500V 30A N-Channel Planar MOSFET

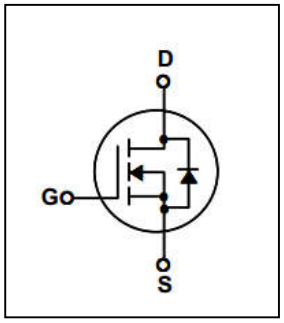
General Description

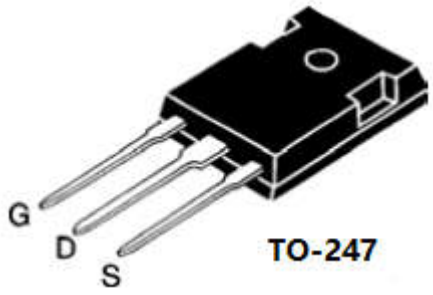
RS30N50W is Fortunatus high voltage MOSFET family based on advanced planar stripe DMOS technology. This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

FEATURES

- RDSON≤100mΩ @Vgs=10V, Id=15A
- Ultra Low gate Charge(typical 140 nC)
- Low Crss (typical 80pF)
- Fast switching capability
- 100% avalanche tested
- Improved dv/dt capability

SYMBOL





ABSOLUTE MAXIMUM RATINGS (T_C=25°C unless otherwise noted)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	500	V
Drain Current	Continuous (T_C = 25°C)	I_D	30	A
	Continuous (T_C = 100°C)		20	A
Drain Current	Pulsed (Note1)	I_{DM}	120	A
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Energy	Single Pulse (Note2)	E_{AS}	3500	mJ
	Repetitive (None1)	E_{AR}	400	mJ
Avalanche Current (None1)		I_{AR}	30	A
Peak Diode Recovery dv/dt (Note3)		dv/dt	5	V/ns
Power Dissipation (Note 2)	T_C =25°C	P_D	360	W
	Derate above 25°C		3.2	W/°C
Maximum Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{STG}	-55 to 150	°C

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

2. L=10.15mH, I_{AS}=10.0A, V_{DD}=50V, RG=25 Ω, Starting TJ = 25°C

3. I_{SD} ≤ 10.0A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS}, Starting TJ = 25°C

THERMAL CHARACTERISTICS

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	---	0.31	°C / W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	---	38	°C / W

ELECTRICAL CHARACTERISTICS（T_J=25℃,unless otherwise Noted）

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	VGS=0V, ID=250μA	500			V
Zero Gate Voltage Drain Current	I_{DSS}	VDS=500V, VGS=0V			1	uA
		VDS=480V, TC = 125°C			100	uA
Gate-Body Leakage Current, Forward	I_{GSS}	VGS=30V			100	nA
Gate-Body Leakage Current, Reverse		VGS=-30V			-100	nA
Breakdown Voltage Temperature Coefficient	△BVDSS/ △TJ	ID = 250 μA		0.65		V/℃
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	VDS=VGS, ID=250μA	2		4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	VGS=10V, ID=15A		82	100	mΩ
Forward Transconductance (Note4)	g_{FS}	VDS = 30V, ID =15A		20		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	VDS=25V, VGS=0V, f=1.0MHz		8260		pF
Output Capacitance	C_{OSS}			730		pF
Reverse Transfer Capacitance	C_{RSS}			80		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	VDD=250V, ID=30A, VGS = 10V ,RG=25Ω (Note4,5)		68		ns
Turn-ON Rise Time	t_R			120		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			485		ns
Turn-OFF Fall-Time	t_F			145		ns
Total Gate Charge(Note)	Q_G	VDS =250V, VGS =10V, ID =30A (Note4,5)		140		nC
Gate Source Charge	Q_{GS}			22		nC
Gate Drain Charge	Q_{GD}			48		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	IS=30A, VGS=0V			1.4	V
Diode Continuous Forward Current	I_S				30	A
Pulsed Drain-Source Current	I_{SM}				120	A
Reverse Recovery Time	t_{RR}	VGS = 0 V, ISD = 30A di/dt=100 A/μs (Note4,5)		485		ns
Reverse Recovery Charge	Q_{RR}			4.8		uC

