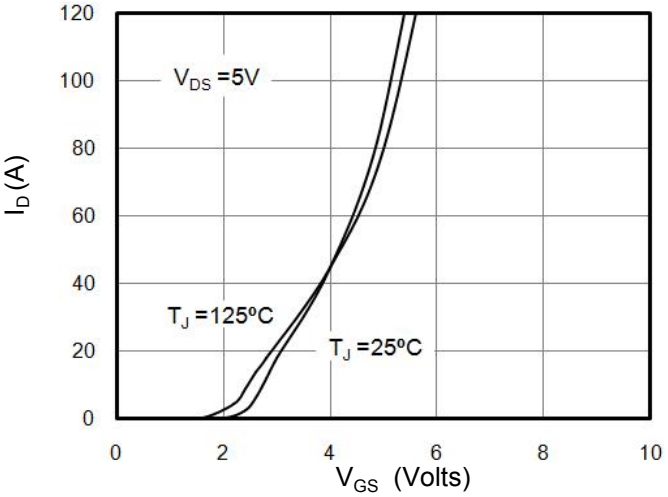


Figure 2: Transfer Characteristics

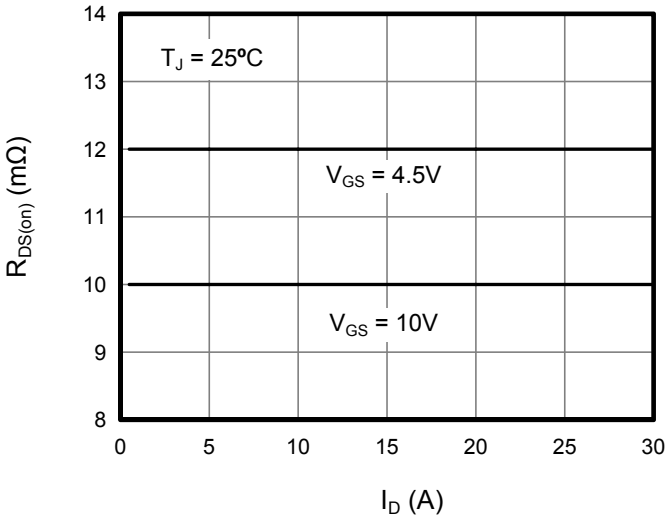


Figure 3: On-Resistance vs. Drain Current

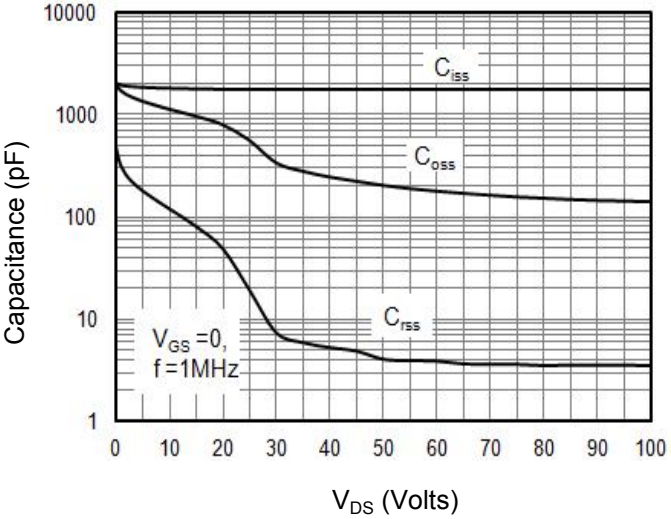


Figure 4: Capacitance Characteristics

