



Multi-Epi Super Junction MOSFETs

Lead Free Package and Finish

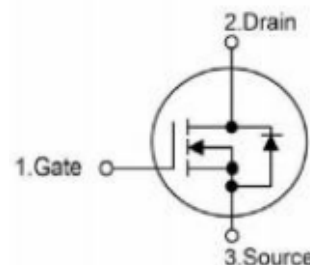
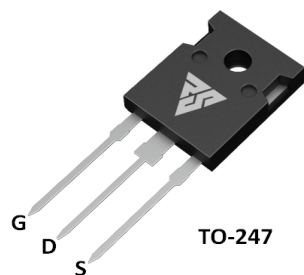
Applications:

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply(UPS)
- PFC stages for server & telecom
- Motor Controls

Features:

- New revolutionary high voltage technology
- Better RDS(on) in TO-247
- Ultra Low Gate Charge cause lower driving requirements
- Periodic avalanche rated
- Integrate fast recovery diode

I_D	$R_{DS(ON)}(Typ.)$	V_{DSS}
47A	60mΩ	600V



Ordering Information

Not to Scale

Part Number	Package	Marking
RS60R070W	TO-247	RS60R070W

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

Symbol	Parameter	RS60R070W	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current ($T_C = 25^\circ\text{C}$)	47	A
	Continuous Drain Current ($T_C = 100^\circ\text{C}$)	29	
I_{DM}	Pulsed Drain Current (Note*1)	140	
P_D	Power Dissipation($T_c=25^\circ\text{C}$)	391	W
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (Note*2)	1160	mJ
I_{AR}	Avalanche Current (Note*1)	10.0	A
E_{AR}	Repetitive Avalanche Energy (Note*1)	1.72	mJ
T_L 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	RS60R070W	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	0.32	$^\circ\text{C/W}$	Drain lead soldered to water cooled heatsink , P_D 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
BVDSS	Drain-to-source Breakdown Voltage	600	--	--	V	$V_{GS} = 0V, I_D = 250\mu A, T_J = 25^{\circ}\text{C}$
		--	600	--	V	$V_{GS} = 0V, I_D = 250\mu A, T_J = 150^{\circ}\text{C}$
IDSS	Drain-to-Source Leakage Current	--	--	3.0	μA	$V_{DS}=600V, V_{GS}=0V$
IGSS	Gate-to-Source Forward Leakage	--	--	100	nA	$V_{GS}=+30V, V_{DS}=0V$
	Gate-to-Source Reverse Leakage	--	--	-100		$V_{GS}=-30V, V_{DS}=0V$

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
RDS(on)	Static Drain-to-Source On-Resistance	--	60	75	m Ω	$V_{GS}=10V, I_D=23A$
VGS(TH)	Gate Threshold Voltage	2.0	--	4.0	V	$V_{GS}=V_{DS}, I_D=250\mu A$
gFS	Forward Transconductance	--	30	--	S	$V_{DS} = 40V, I_D = 25A$

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
td(ON)	Turn-on Delay Time	--	19	--	ns	$V_{DS}=480V$ $I_D=23A$ $R_G=20\Omega$ $V_{GS}=10V$
trise	Rise Time	--	10	--		
td(OFF)	Turn-OFF Delay Time	--	87	--		
tfall	Fall Time	--	5	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	3100	--	pF	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0\text{MHz}$
Coss	Output Capacitance	--	148	--		
Crss	Reverse Transfer Capacitance	--	5	--		
Qg	Total Gate Charge	--	190	--	nC	$V_{DS}=480V$ $I_D=23A$ $V_{GS}=10V$
Qgs	Gate-to-Source Charge	--	30	--		
Qgd	Gate-to-Drain("Miller") Charge	--	95	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	47	A	Integral pn-diode in MOSFET
ISM	Maximum Pulsed Current	--	--	140	A	
VSD	Diode Forward Voltage	--	0.9	1.5	V	IS=23A, VGS=0V Tj=25°C
trr	Reverse Recovery Time	--	210	--	nS	VGS=0V IS=23A, di/dt=100A/μs
Qrr	Reverse Recovery Charge	--	2.5	--	μC	

Notes:

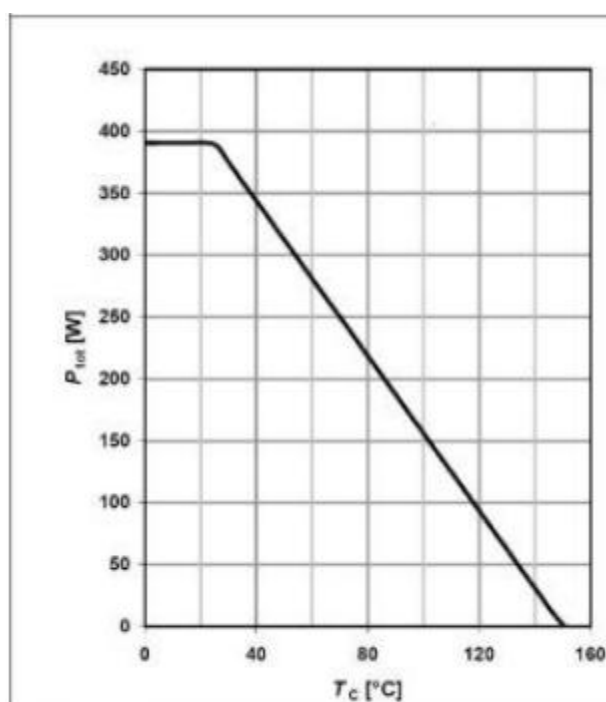
*1.Repetitive rating;pulse width limited by maximum junction temperature .

*2. Pulse width tp limited by Tj,max

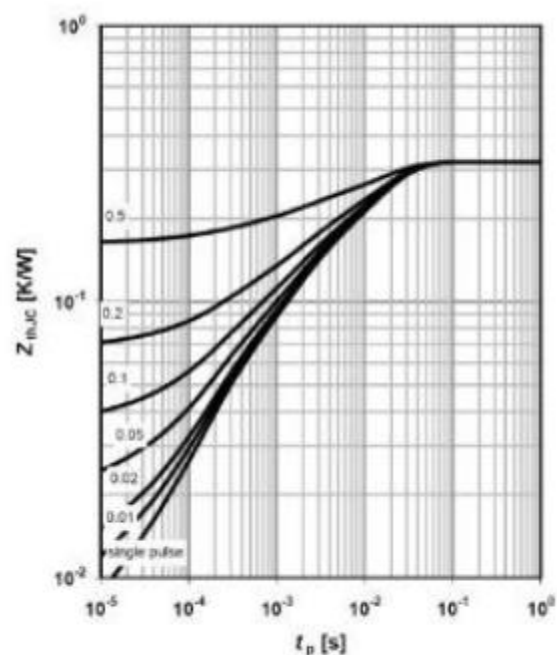
Typical Feature curve Tj=25°C, unless otherwise noted

