

## Multi-Epi Super Junction MOSFET



Lead Free Package and Finish

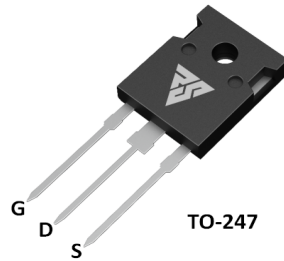
### Applications:

- PFC Power Supply Stages
- Switching Applications
- Adapter
- LED Lighting Power

$I_D$	$R_{DS(ON)}$ (Typ.)	$V_{DSS}$
78A	36mΩ	650V

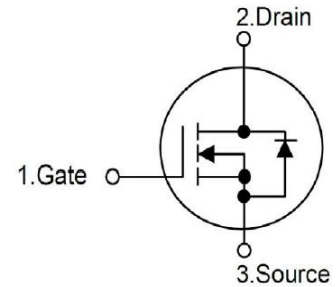
### Features:

- Low Power Loss by High Speed Switching
- Low On-Resistance
- 100% Avalanche Tested
- RoHS Compliant



TO-247

Not to Scale



### Ordering Information:

Part Number	Package	Marking
RS65R041W	TO-247	RS65R041W

### Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	RS65R041W	Units
$V_{DSS}$	Drain-to-Source Voltage	650	V
$I_D$	Continuous Drain Current	78	A
$I_{D@ 100^\circ\text{C}}$	Continuous Drain Current	46	
$I_{DM}$	Pulsed Drain Current (Note*1)	230	
PD	Power Dissipation	500	W
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
EAS	Single Pulse Avalanche Energy (Note*2)	2350	mJ
TL TPKG	Maximum Temperature for Soldering	300 260	$^\circ\text{C}$
	Leads at 0.063in(1.6mm)from Case for 10 seconds		
	Package Body for 10 seconds		
$T_J$ and $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to 150	

\*Drain Current Limited by Maximum Junction Temperature

Caution:Stresses greater than those listed in the“Absolute Maximum Ratings”Table may cause permanent damage to the device.

### Thermal Resistance

Symbol	Parameter	RS65R041W	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	0.25	$^\circ\text{C}/\text{W}$	Drain lead soldered to water cooled heatsink,PD adjusted for a peak junction temperature of $+150^\circ\text{C}$ .
$R_{\theta JA}$	Junction-to-Ambient	62		1 cubic foot chamber,free air.

### OFF Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub>	Drain-to-source Breakdown Voltage	650	--	--	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250 $\mu$ A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	--	--	5.0	$\mu$ A	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	--	--	100	$\mu$ A	V <sub>GS</sub> =+30V V <sub>DS</sub> =0V
	Gate-to-Source Reverse Leakage	--	--	-100		V <sub>GS</sub> =-30V V <sub>DS</sub> =0V

### ON Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	--	0.036	0.041	$\Omega$	V <sub>GS</sub> =10V, I <sub>D</sub> =20A
V <sub>GS(TH)</sub>	Gate Threshold Voltage	2.5	--	5.0	V	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 $\mu$ A

### Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t <sub>d(ON)</sub>	Turn-on Delay Time	--	46	--	nS	V <sub>DS</sub> =400V I <sub>D</sub> =39A R <sub>G</sub> =10 $\Omega$ V <sub>GS</sub> = 10V
t <sub>rise</sub>	Rise Time	--	52	--		
t <sub>d(OFF)</sub>	Turn-OFF Delay Time	--	342	--		
t <sub>fall</sub>	Fall Time	--	8.6	--		

### Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C <sub>iss</sub>	Input Capacitance	--	7710	--	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =100V f=250KHz
C <sub>oss</sub>	Output Capacitance	--	251	--		
C <sub>rss</sub>	Reverse Transfer Capacitance	--	7	--		
Q <sub>g</sub>	Total Gate Charge	--	100	--	nC	V <sub>DS</sub> =400V I <sub>D</sub> =39A V <sub>GS</sub> =10V
Q <sub>gs</sub>	Gate-to-Source Charge	--	25	--		
Q <sub>gd</sub>	Gate-to-Drain("Miller") Charge	--	42	--		

## Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current	--	--	78	A	Integral pn-diode in MOSFET
$I_{SM}$	Maximum Pulsed Current	--	--	230	A	
$V_{SD}$	Diode Forward Voltage	--	--	1.2	V	$I_S=39A, V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	--	200	--	nS	$V_{GS}=0V$
$Q_{rr}$	Reverse Recovery Charge	--	1.9	--	$\mu C$	$I_S=39A, di/dt=100A/\mu s$

### Notes:

- \*1. Repetitive rating; pulse width limited by maximum junction temperature.
- \*2.  $I_{AS}=10A, V_{DD}=60V, R_G=25 \Omega$ , Starting  $T_J=25^\circ C$ .

## Typical Feature curve

Figure 1. On-Region Characteristics

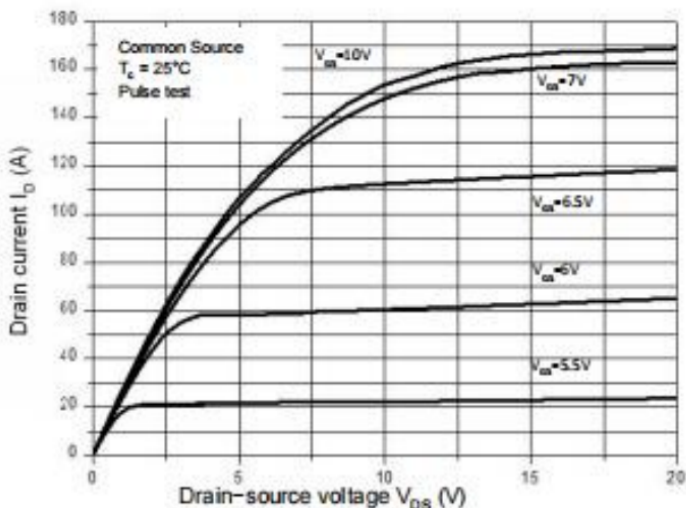


Figure 2. Transfer Characteristics

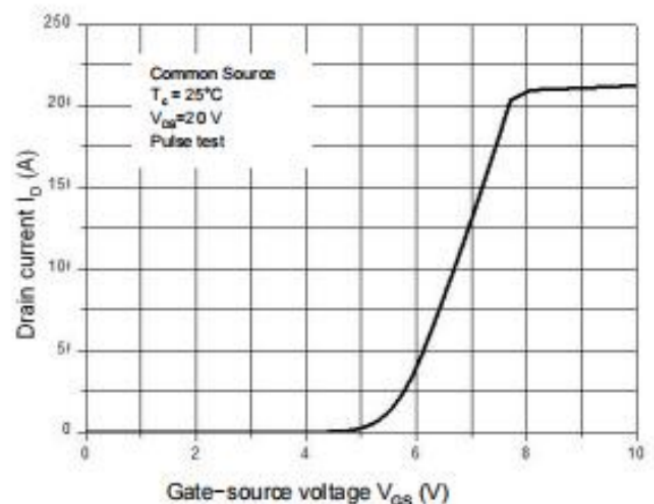


Figure 3. On-Resistance Variation vs. Drain Current

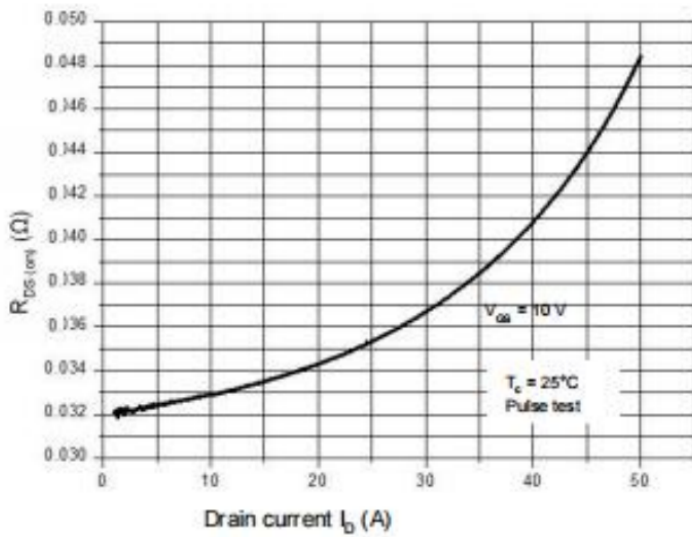


Figure 4. Threshold Voltage vs. Temperature

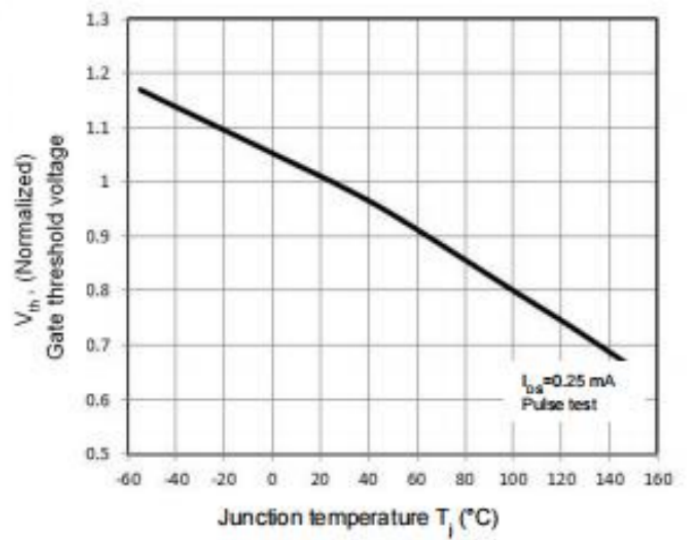