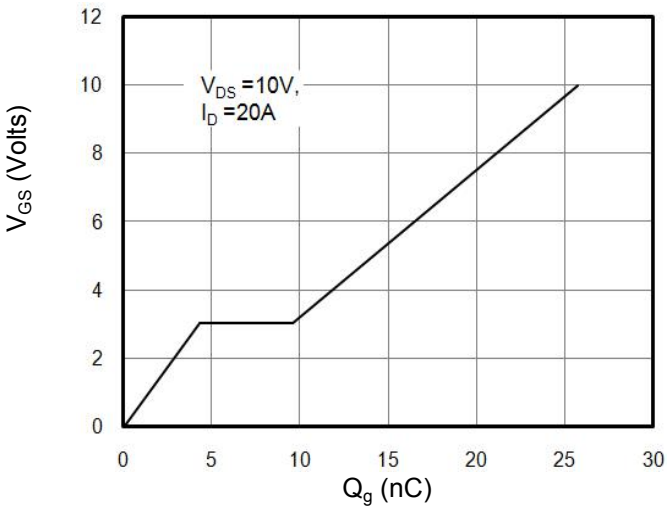


Figure 5: Gate Charge Characteristics

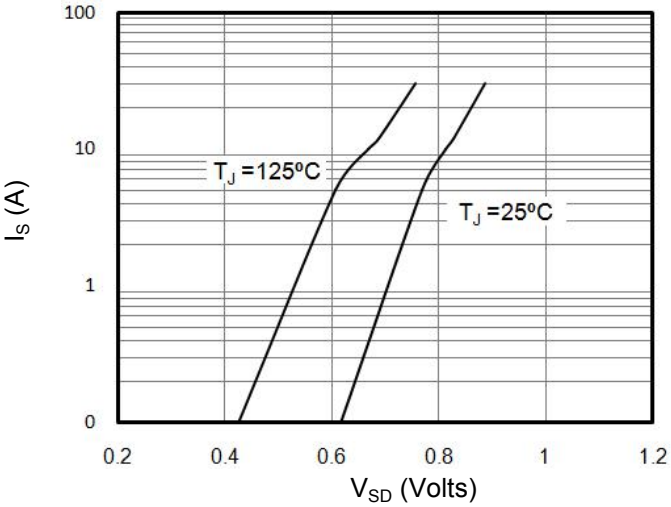


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

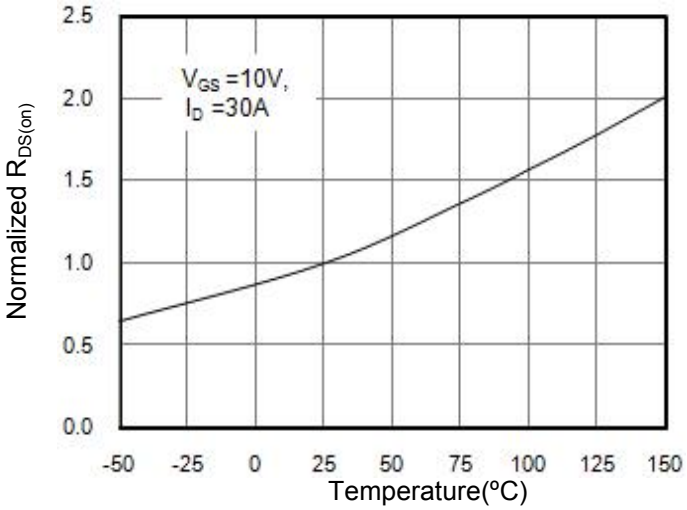