Figure1. Power dissipation

Figure2. Max. transient thermal impedance



$$P_{tot} = f(T_c)$$



$$Z_{thJC} = f(tp); \text{ parameter: } D = t_p / T$$

Figure3. Safe operating areaTc=25°C

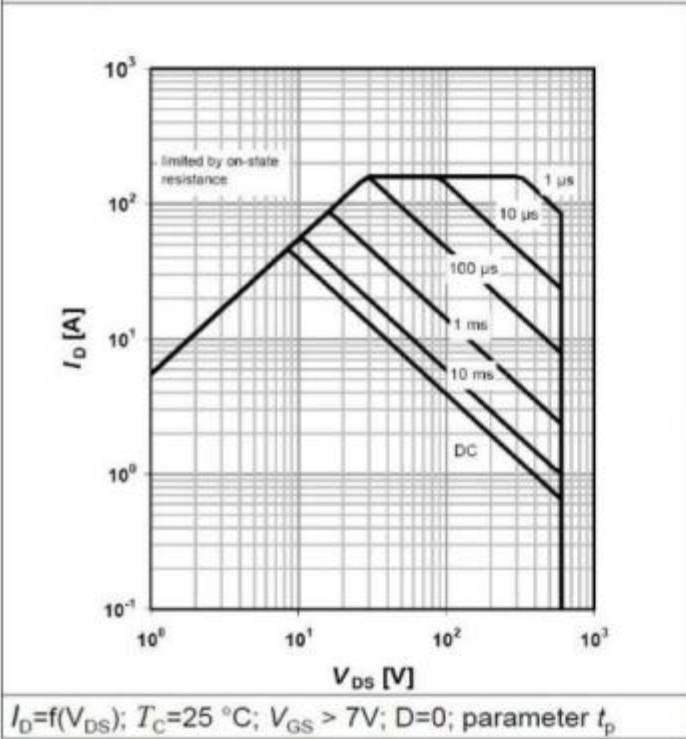


Figure4. Safe operating areaTc=80°C

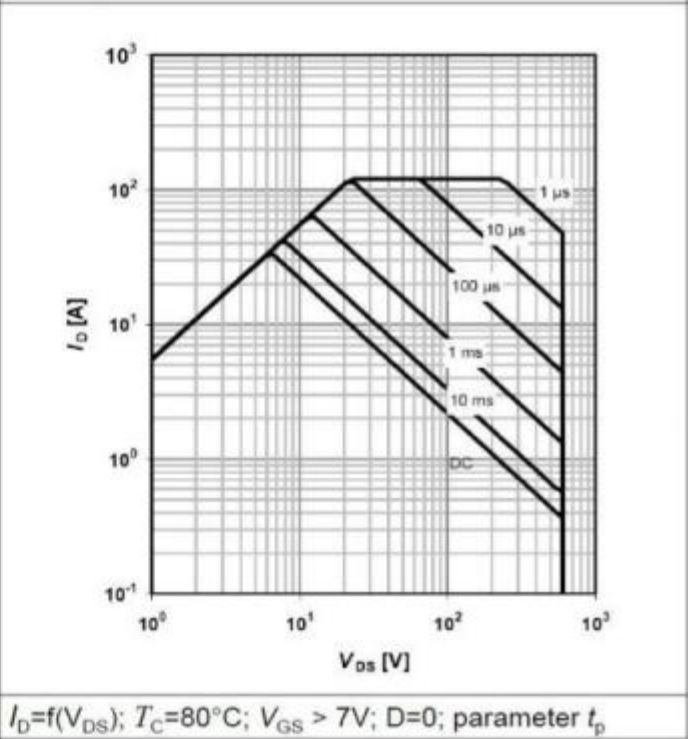


Figure5. Output characteristics Tj=25°C

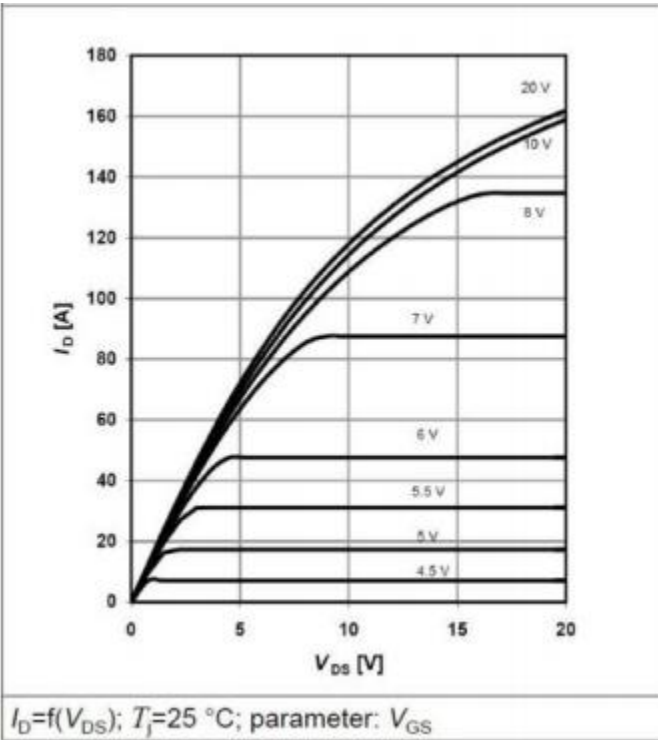
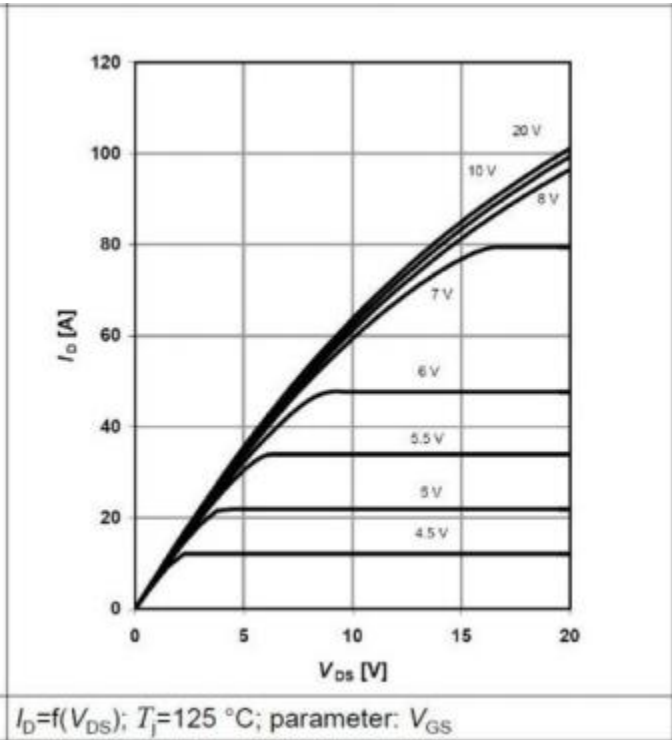
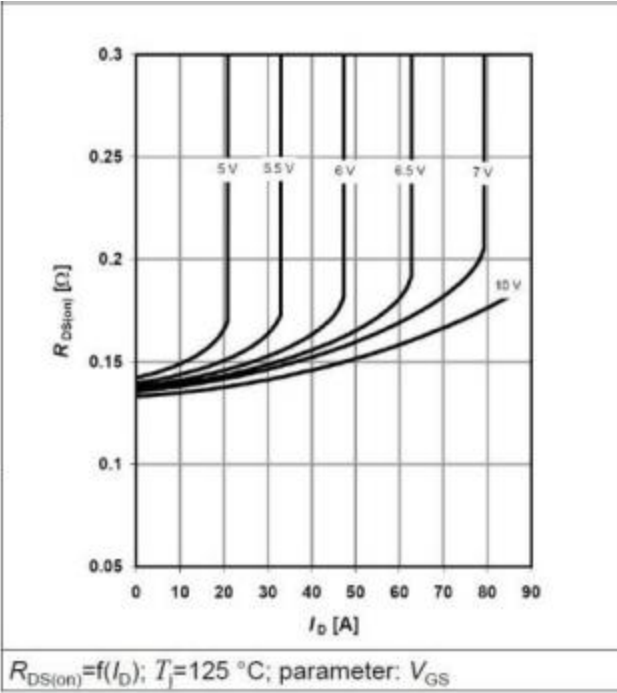


