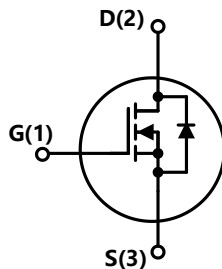
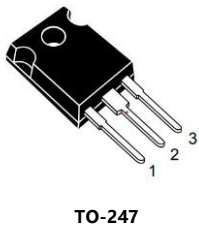




N-channel 600V 29mΩ (Typ) Power MOSFET

1 FEATURES

- 600V breakdown voltage
- Ultra-low R_{DS-ON} & FOM
- Ultra-fast body diode
- Fast switching on/off



2 APPLICATIONS

- Server power
- Telecom power
- EV charger
- Motor driver

3 ORDERING INFORMATION

TYPE	MARKING	PACKAGE
GBS60037TOB	60037	TO-247

4 DISCRIPTION

The 600V high voltage Super Junction MOSFET achieves ultra-low ON-resistance and gate charge. Thanks to excellent balance between switching performance and conduction performance, the GBS60037 provides very high efficiency in resonant switch topology.

The Ultra-fast body diode makes the GBS60037 suitable for high switching frequency application and supports high power density application. The GBS60037 is available in TO-247 package.

5 KEY PERFORMANCE PARAMETERS

PARAMETER	VALUE	UNIT
$V_{DS} @ T_{j_max}$	650	V
$R_{DS-ON} \text{ max } @ V_{GS}=10V$	34	mΩ
$Q_g \text{ (Typ)}$	146	nC
$I_{D-pulse}$	240	A
$E_{oss}@400V$	16	μJ
Body diode recovery time	148	ns



6 SPECIFICATIONS

6.1 ABSOLUTE MAXIMUM RATINGS

$T_J=25^{\circ}\text{C}$ operating free-air temperature unless otherwise noted

SYMBOL	PARAMETER	TEST CONDITION	VALUE	UNIT
V_{DS}	Drain-source voltage		600	V
I_D	Continuous drain current	$T_C=25^{\circ}\text{C}$	60	A
		$T_C=100^{\circ}\text{C}$	38	
$I_{D\text{-pulse}}$	Pulsed drain current		240	A
V_{GS}	Gate-source voltage		± 30	V
E_{AS}	Single pulsed avalanche energy	$I_D=8\text{A}$, $V_{DD}=50\text{V}$	340	mJ
E_{AR}	Repetitive avalanche energy	$I_D=8\text{A}$, $V_{DD}=50\text{V}$	1.7	mJ
I_{AS}	Single pulsed avalanche current		8	A
P_D	Power dissipation		300	W
dv/dt	MOSFET dv/dt ruggedness	$V_{DS}=0\sim 400\text{V}$	90	V/ns
I_S	Continuous diode forward current		60	A
$I_{S\text{-pulse}}$	Diode pulsed current		240	A
dv/dt	Reverse diode dv/dt	$V_{DS}=0\sim 400\text{V}$, $I_{SD}<50\text{A}$	70	V/ns
T_J	Operating junction temperature		$-55 \sim 150$	$^{\circ}\text{C}$
T_{stg}	Storage temperature		$-55 \sim 150$	$^{\circ}\text{C}$

6.2 THERMAL INFORMATION

SYMBOL	PARAMETER	VALUE	UNIT
$R_{\theta JC \text{ max.}}$	Max. Thermal resistance, junction - case	0.416	$^{\circ}\text{C/W}$
$R_{\theta JA \text{ max.}}$	Max. Thermal resistance, junction - ambient	62	$^{\circ}\text{C/W}$
T_{sold}	Soldering temperature	260	$^{\circ}\text{C}$

6.3 ELECTRICAL CHARACTERISTICS

$T_J=25^{\circ}\text{C}$ operating free-air temperature unless otherwise noted

SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
STATIC CHARACTERISTICS						
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS}=0\text{V}$, $I_D=1\text{mA}$	600			V



SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
V _{(GS)th}	Gate threshold voltage	V _{DS} =V _{GS} , I _D =1mA	3.4	4	4.6	V
R _{DS-ON}	Drain-source on state resistance	V _{GS} =10V, I _D =25A		29	34	mΩ
		V _{GS} =10V, I _D =25A, T _j =125°C		60		
I _{GSS}	Gate-source leakage current	V _{GS} =30V, V _{DS} =0V			100	nA
I _{DSS}	Drain-source leakage current	V _{GS} =0V, V _{DS} =600V			5	uA
		V _{GS} =0V, V _{DS} =600V, T _j =125°C			500	
R _g	Gate resistance	F=1MHz, open drain		3		Ω
DYNAMIC CHARACTERISTICS						
C _{iss}	Input capacitance	V _{GS} =0V V _{DS} =400V, f=250KHz		6345		pF
C _{oss}	Output capacitance			110		pF
C _{rss}	Reverse transfer capacitance			15		pF
C _{o(er)}	Effective output capacitance, energy related	V _{GS} = 0V, V _{DS} = 0V~400V		225		pF
C _{o(tr)}	Effective output capacitance, time related			2435		pF
t _{d(on)}	Turn-on delay time	V _{GS} =15V, V _{DS} =400V, I _D =25A, R _G =3Ω		46		ns
t _r	Rise time			10		ns
t _{d(off)}	Turn-off delay time			158		ns
t _f	Fall time			9		ns
GATE CHARGE CHARACTERISTICS						
Q _g	Gate charge total	V _{DS} =400V, I _D =25A V _{GS} =0~10V		146		nC
Q _{gd}	Gate to drain charge			56		nC
Q _{gs}	Gate to source charge			36		nC
V _{plateau}	Gate plateau voltage			5.9		V
BODY DIODE CHARACTERISTICS						
V _{SD}	Diode forward voltage	V _{GS} =0V, I _F =25A, T _j =25°C			1.3	V
t _{rr}	Reverse recovery time			148		ns



SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
Q_{rr}	Reverse recovery charge	$V_R=400V, I_F=25A$ $di_F/dt=100A/\mu s$		0.95		μC
I_{rr}	Peak reverse recovery current			13		A

CONFIDENTIAL



7 Electrical Characteristic Diagram

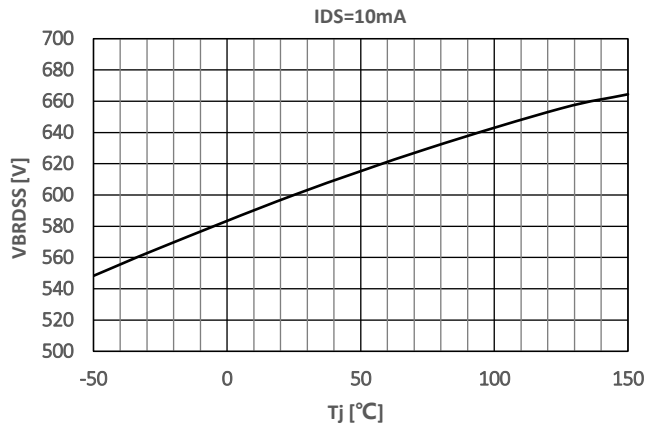


Figure 1. Drain-source Breakdown Voltage

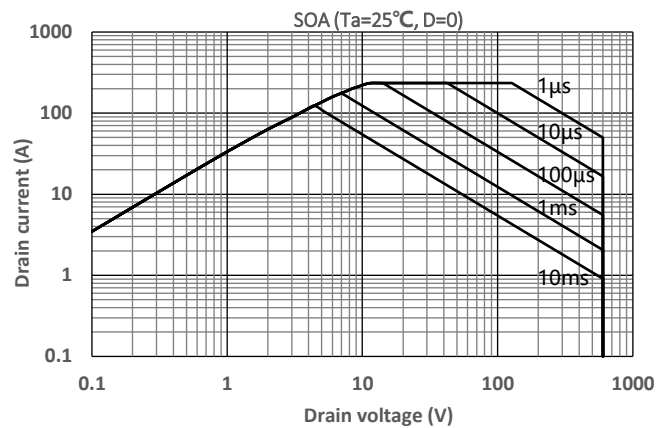


Figure 2. Safety Operating Area

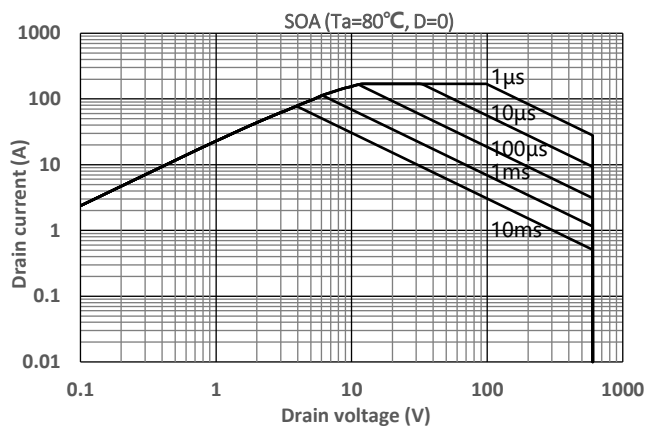


Figure 3. Safety Operating Area (Ta=80°C)

