

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced trench gate super junction technology

Product Summary



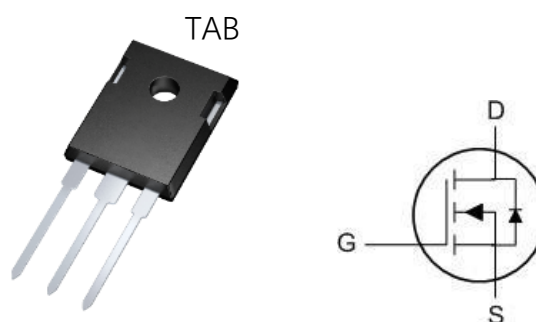
BVDSS	RDS(ON)	ID
650V	45mΩ	31A

Description

The XR65R45H use super junction technology and design to provide excellent RDS(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.

The XR65R45H meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO-247 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	650	V
V <sub>GS</sub>	Gate-Source Voltage	±30	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1,6</sup>	31	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1,6</sup>	20	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	121	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	602	mJ
I <sub>AS</sub>	Avalanche Current	---	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation <sup>4</sup>	291	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	47	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	0.32	°C/W

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	650	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	---	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =25A	---	45	60	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =25A	---	---	---	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	3.2	---	4.6	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	---	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	5	uA
		V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	---	1500	---	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =20V, I <sub>D</sub> =25A	---	38	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	1	---	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =25A	---	128	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	27	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	79	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =400V, R <sub>G</sub> =27Ω, I <sub>D</sub> =25A	---	44	---	ns
T <sub>r</sub>	Rise Time		---	90	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	172	---	
T <sub>f</sub>	Fall Time		---	54	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1MHz	---	3395	---	pF
C <sub>oss</sub>	Output Capacitance		---	217	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	2.5	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	31	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =25A, T <sub>J</sub> =25°C	0.7	0.9	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =21.5, di/dt=100A/μs,	---	150	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	0.85	---	nC

Note :

1 The data is tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2 The data is tested by pulsed pulse width ≤ 300us duty cycle ≤ 2%

3 The EAS data shows Max. rating. The test condition is V<sub>RMS</sub>>0, V<sub>D</sub>=200V, V<sub>GS</sub>=10V, L=30mH

4 The power dissipation is limited by 150°C junction temperature

5 The data is theoretically the same as I<sub>SD</sub> and I<sub>OMA</sub>. In real applications, it should be limited by total power

dissipation.

Typical Performance Characteristics

Fig 1. Output Characteristics ( $T_j=25^\circ\text{C}$ )

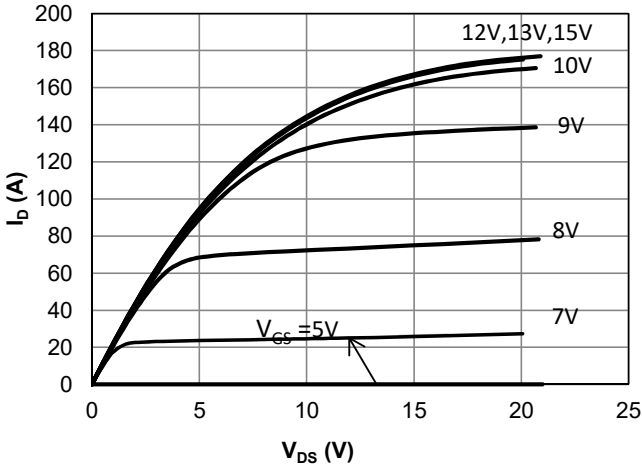


Fig 2. Output Characteristics ( $T_j=150^\circ\text{C}$ )