Note： 4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

5. Essentially independent of operating temperature

TYPICAL CHARACTERISTICS

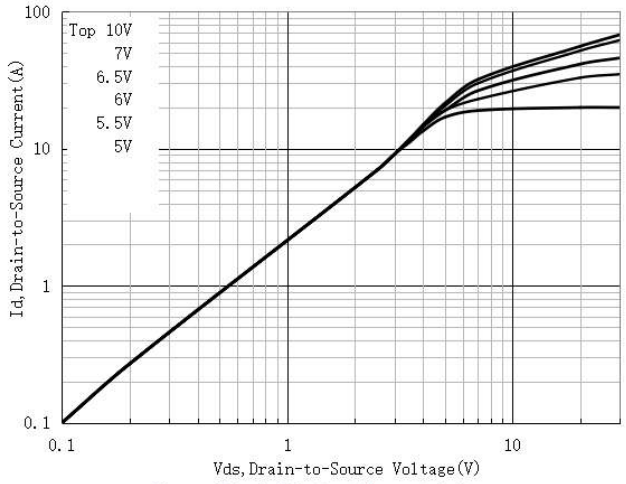


Figure 1. Typical Output Characteristics

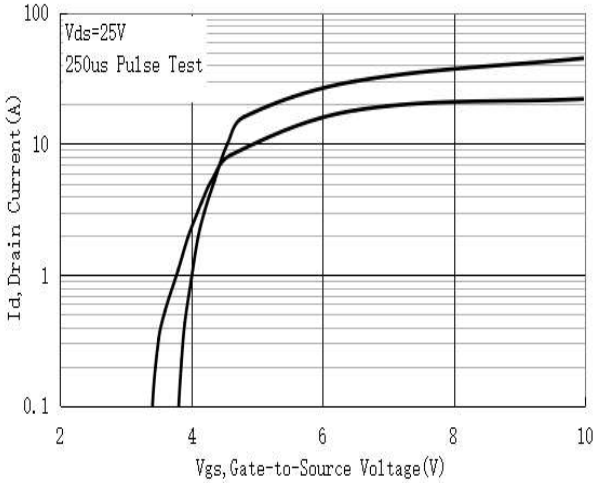


Figure2. Typical Transfer Characteristics

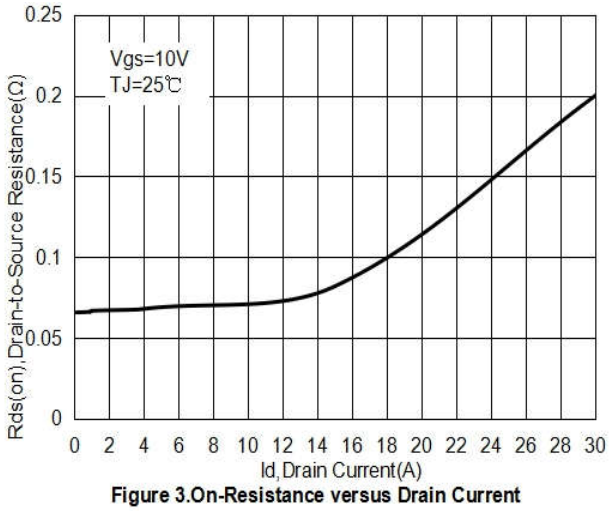