Figure 5. Breakdown Voltage vs. Temperature

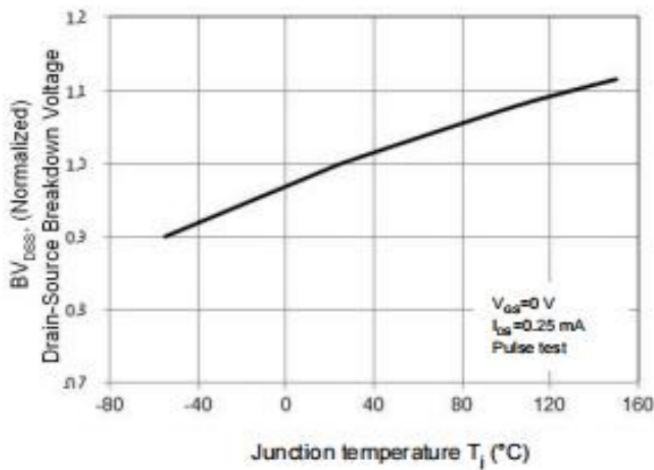


Figure 6. On-Resistance vs. Temperature

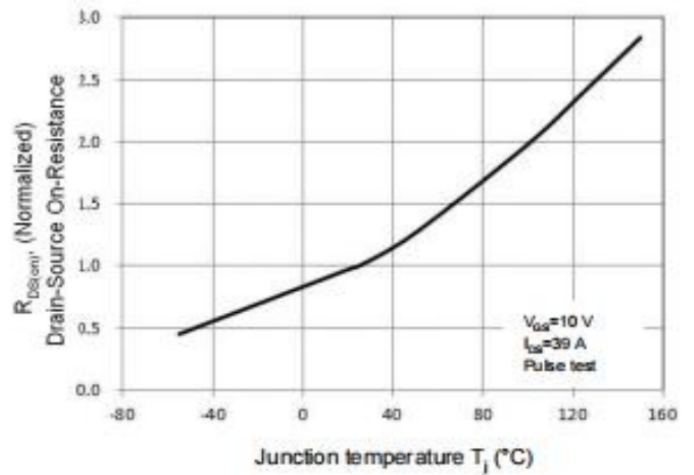


Figure 7. Capacitance Characteristics

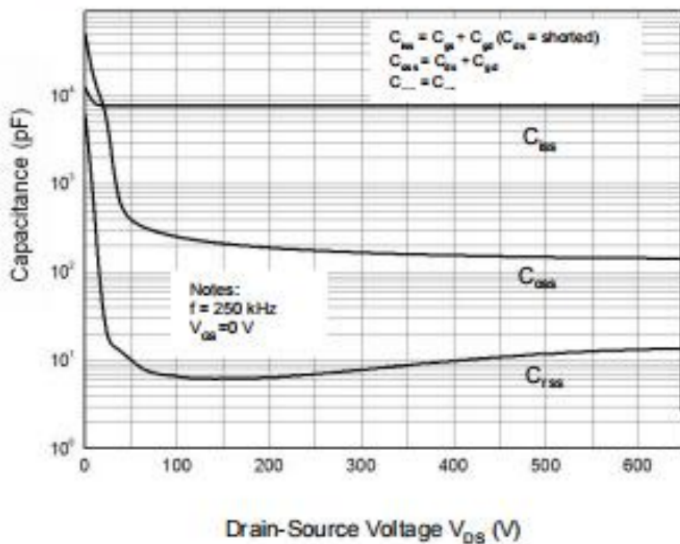


Figure 8. Gate Charge Characterist

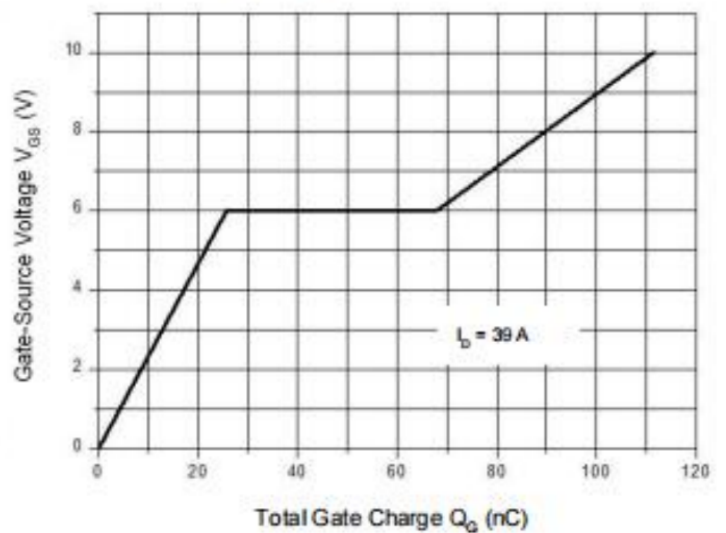


Figure 9 Maximum Safe Operating Area

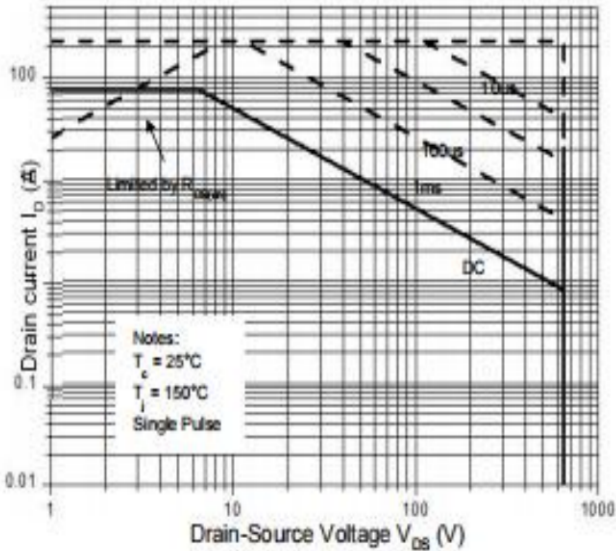
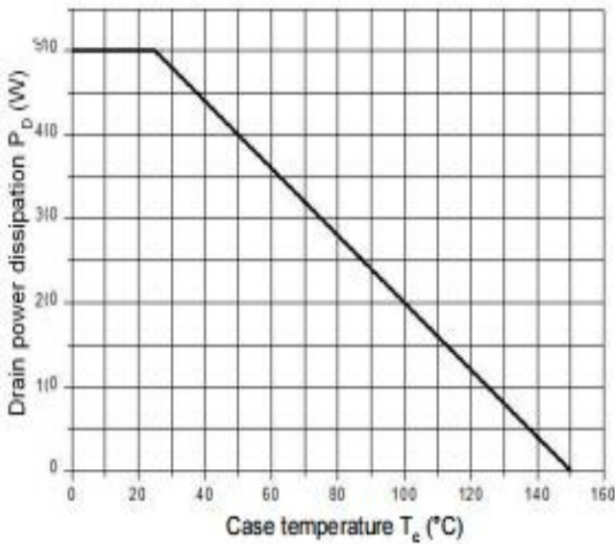


