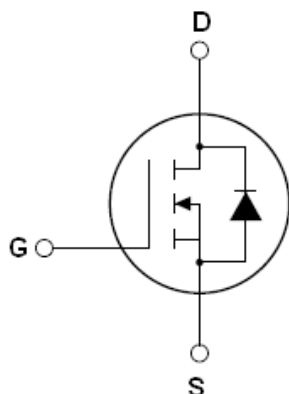




N-Channel Super Junction Power MOSFET II

General Description

The series of devices use advanced super junction technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications.



Schematic diagram

Features

- New technology for high voltage device
- Low on-resistance and low conduction losses
- Small package
- Ultra Low Gate Charge cause lower driving requirements
- 100% Avalanche Tested
- ROHS compliant

Application

- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)

$V_{DS}@T_{jmax}$	710	V
$R_{DS(ON) Max}$	2.4	Ω
I_D	1.8	A

Package Marking And Ordering Information

Device	Device Package	Marking
RSU2N65MD	TO-251	RSU2N65M
RSU2N65D	TO-252	RSU2N65D



TO-251



TO-252

Table 1. Absolute Maximum Ratings ($T_c=25^\circ\text{C}$)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	650	V
Gate-Source Voltage ($V_{DS}=0V$)	V_{GS}	± 30	V
Continuous Drain Current at $T_c=25^\circ\text{C}$	$I_D (DC)$	1.8	A
Continuous Drain Current at $T_c=100^\circ\text{C}$	$I_D (DC)$	1.2	A
Pulsed drain current (Note 1)	$I_{DM} (pulse)$	5.4	A
Maximum Power Dissipation ($T_c=25^\circ\text{C}$)	P_D	22	W
Derate above 25°C		0.176	W/ $^\circ\text{C}$
Single pulse avalanche energy (Note2)	E_{AS}	40	mJ
Avalanche current (Note 1)	I_{AR}	0.9	A
Repetitive Avalanche energy, t_{AR} limited by T_{jmax} (Note 1)	E_{AR}	0.06	mJ

Parameter	Symbol	Value	Unit
Drain Source voltage slope, $V_{DS} \leq 480V$,	dv/dt	50	V/ns
Reverse diode dv/dt , $V_{DS} \leq 480V, I_{SD} < I_D$	dv/dt	15	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55...+150	°C

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	5.68	°C /W
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	75	°C /W

Table 3. Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	650			V
Zero Gate Voltage Drain Current(Tc=25℃)	I _{DSS}	V _{DS} =650V, V _{GS} =0V			1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	3	3.5	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =1A		2200	2400	mΩ
Dynamic Characteristics						
Forward Transconductance	g _{FS}	V _{DS} = 20V, I _D = 0.9A		1.9		S
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, F=1.0MHz		183		PF
Output Capacitance	C _{oss}			12		PF
Reverse Transfer Capacitance	C _{rss}			1.0		PF
Total Gate Charge	Q _g	V _{DS} =480V, I _D =1.8A, V _{GS} =10V		3.0	10	nC
Gate-Source Charge	Q _{gs}			0.6		nC
Gate-Drain Charge	Q _{gd}			1.1		nC
Intrinsic gate resistance	R _G	f = 1 MHz open drain		10		Ω
Switching times						
Turn-on Delay Time	t _{d(on)}	V _{DD} =380V, I _D =0.9A, R _G =50Ω, V _{GS} =10V		6		nS
Turn-on Rise Time	t _r			3		nS
Turn-Off Delay Time	t _{d(off)}			64		nS
Turn-Off Fall Time	t _f			11		nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I _{SD}	T _C =25℃			1.8	A
Pulsed Source-drain current(Body Diode)	I _{SDM}				5.4	A
Forward On Voltage	V _{SD}	T _j =25℃, I _{SD} =1.8A, V _{GS} =0V		1	1.3	V
Reverse Recovery Time	t _{rr}	T _j =25℃, I _F =1.8A, di/dt=100A/μs		135		nS
Reverse Recovery Charge	Q _{rr}			0.6		uC
Peak reverse recovery current	I _{rrm}			8.2		A

Notes: 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2. $T_J=25^\circ C, V_{DD}=50V, V_G=10V, R_G=25\Omega$

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves)