Figure 3.On-Resistance versus Drain Current

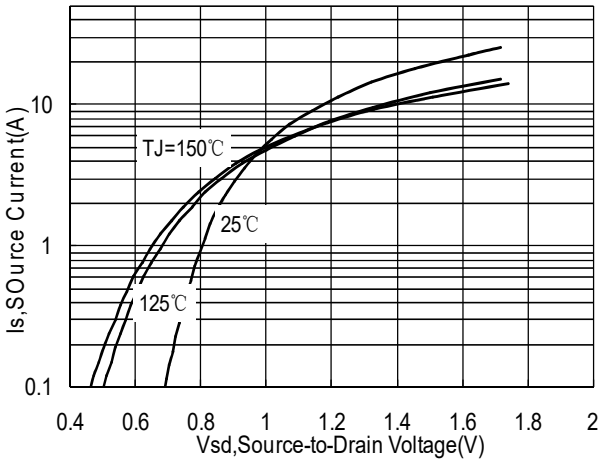


Figure 4.Diode Forward Voltage versus Current

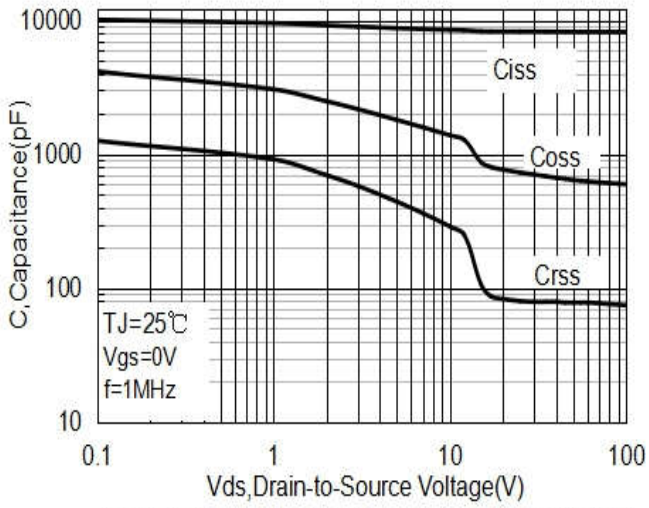


Figure 5.Typical Capacitance vs.Drian-to-Source Voltage

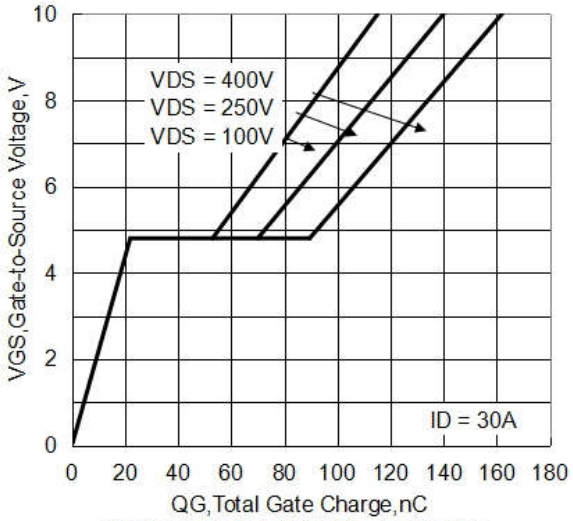


Figure 6. Typical Gate Charge vs.Vgs

TYPICAL CHARACTERISTICS(Cont.)