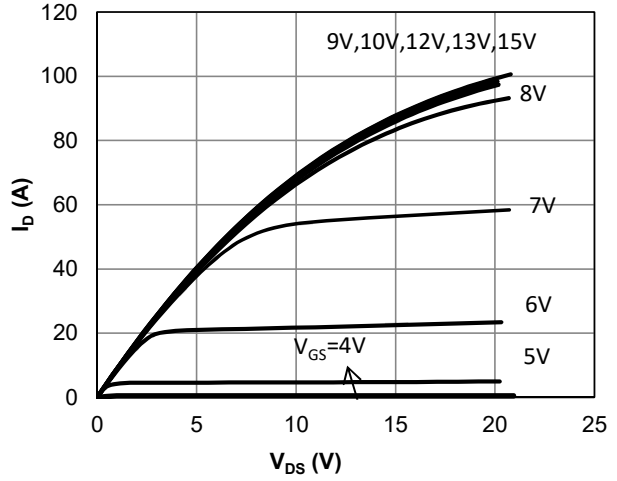


Fig 3: Transfer Characteristics

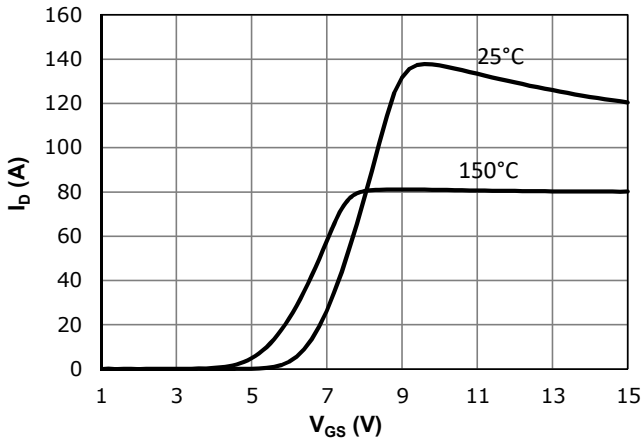


Fig 4:  $V_{TH}$  vs.  $T_j$  Temperature Characteristics

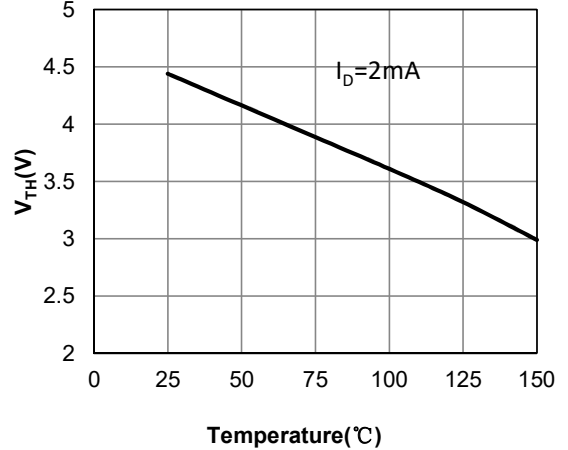


Fig 5:  $R_{DS(on)}$  vs.  $I_{DS}$  Characteristics ( $T_j=25^\circ\text{C}$ )