Figure1. Safe operating area

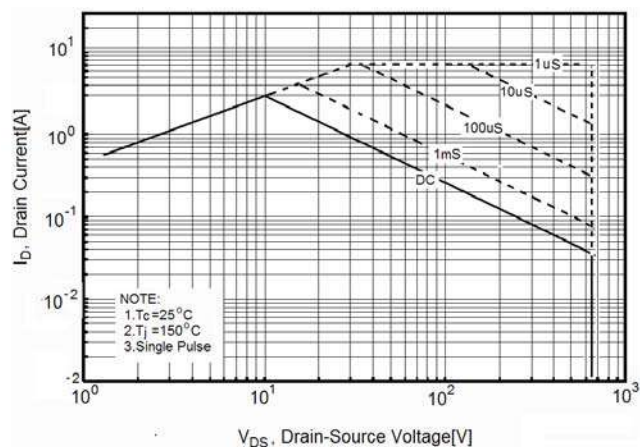


Figure2. Source-Drain Diode Forward Voltage

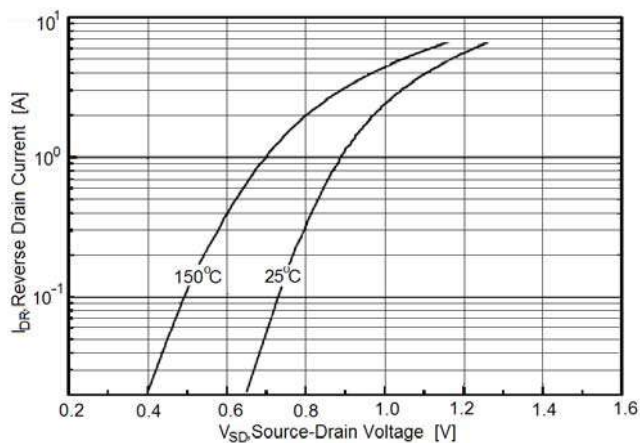


Figure3. Output characteristics

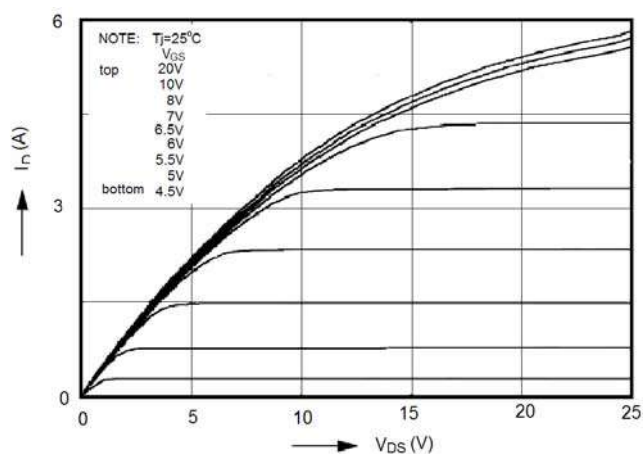


Figure4. Transfer characteristics

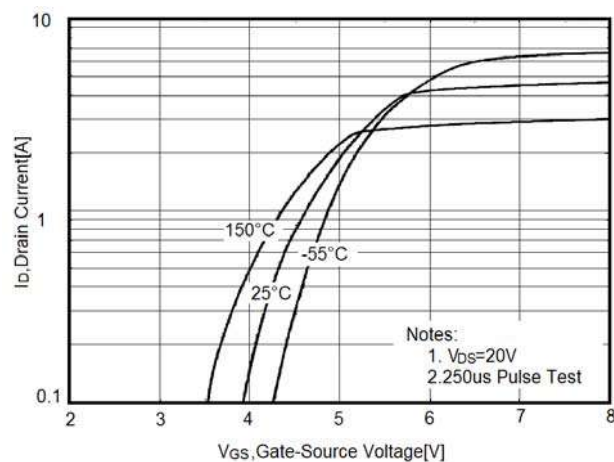


Figure5. Static drain-source on resistance