Figure 10 Power Dissipation vs. Temperature



## Test Circuits and Waveforms

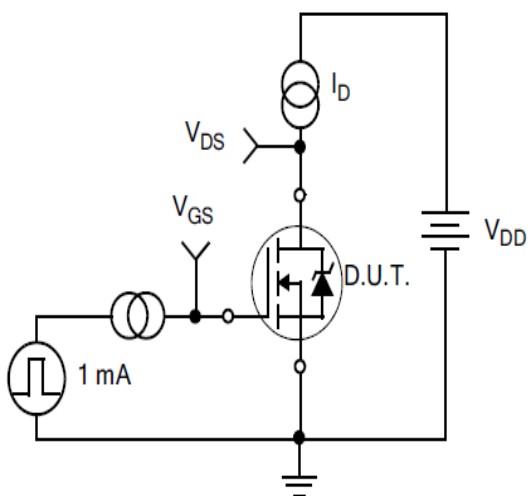


Figure A.  
Gate Charge Test Circuit

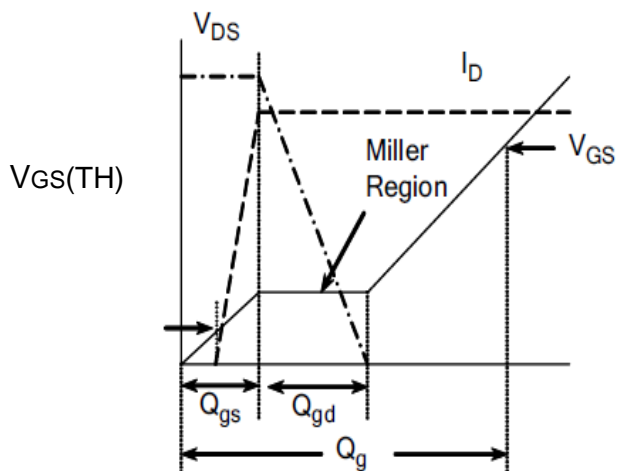


Figure B.  
Gate Charge Waveform

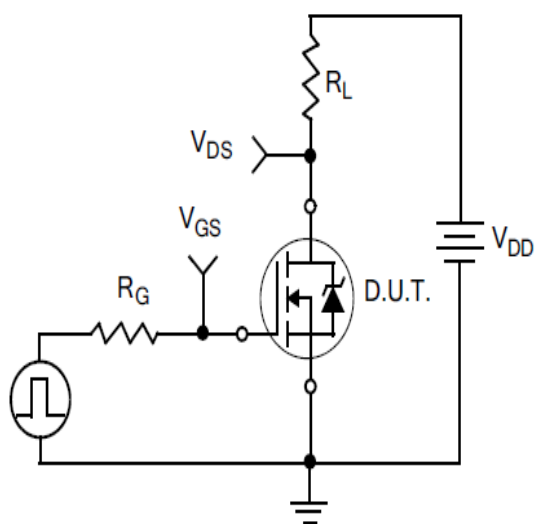


Figure C.  
Resistive Switching Test Circuit

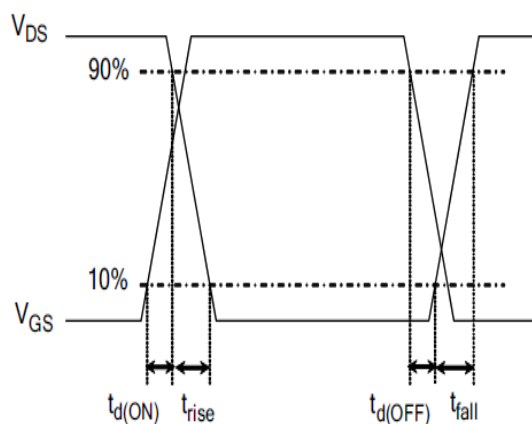