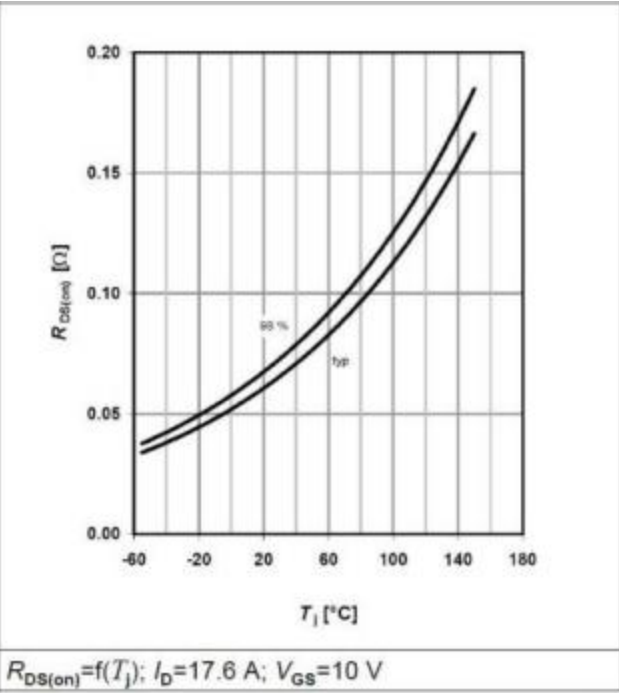
Figure6. Output characteristics Tj=125°C