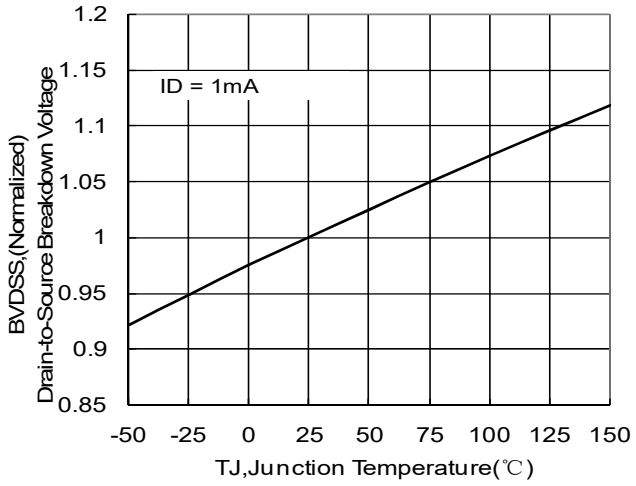


Figure 7.Bvdss Variation with Temperature

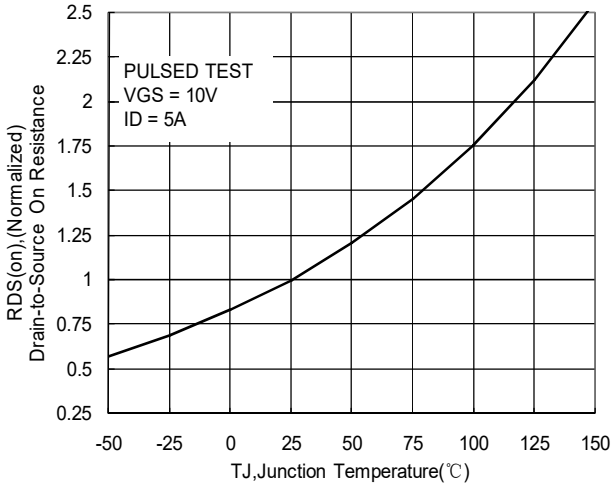


Figure 8.On-Resistance Variation with Temperature

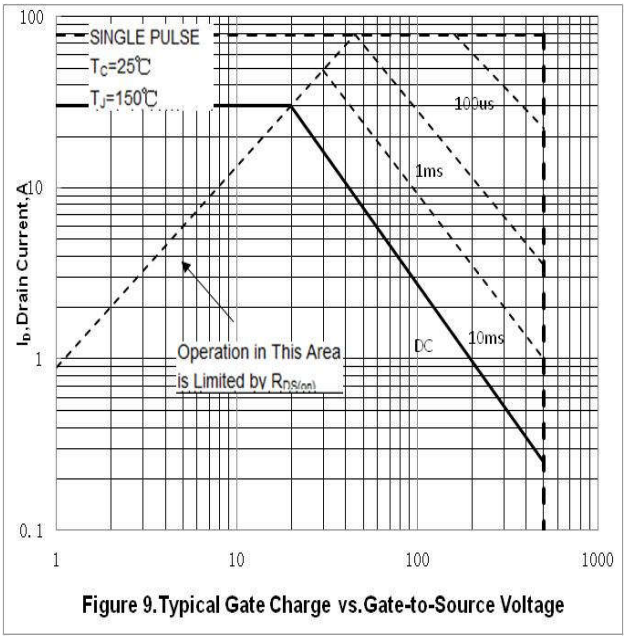


Figure 9.Typical Gate Charge vs.Gate-to-Source Voltage

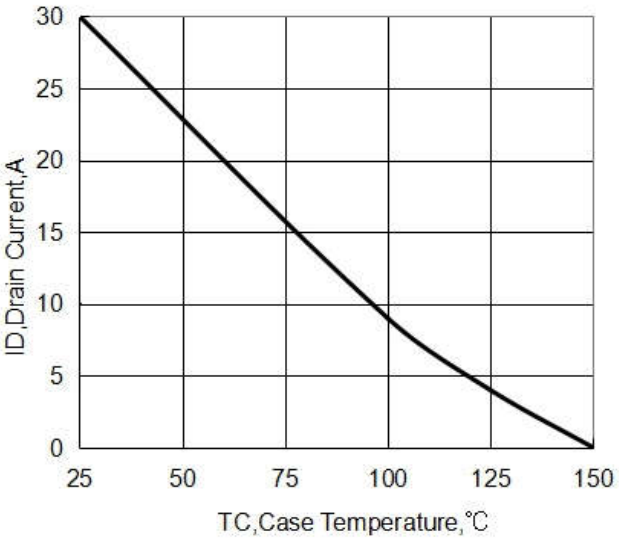
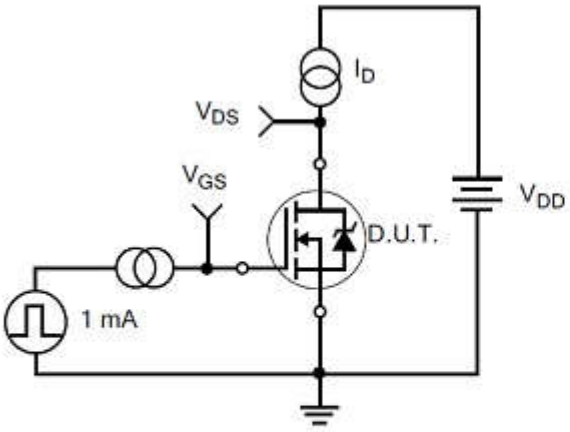
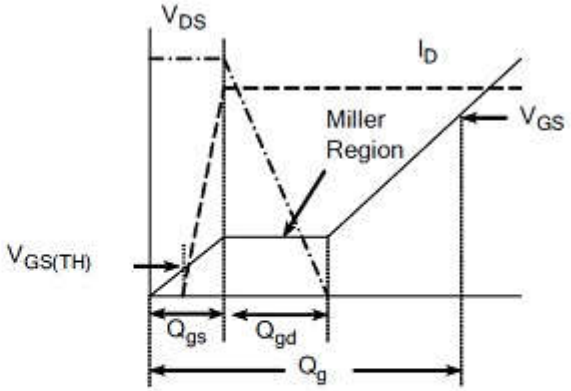