Figure 7: On-Resistance vs. Junction Temperature

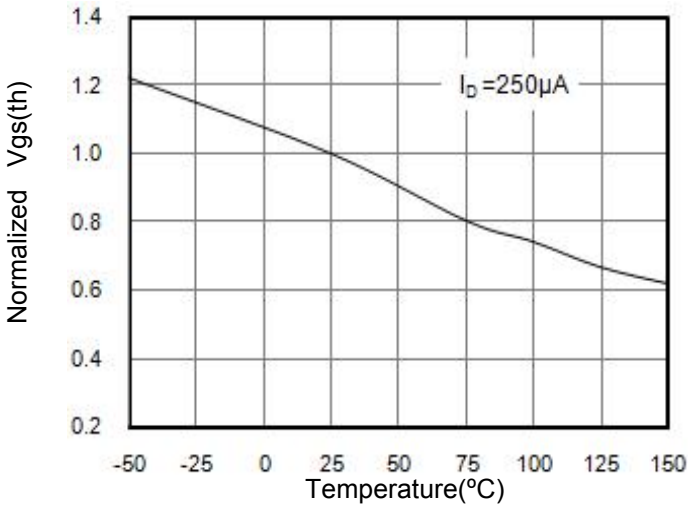


Figure 8: Vgs(th) vs. Junction Temperature

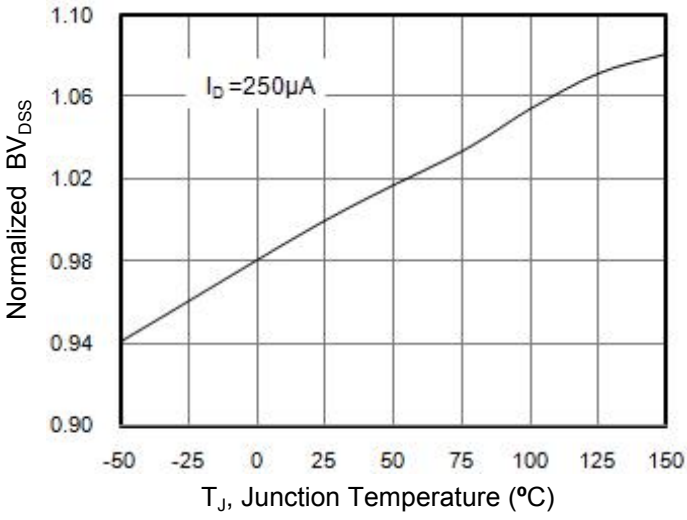


Figure 9: BV_{DSS} vs. Junction Temperature

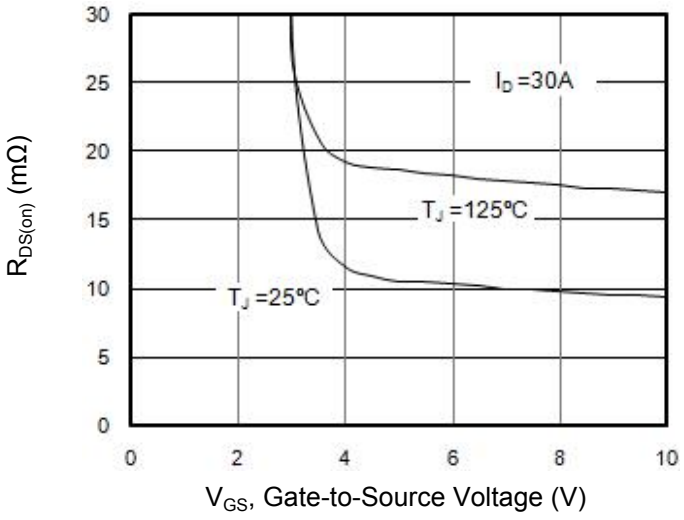