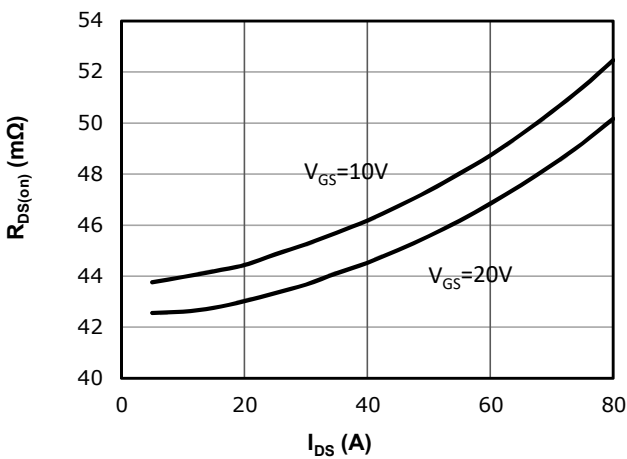


Fig 6:  $R_{DS(on)}$  vs. Temperature

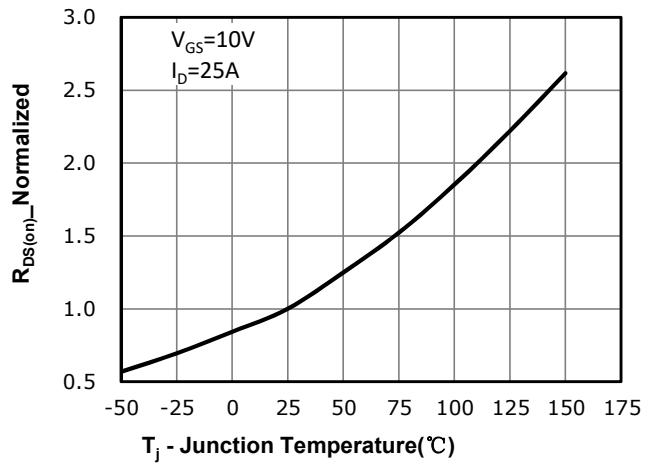


Fig 7:  $BV_{DSS}$  vs. Temperature

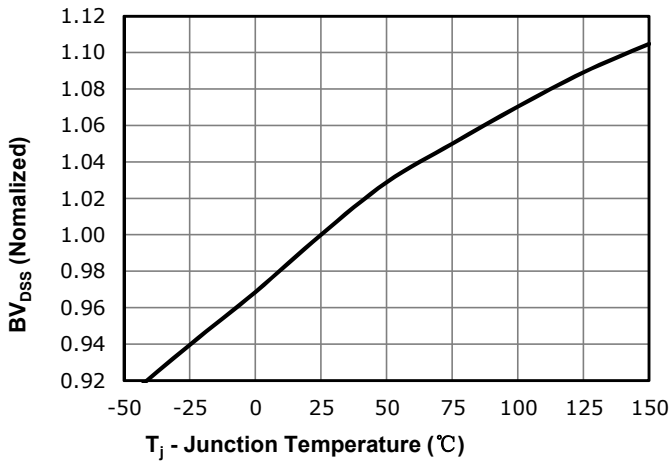


Fig 8:  $R_{DS(on)}$  vs. Gate Voltage