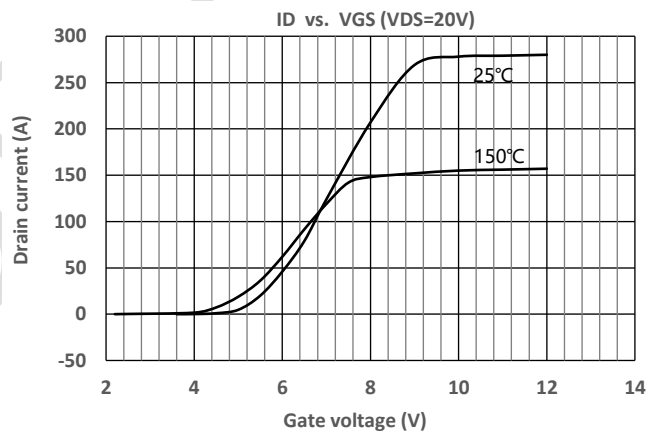


Figure 4. Typ. Transfer Characteristics

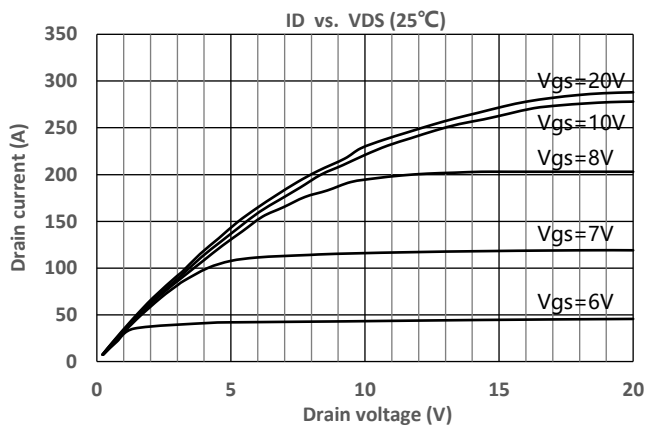


Figure 5. Typ. Output Characteristics

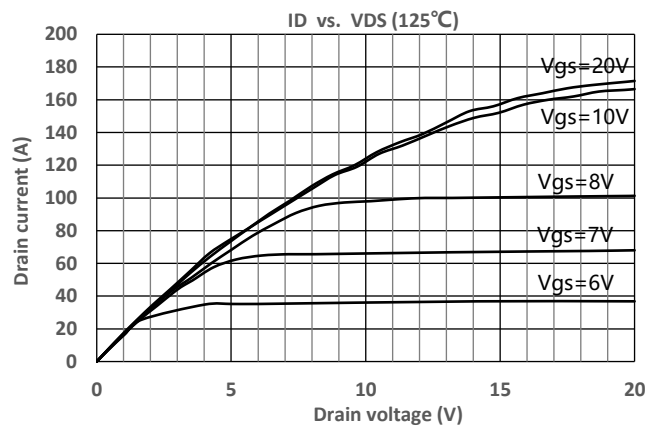


Figure 6. Typ. Output Characteristics

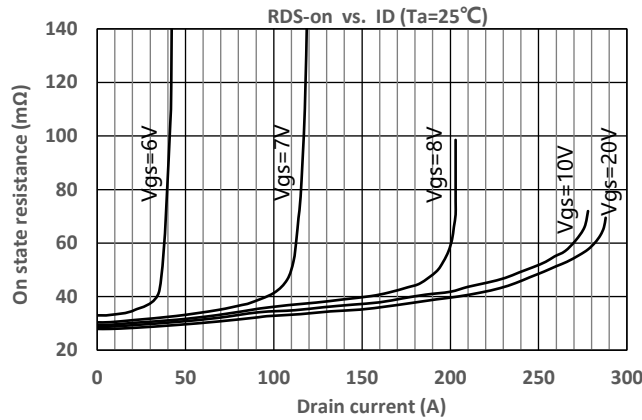