Figure 10: On-Resistance vs. Gate-Source Voltage

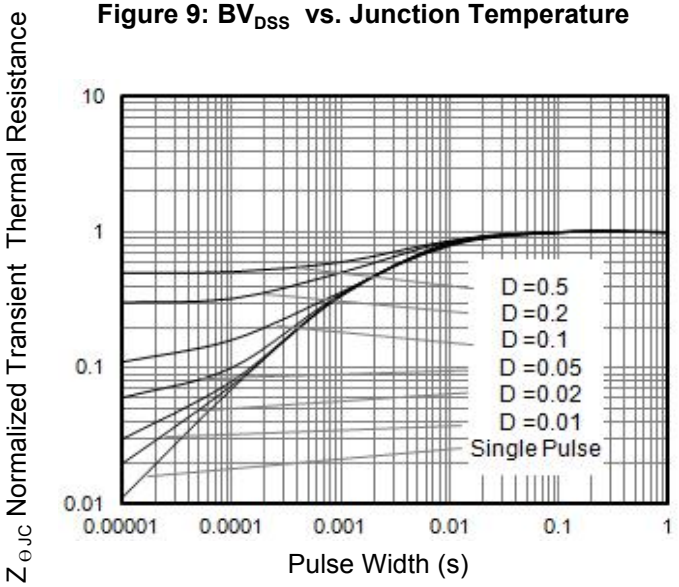


Figure 11: Normalized Transient Thermal Resistance

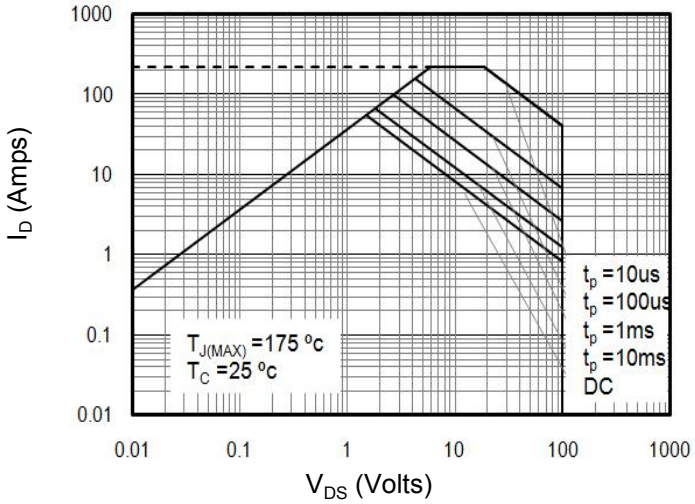


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveforms

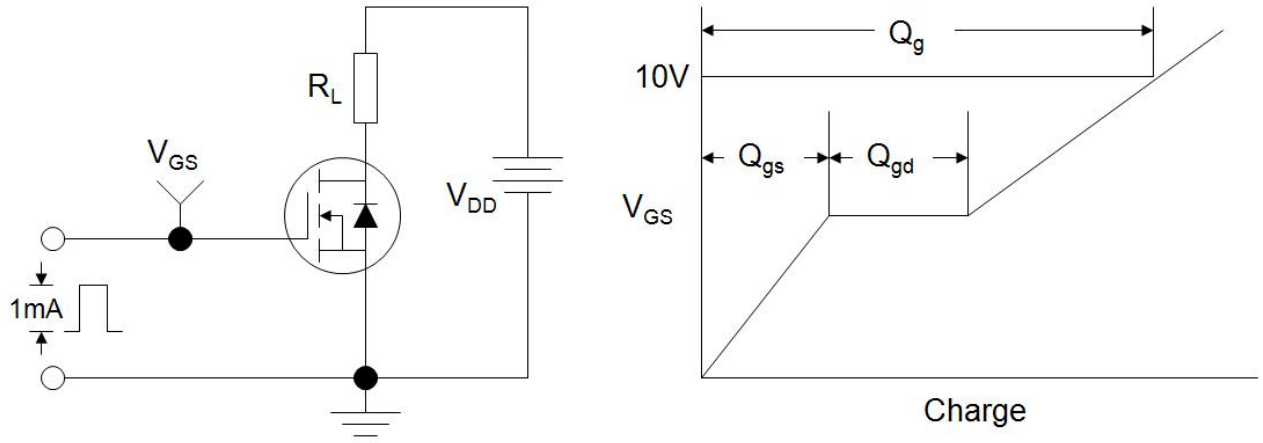


Figure B：Resistive Switching Test Circuit and Waveforms

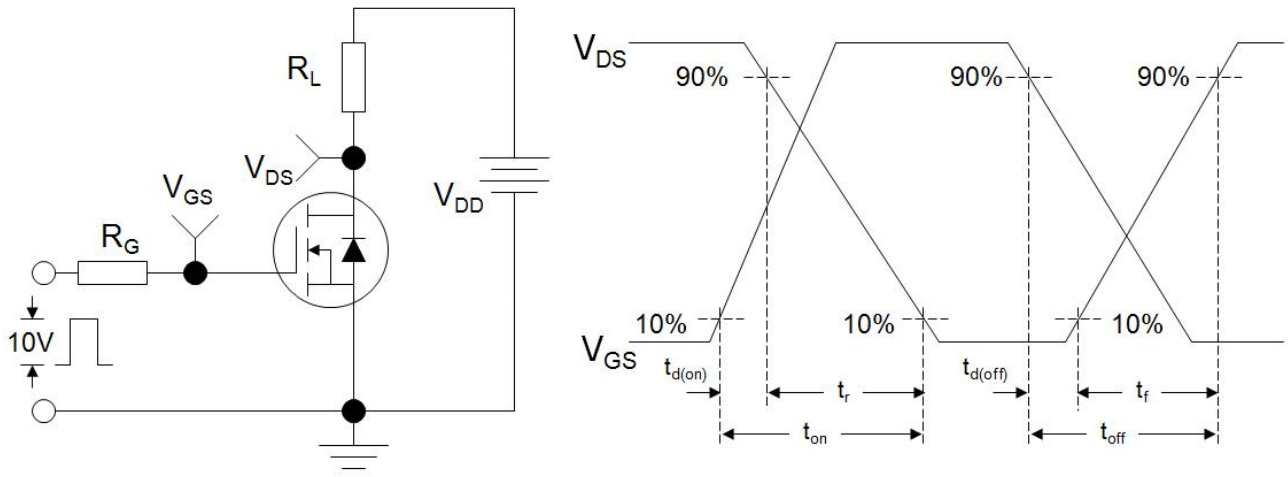
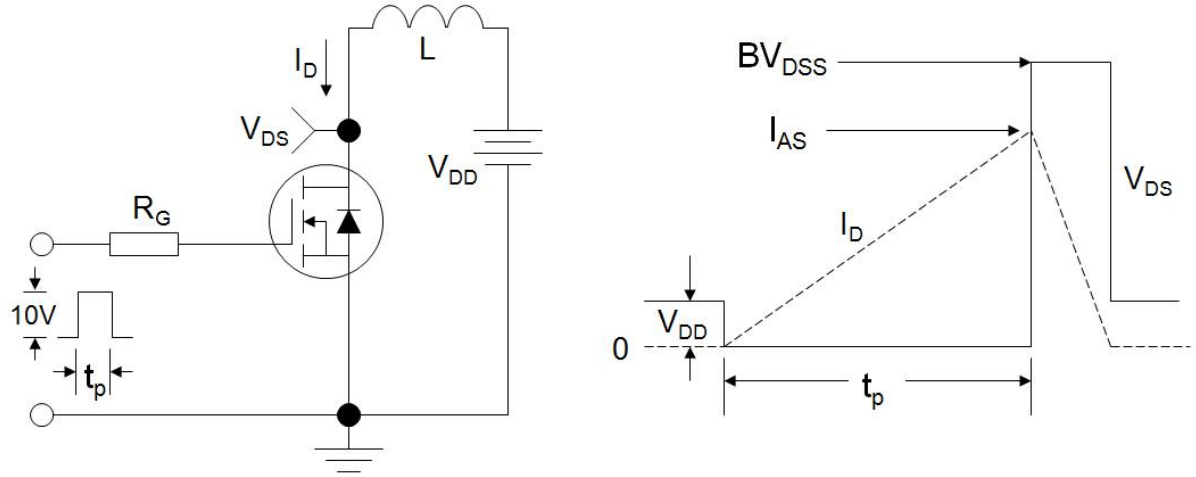
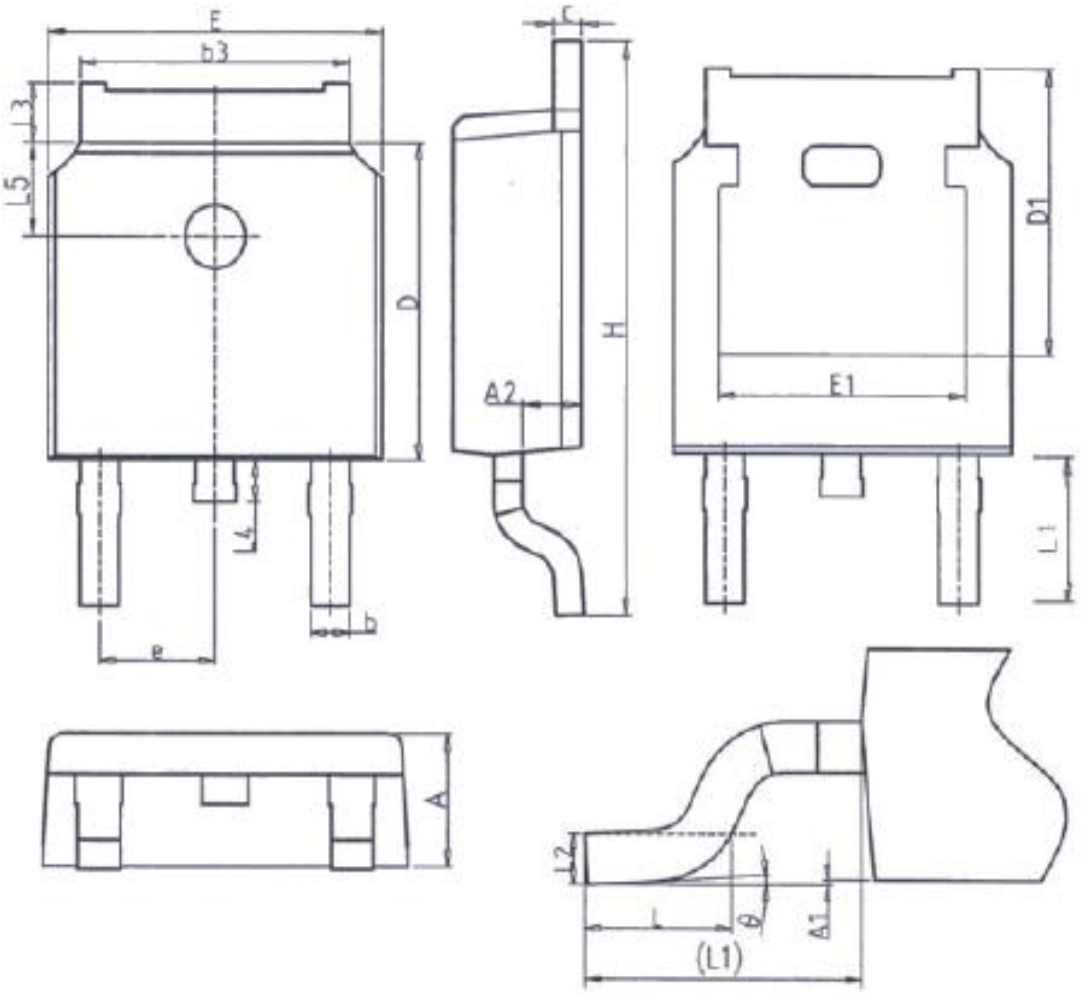