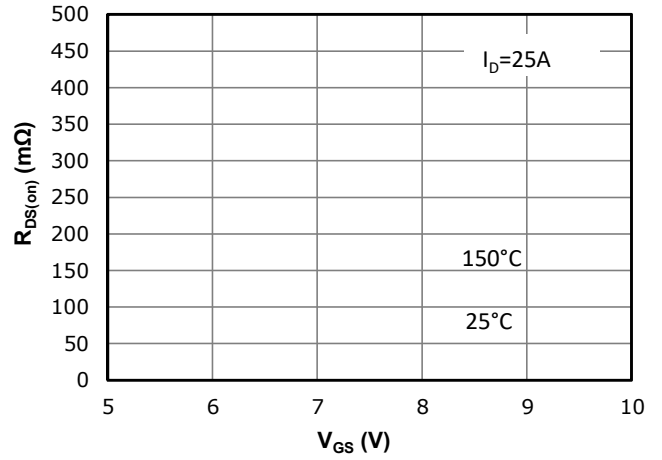


Fig 9: Body-diode Forward Characteristics

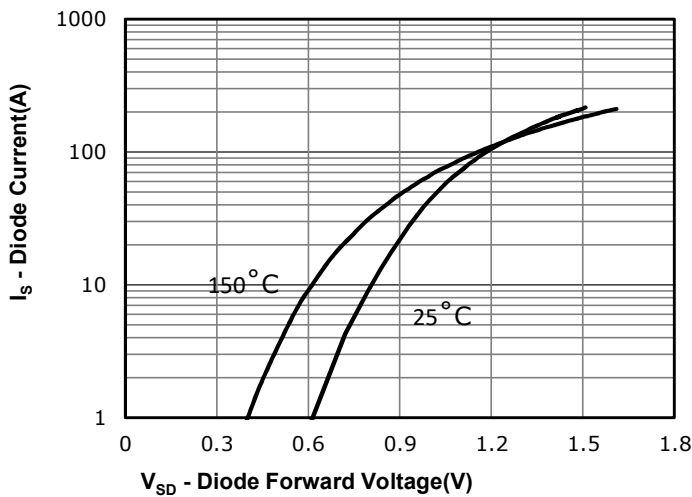


Fig 10: Gate Charge Characteristics

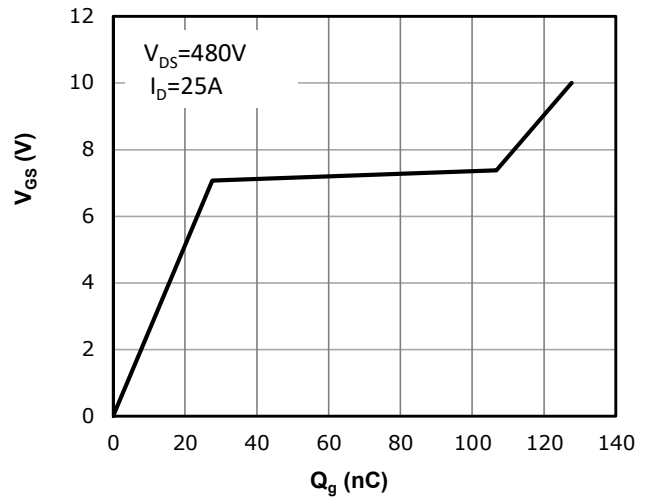


Fig 11: Capacitance Characteristics

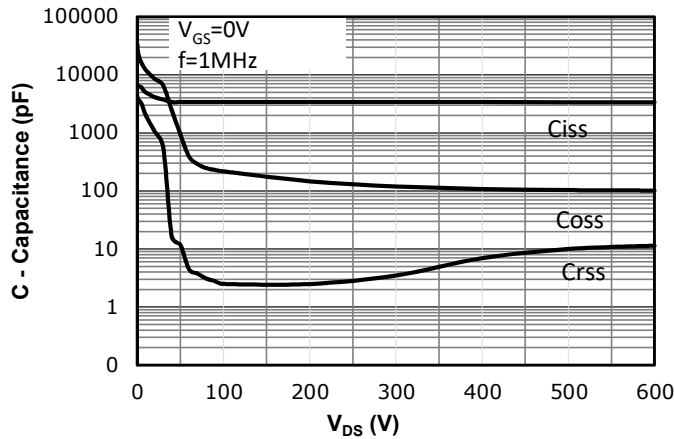