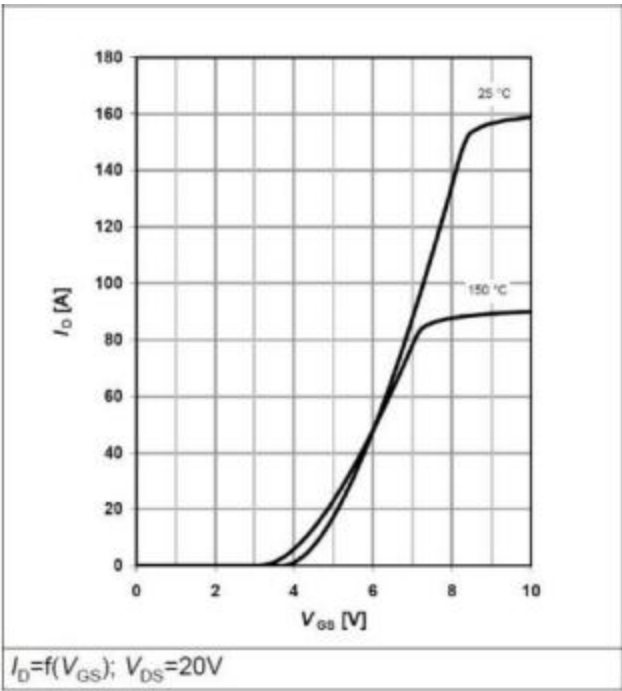
Fingure7. Type drain-source on state resistance