Figure C：Unclamped Inductive Switching (UIS) Test Circuit and Waveforms



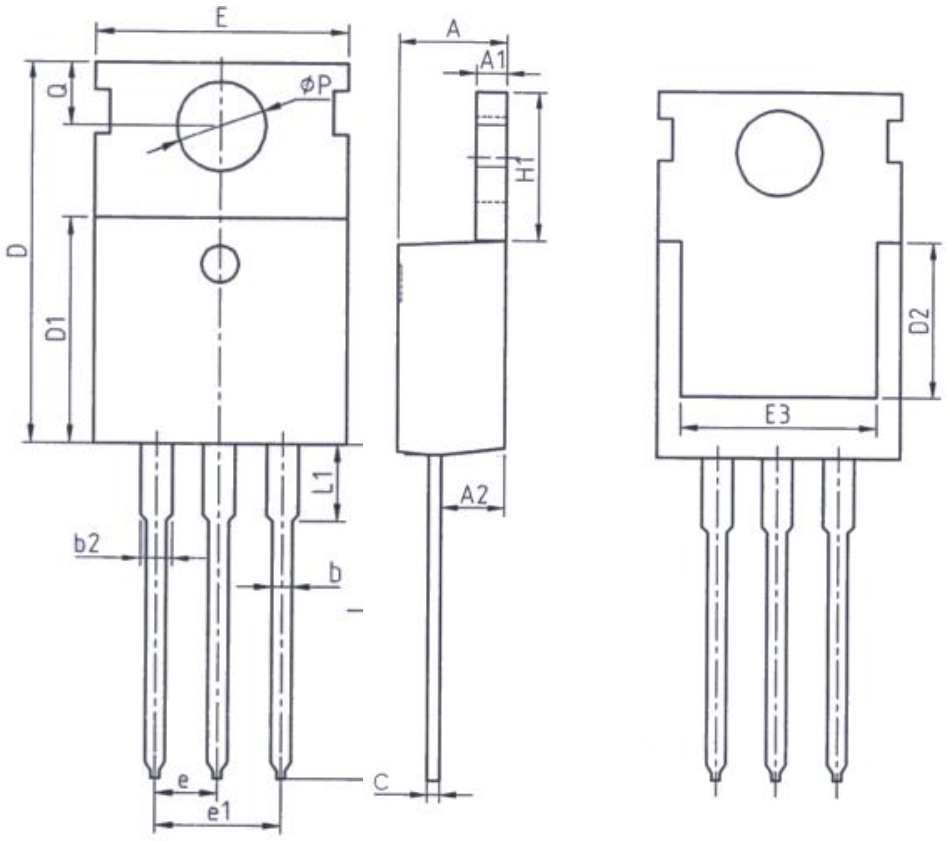
TO-252



Unit：mm			
Symbol	Min	Nom	Max
A	2.20	2.30	2.38
A1	0.00	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b3	5.13	5.33	5.46
c	0.47	-	0.60
D	6.00	6.10	6.20
D1		5.25 REF	
E	6.50	6.60	6.70
E1	4.70	-	-