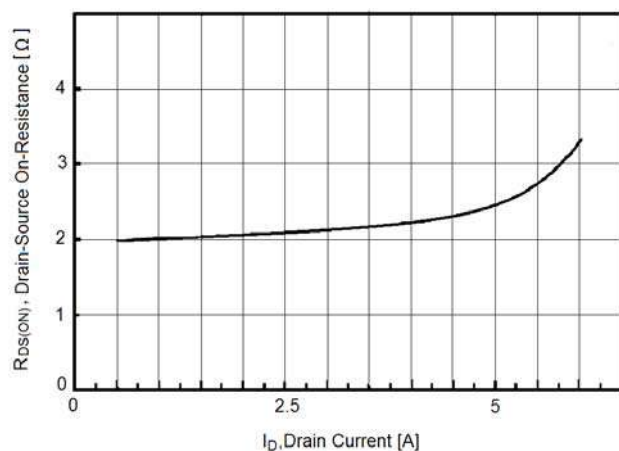


Figure6. $R_{DS(ON)}$ vs Junction Temperature

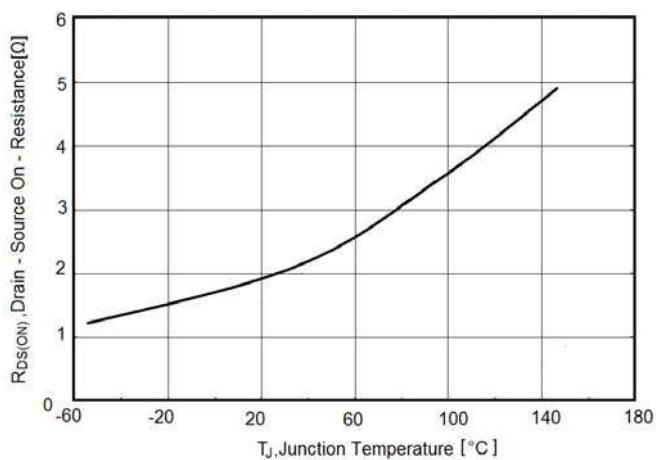


Figure7. BV_{DSS} vs Junction Temperature

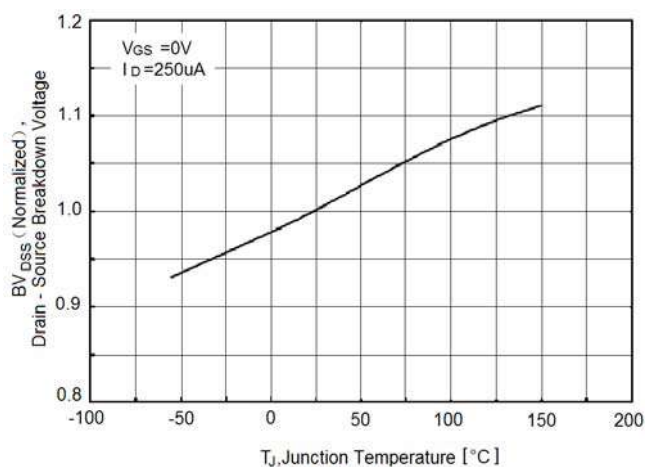


Figure8. Maximum I_D vs Junction Temperature

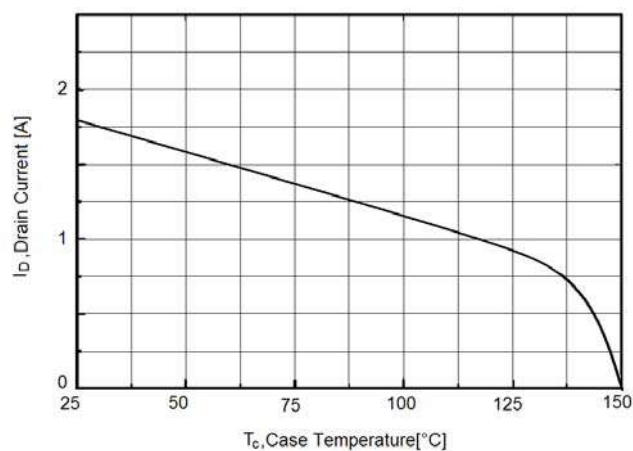


Figure9. Gate charge waveforms