Fingure8. Typ. drain-source on state resistance



Fingure9. Typ. transfer characteristics



Fingure10. Gate charge

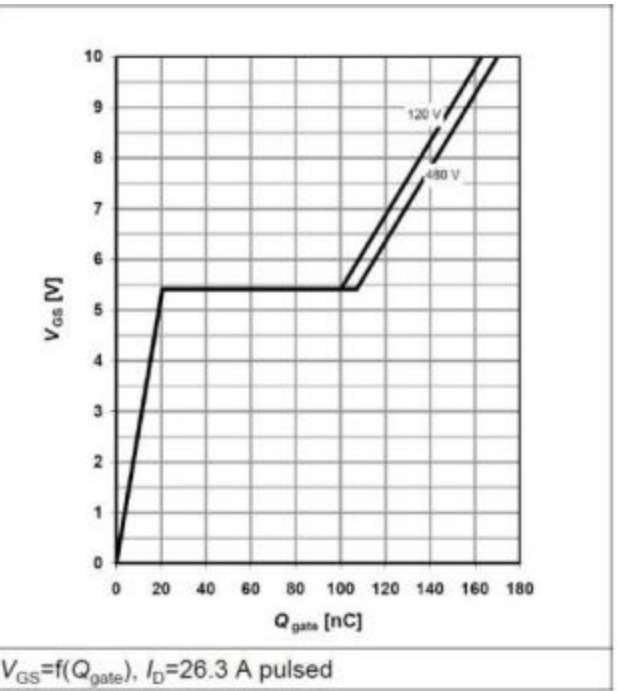


Figure11. Avalanche energy

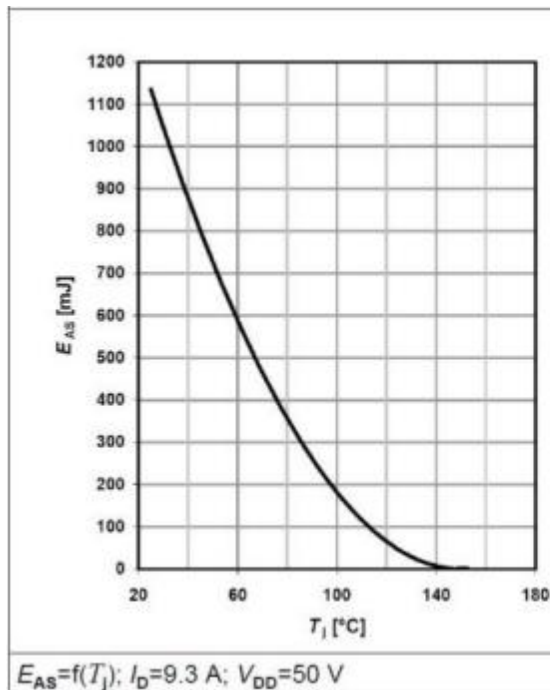


Figure12. Drain-source breakdown voltage

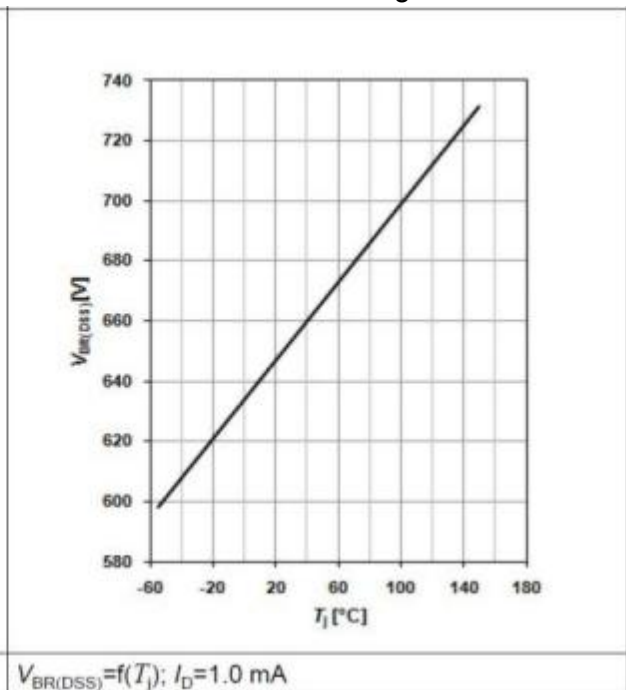


Figure13. Typ. Capacitances

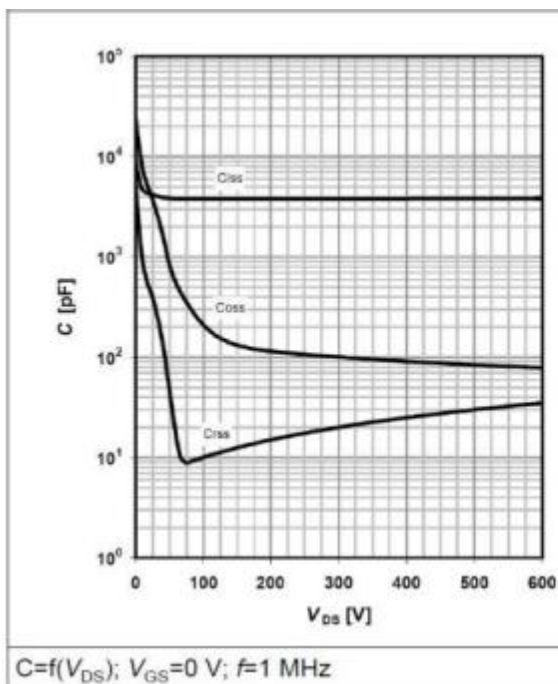
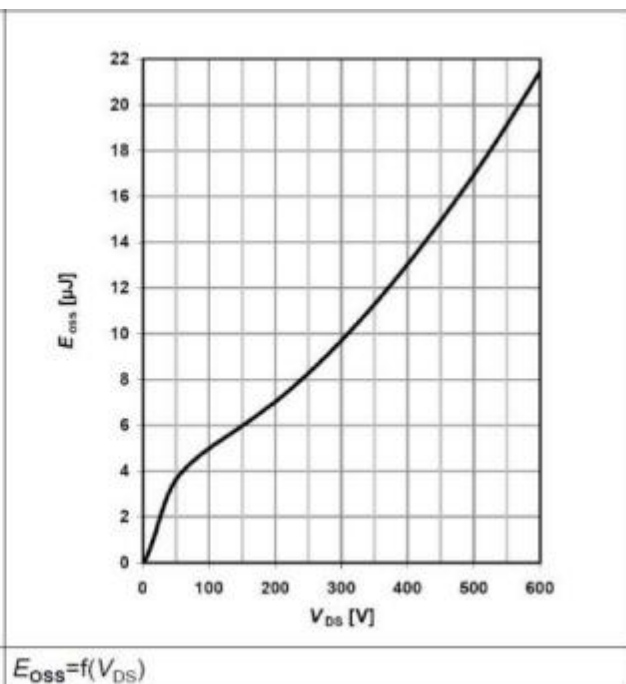