Fig 12: Safe Operating Area

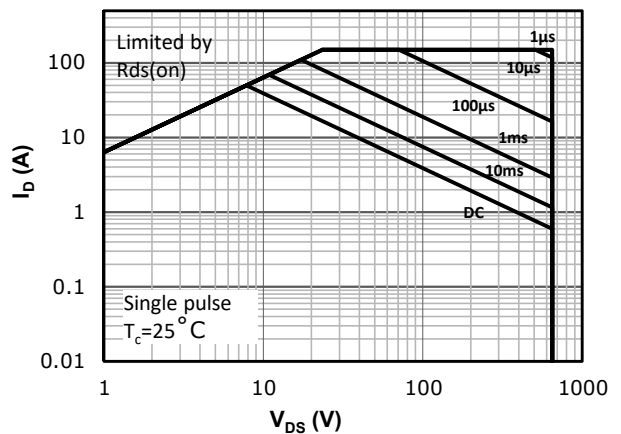
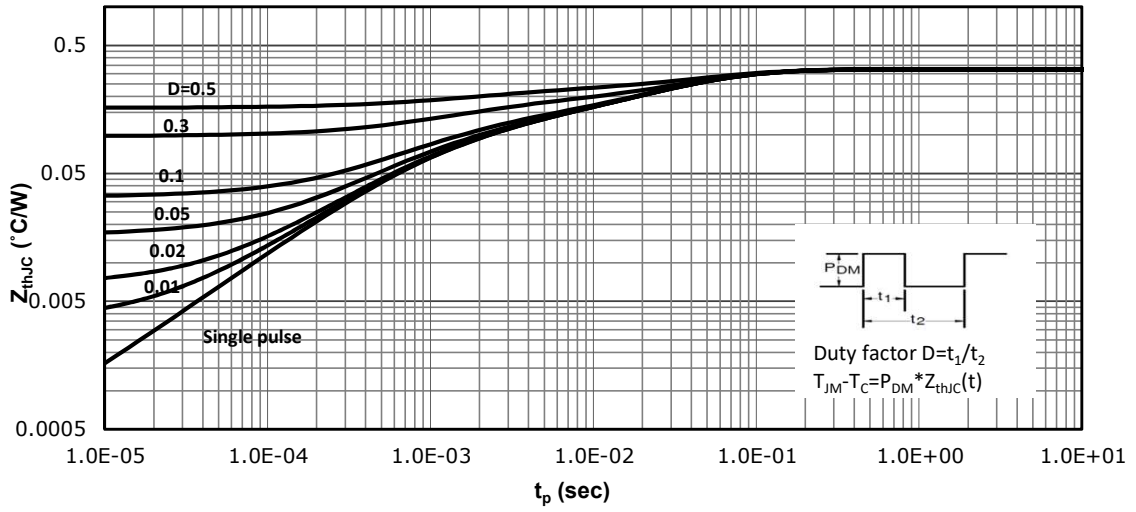
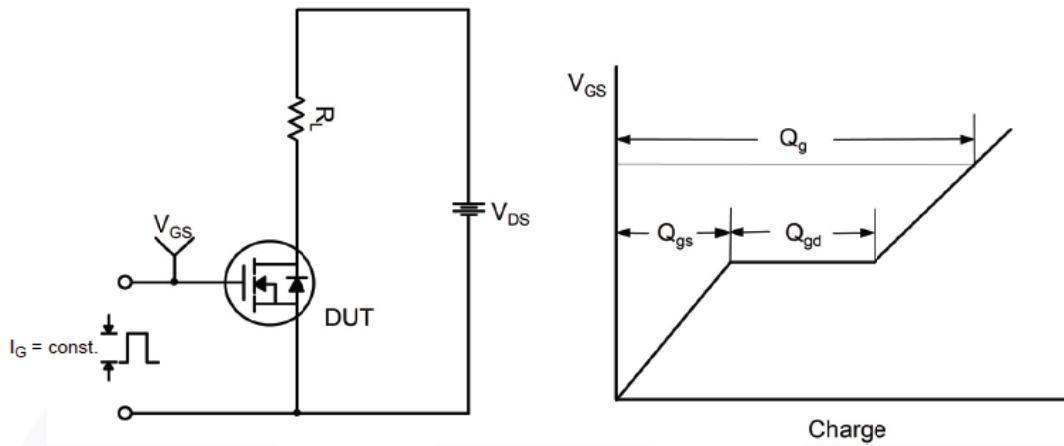


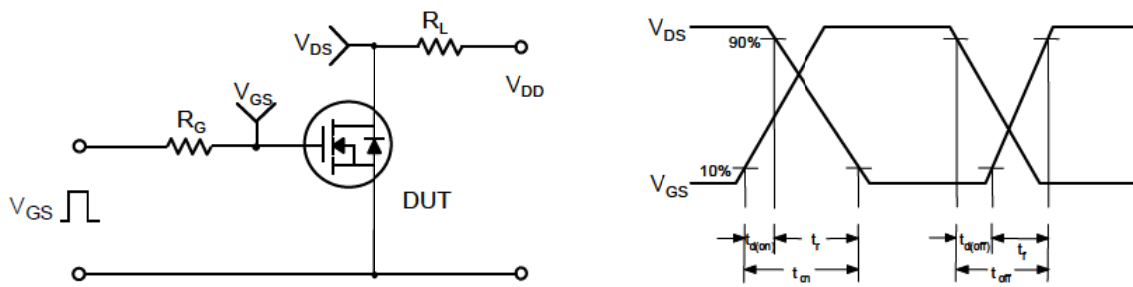
Fig 13: Max. Transient Thermal Impedance