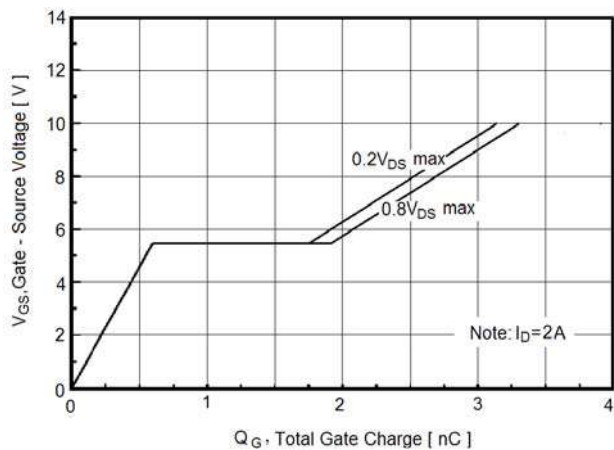


Figure10. Capacitance

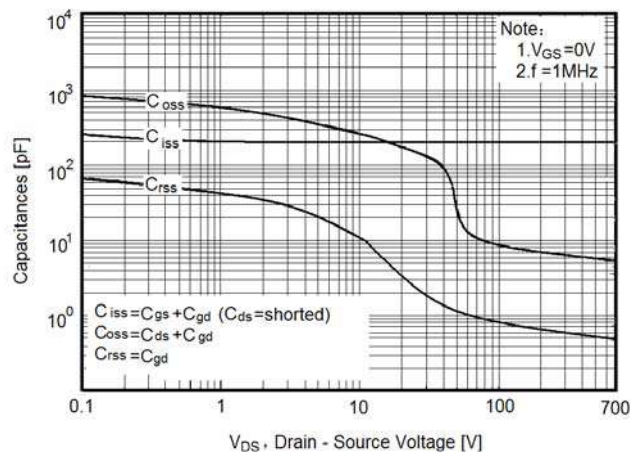
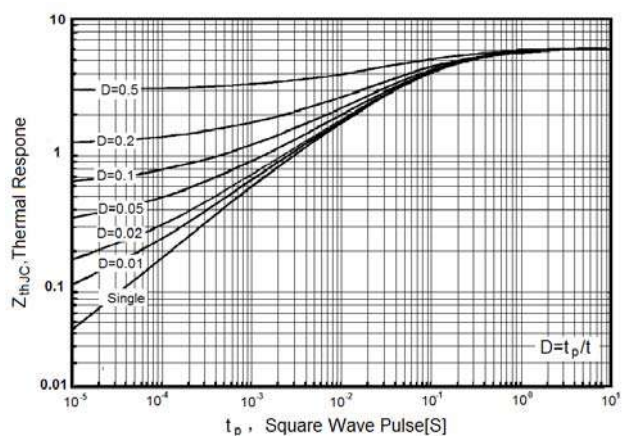
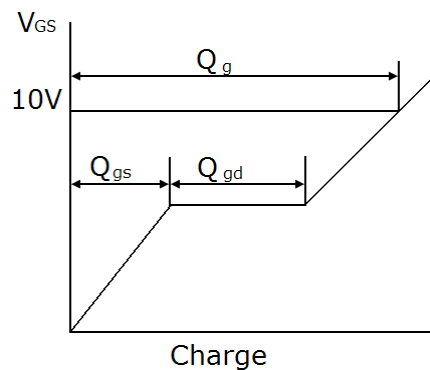
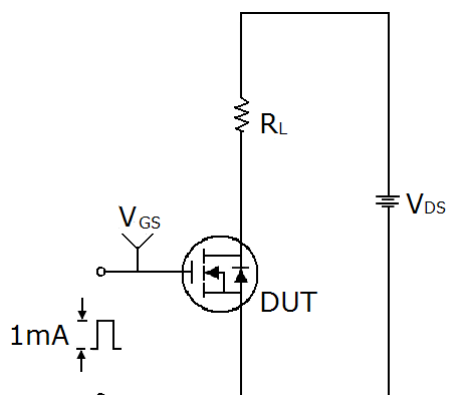


Figure11. Transient Thermal Impedance

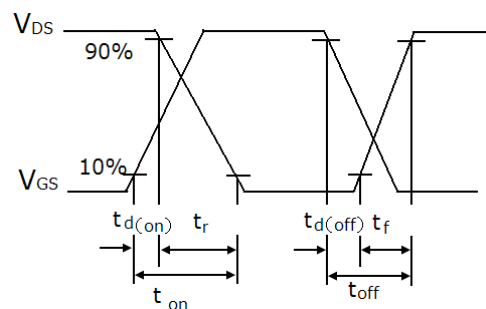
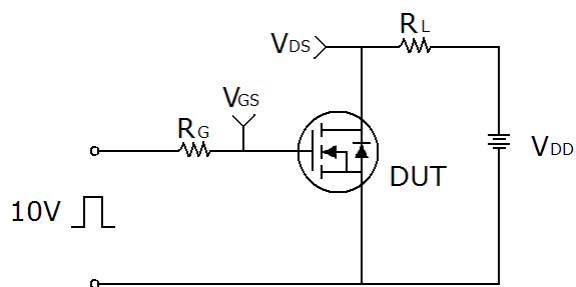