Figure 10. Maximum Continuous Drain Current vs Case Temperature

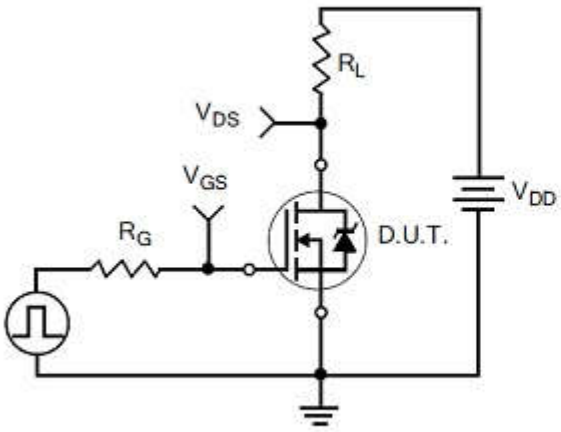
TEST CIRCUITS AND WAVEFORMS



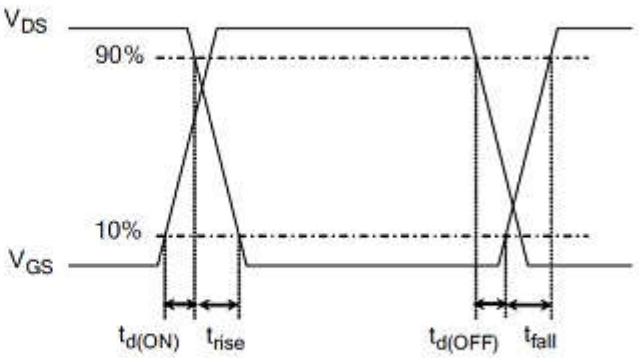
Gate Charge Test Circuit



Gate Charge Waveform

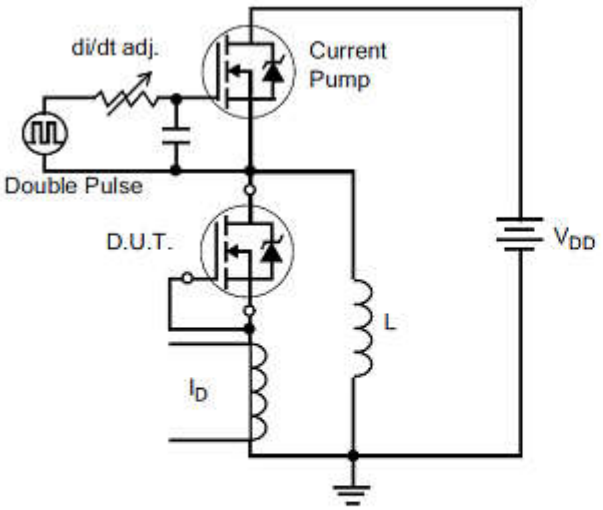


Resistive Switching Test Circuit

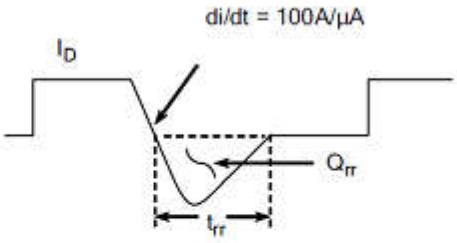


Resistive Switching Waveforms

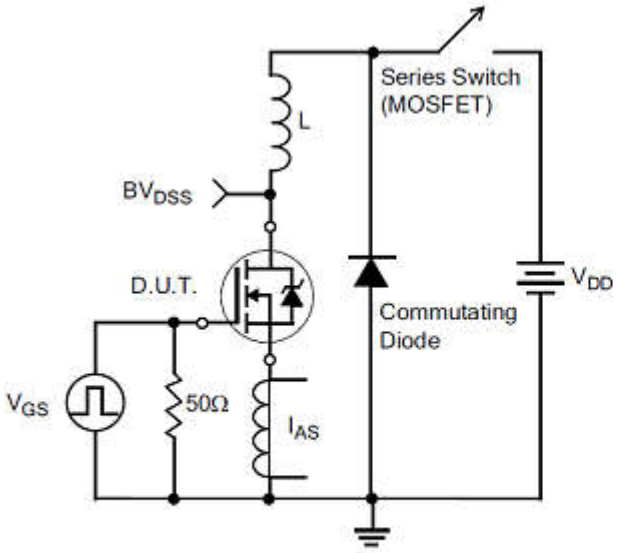
TEST CIRCUITS AND WAVEFORMS(Cont.)