Figure14. Coss stored energy



Test Circuits and Waveforms

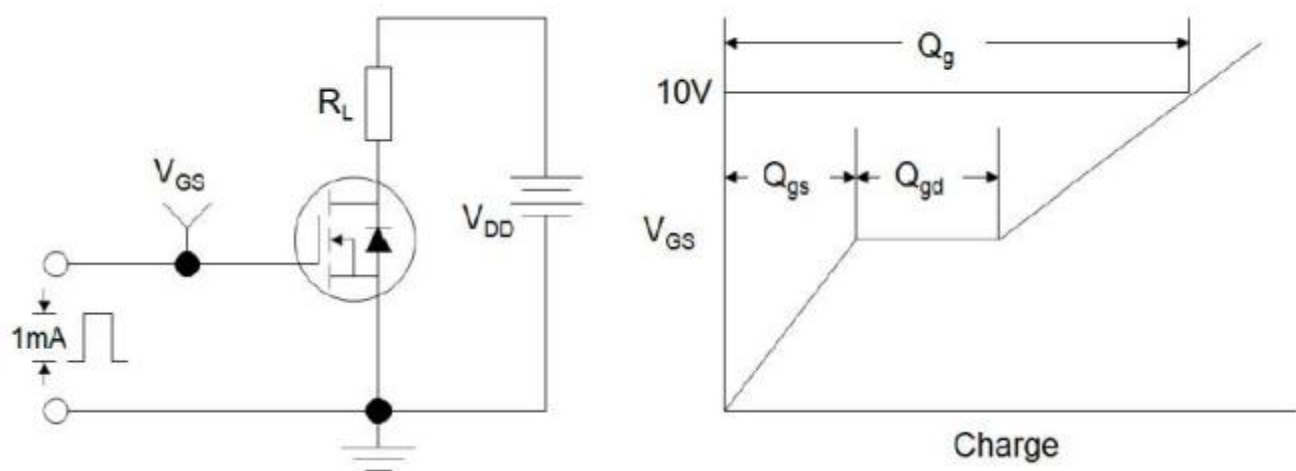


Figure A.
Gate Charge Test Circuit and Waveform

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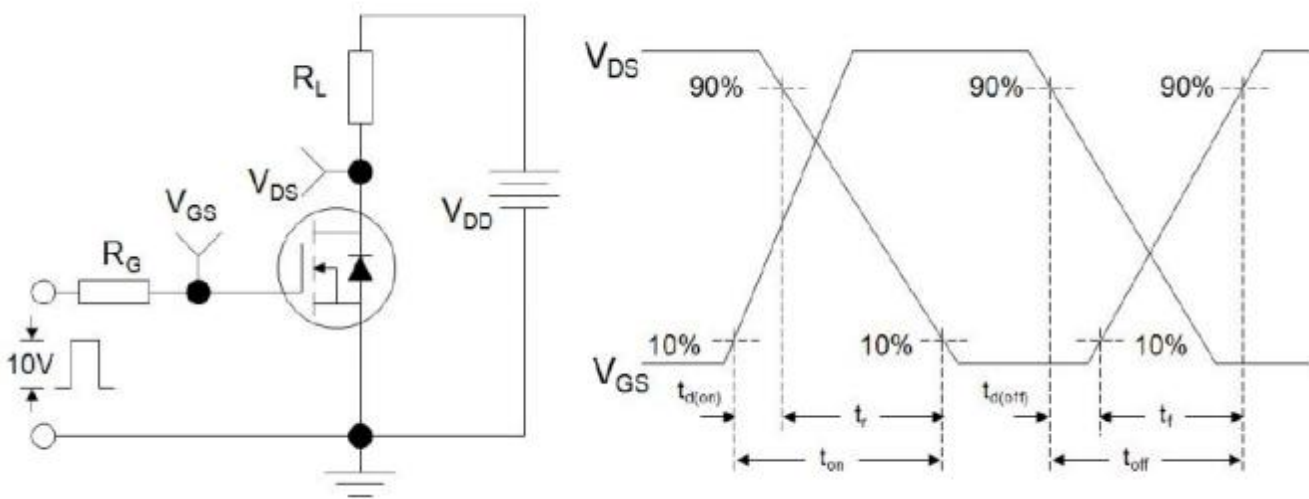