Test circuit

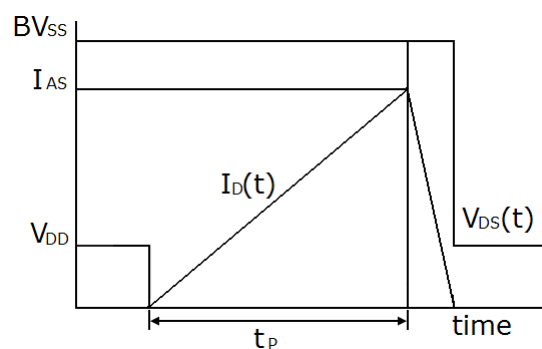
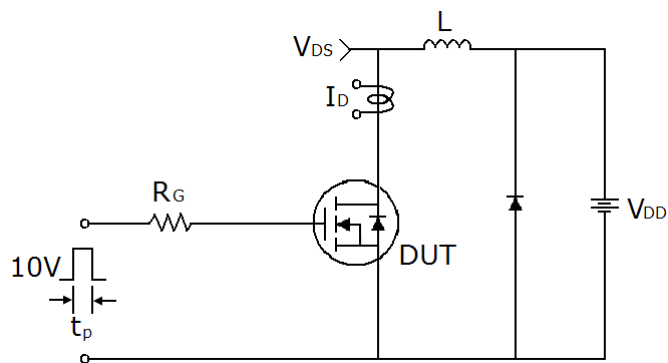
1) Gate charge test circuit & Waveform



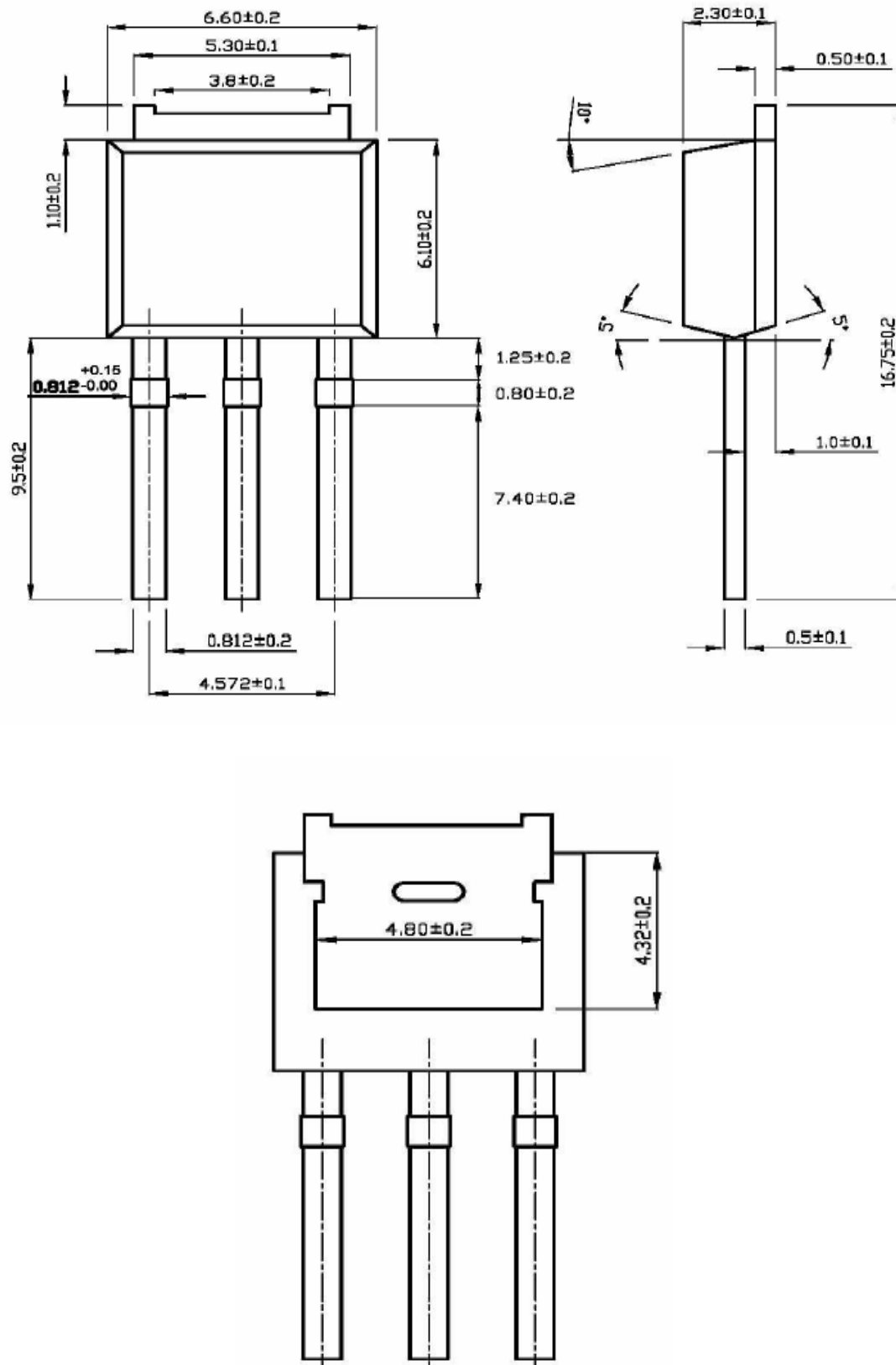
2) Switch Time Test Circuit:



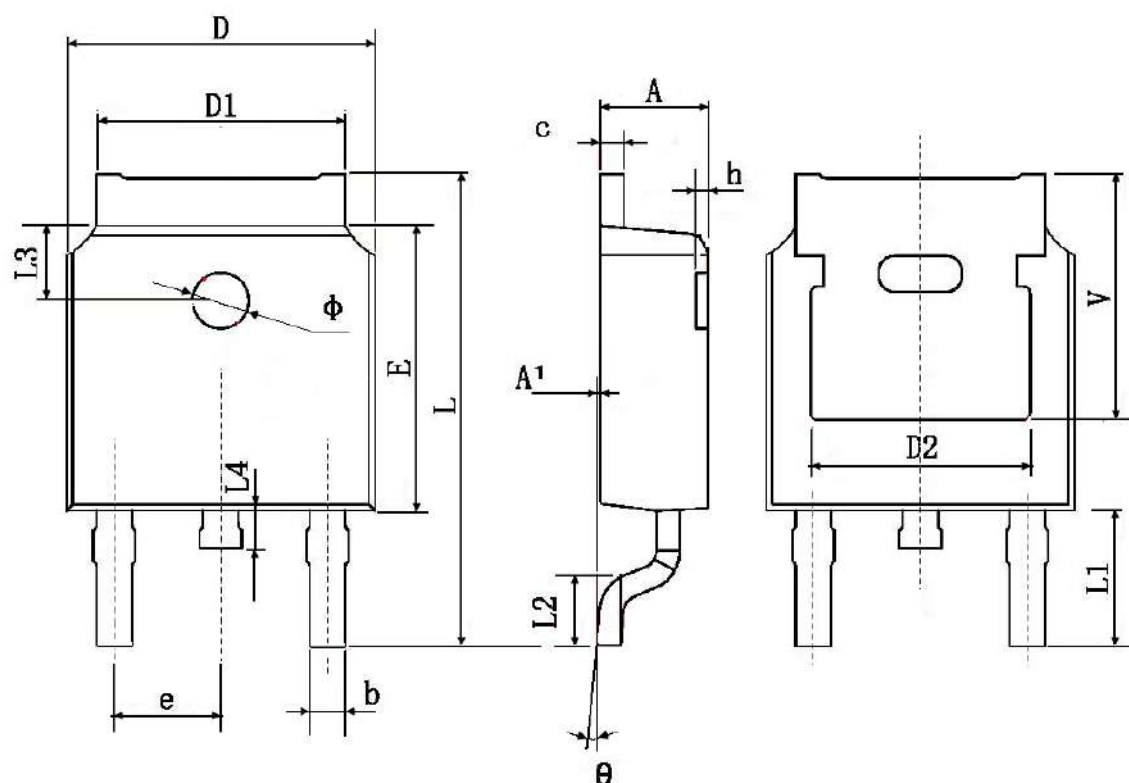
3) Unclamped Inductive Switching Test Circuit & Waveforms



TO-251 Package Information



TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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