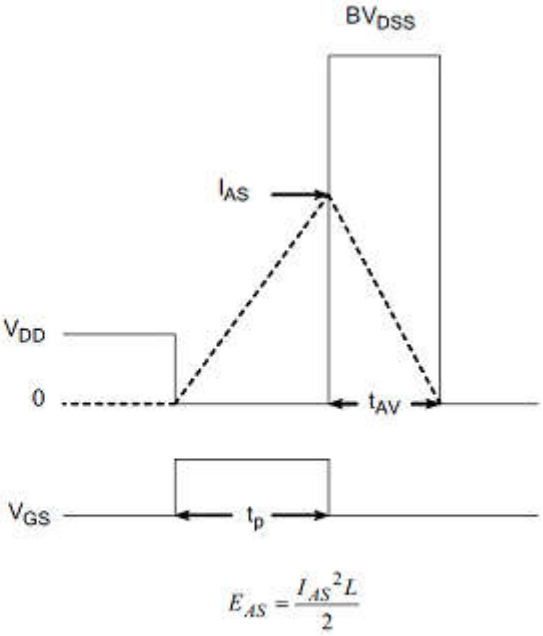
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform

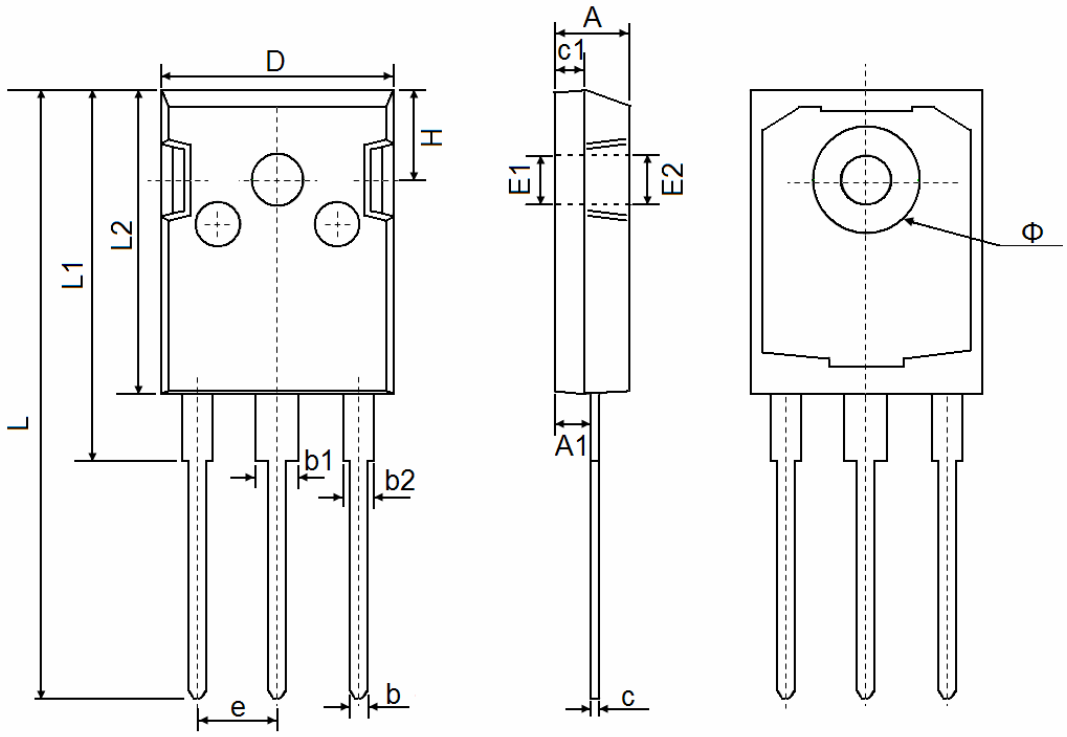


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TO-247 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	

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