Figure B.
Resistive Switching Test Circuit and Waveform

Test Circuits and Waveforms

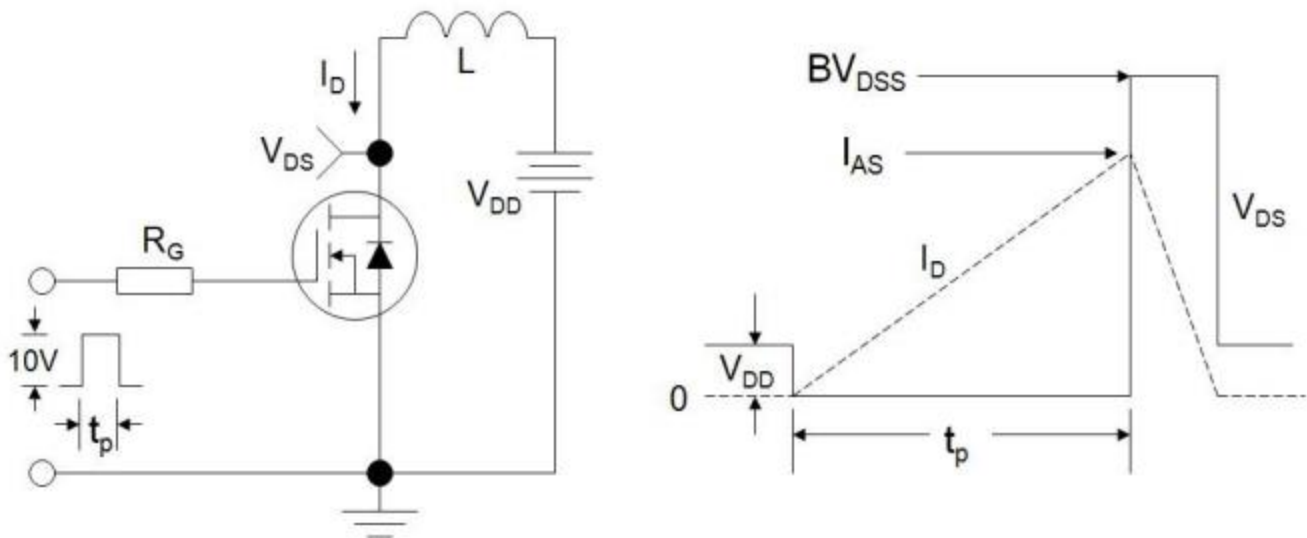
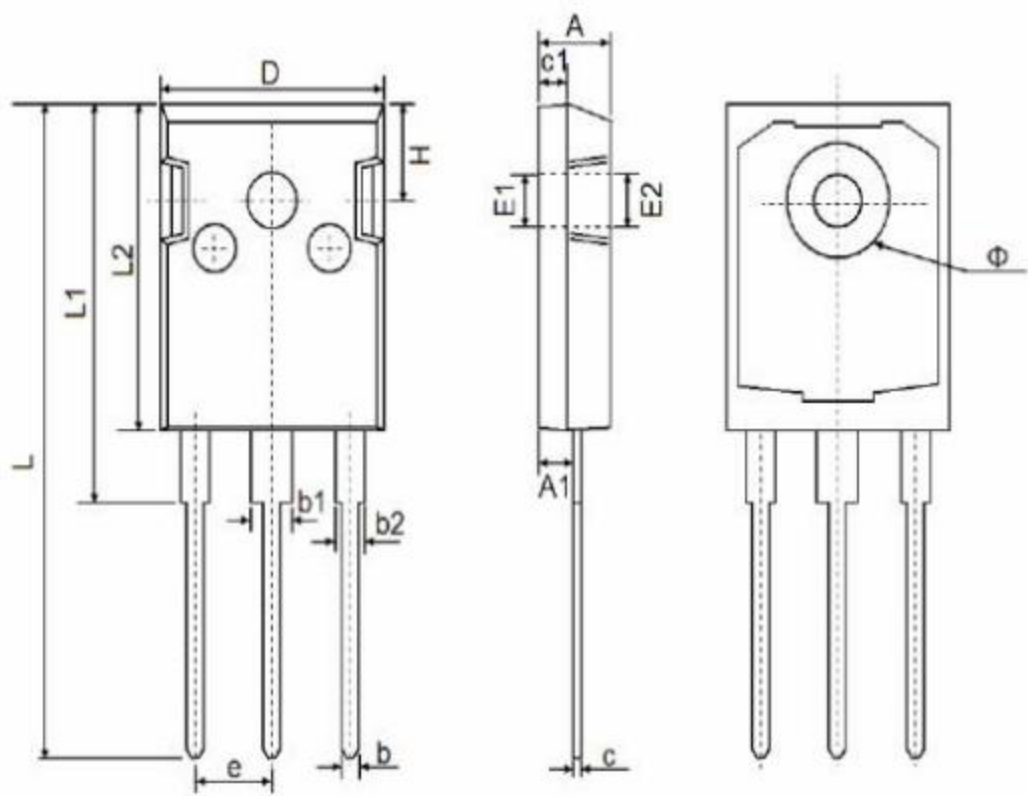


Figure C.Unclamped Inductive Switching Test Circuit and Waveform

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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