Figure 7. Typ. Drain Source On-state Resistance

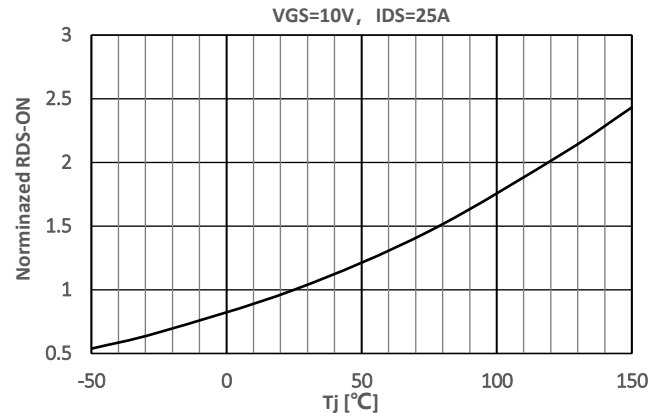


Figure 8. RDS-ON vs. Tj

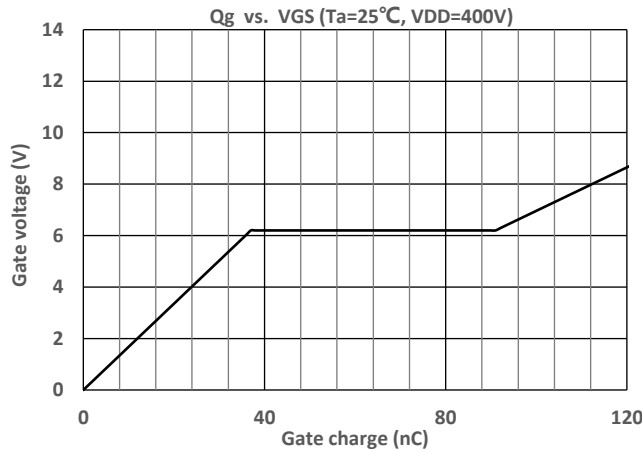


Figure 9. Typ. Gate Charge

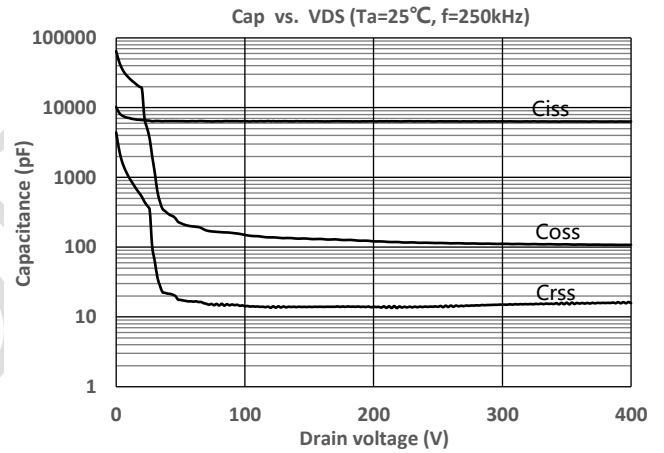


Figure 10. Typ. Capacitance

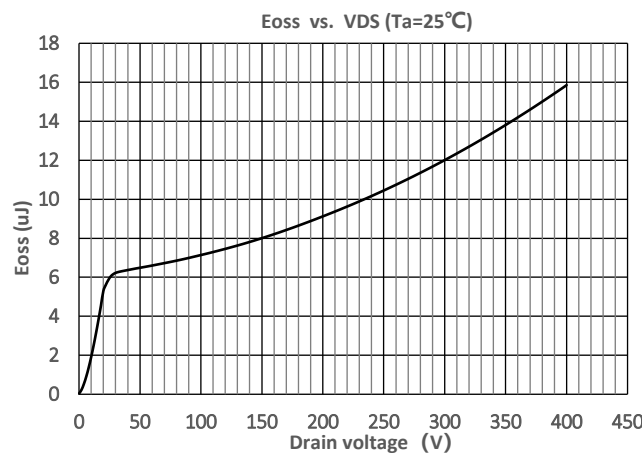


Figure 11. Typ. Coss Stored Energy