Figure D.  
Resistive Switching Waveforms

## Test Circuits and Waveforms

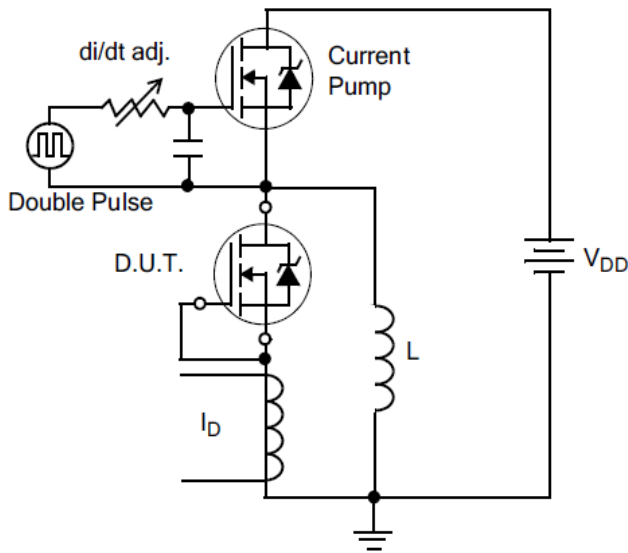


Figure E. Diode Reverse Recovery Test Circuit

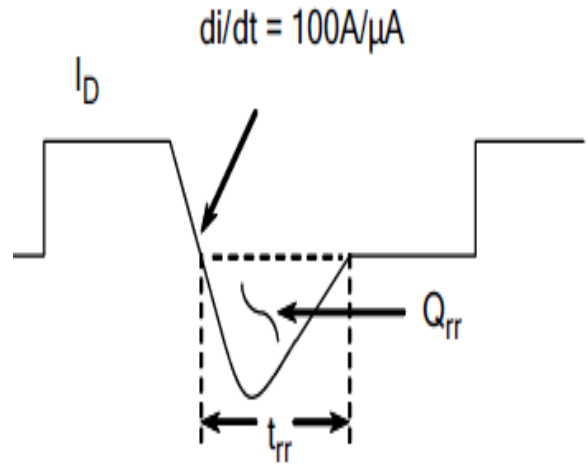


Figure F. Diode Reverse Recovery Waveform

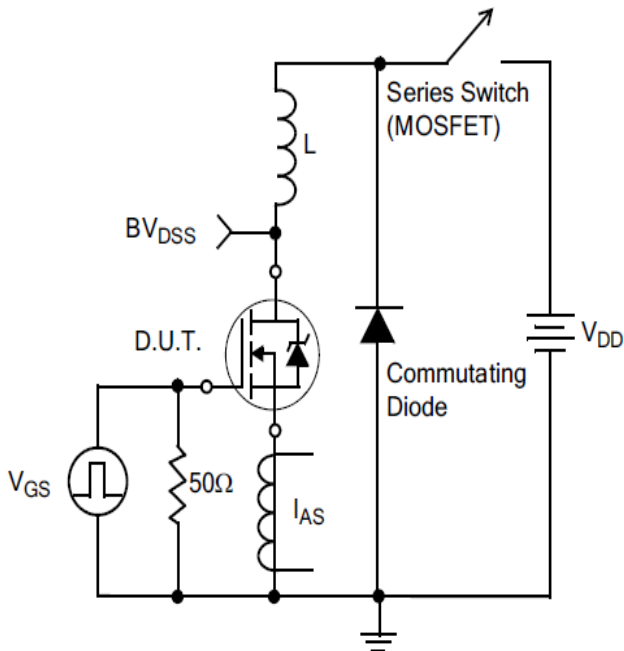
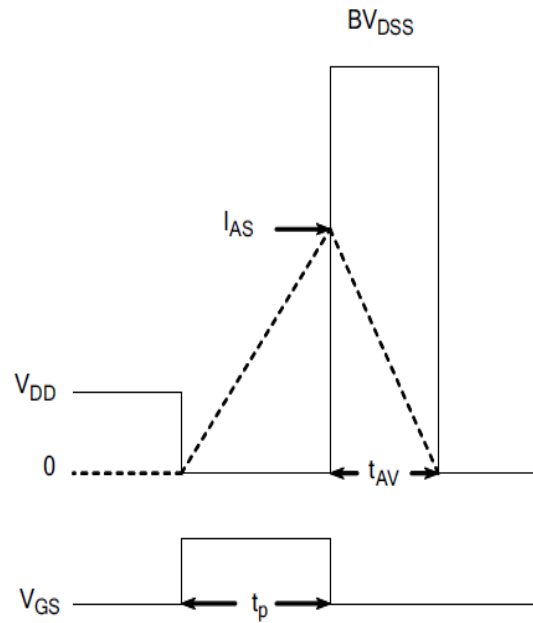