Unit：mm			
Symbol	Min	Nom	Max
e		2.286BSC	
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1		2.90REF	
L2		0.508BSC	
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5		1.8 REF	
θ	0°	-	8°

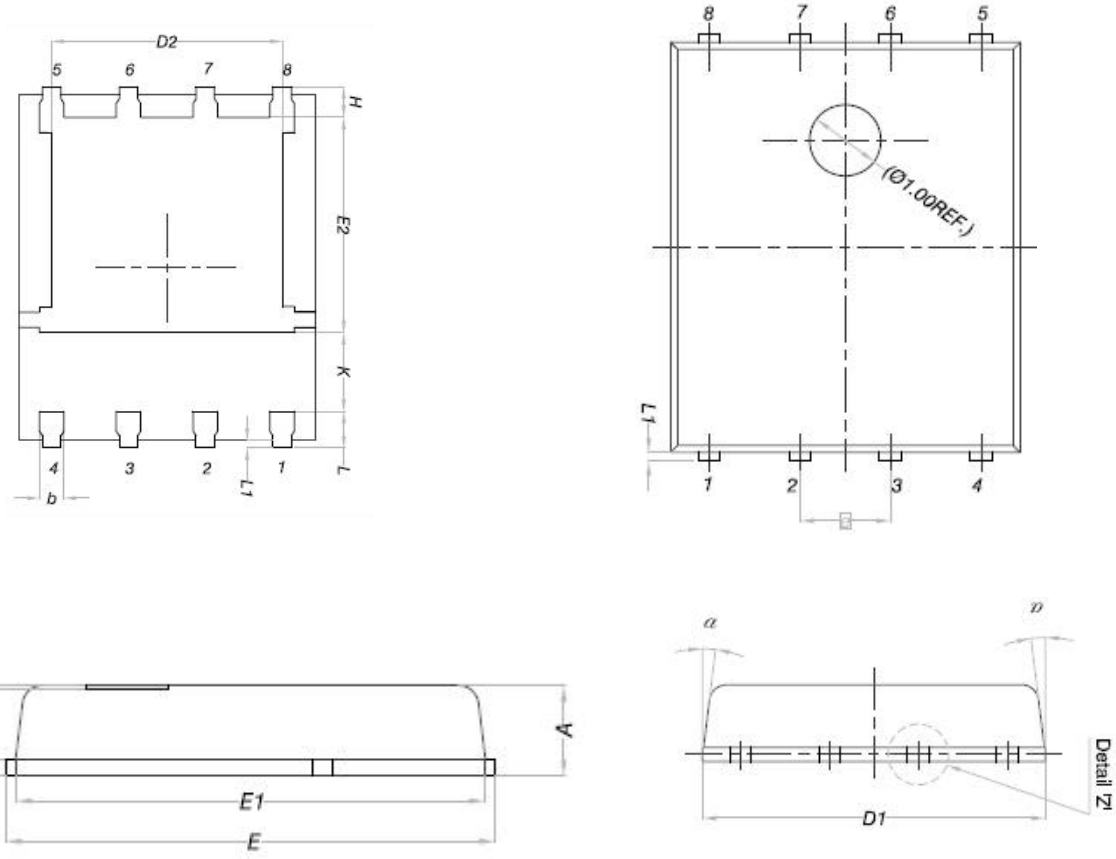
TO-220



Unit: mm		
Symbol	Min.	Max.
A	4.37	4.77
A1	1.25	1.45
A2	2.20	2.60
b	0.70	0.95
b2	1.17	1.47
c	0.40	0.65
D	15.10	16.10
D1	8.80	9.40
D2	5.50	–

Unit: mm		
Symbol	Min.	Max.
E	9.70	10.30
E3	7.00	–
e	2.54BSC	
e1	5.08BSC	
H1	6.25	6.85
L	12.75	13.80
L1	–	3.40
P	3.40	3.80
Q	2.60	3.00

DFN5x6



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96

DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

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