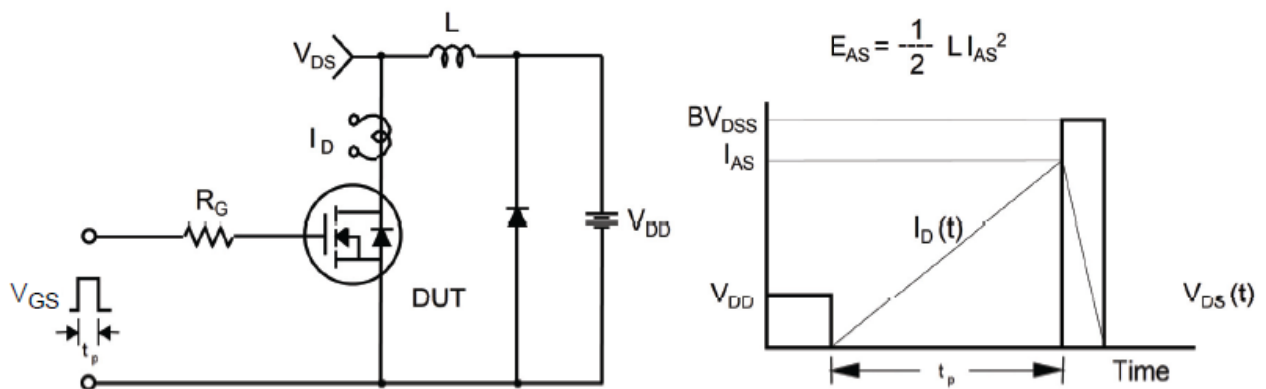
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

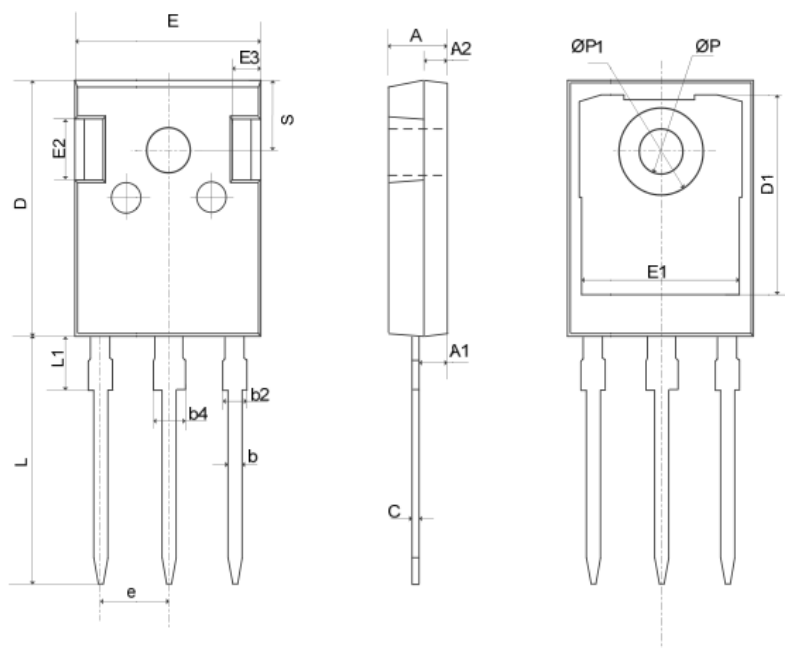


Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO-247

COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.11	1.36
b2	1.91	2.21
b4	2.91	3.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.44BSC	
L	19.62	20.22
L1	—	4.30
ØP	3.40	3.80
ØP1	—	7.30
S	6.15BSC	