Figure G. Unclamped Inductive Switching Test Circuit



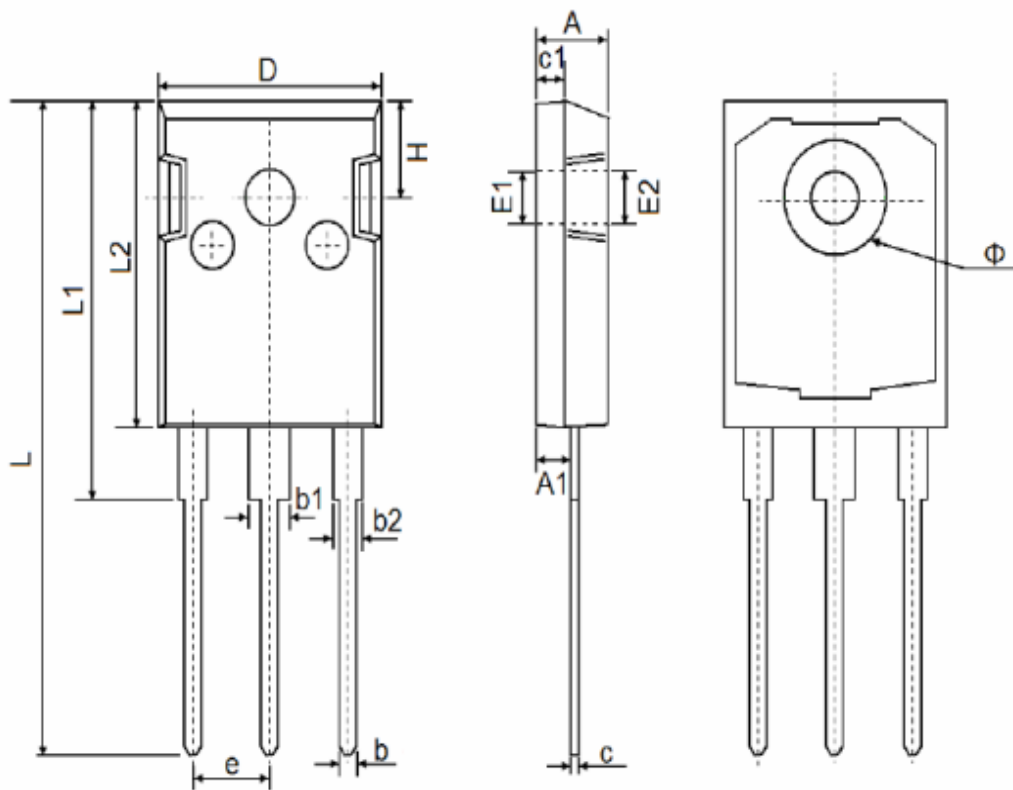
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure H. Unclamped Inductive Switching Waveforms



## Package outline drawing

Unit:mm



## TO-247

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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  - b.support or sustain life,
  - c.whose failuer to when properly used in accordance with instructions for used provided in the laeling,can be reasonably expected to result in significant injury to the user.
  
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