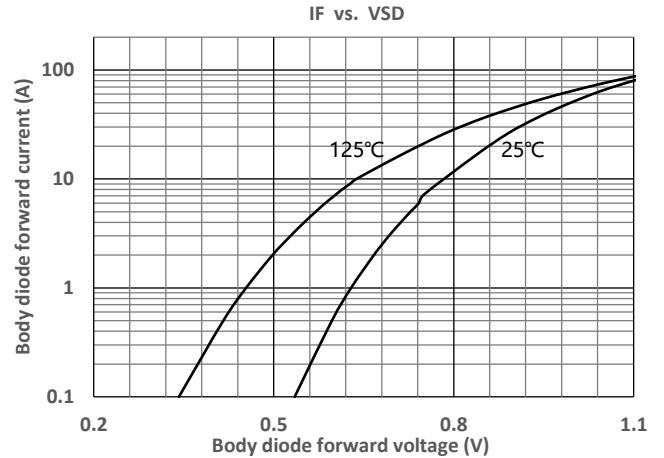


Figure 12. Body diode forward characteristics

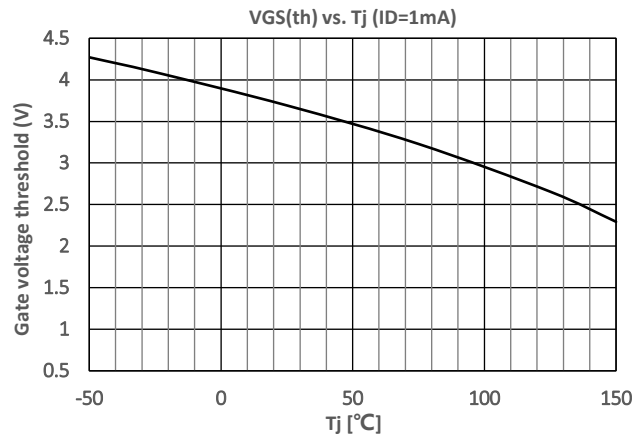


Figure 13. Threshold Voltage vs. Tj

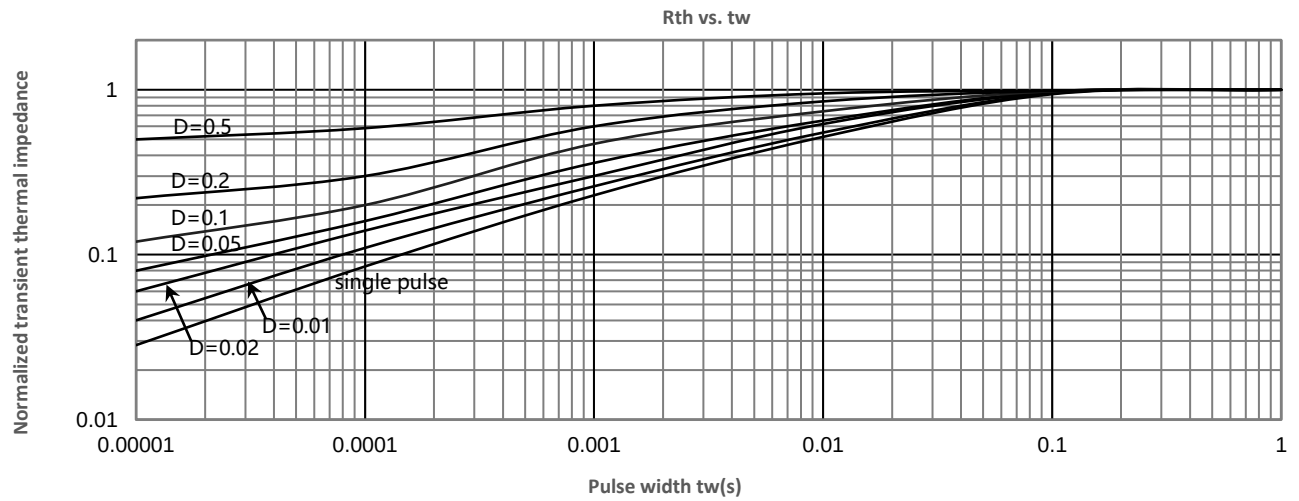


Figure 14. Rth vs. Tw



8 Test Circuit

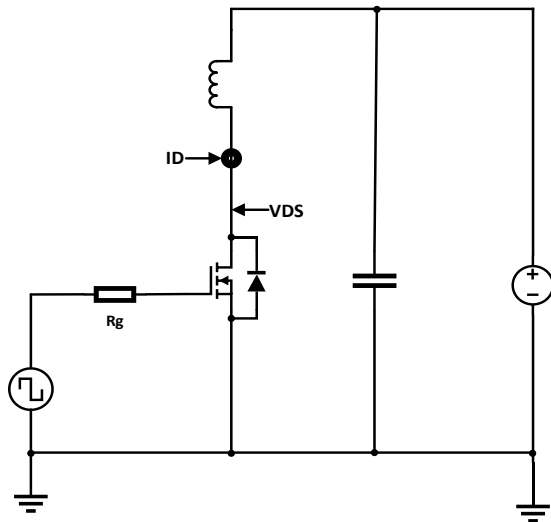
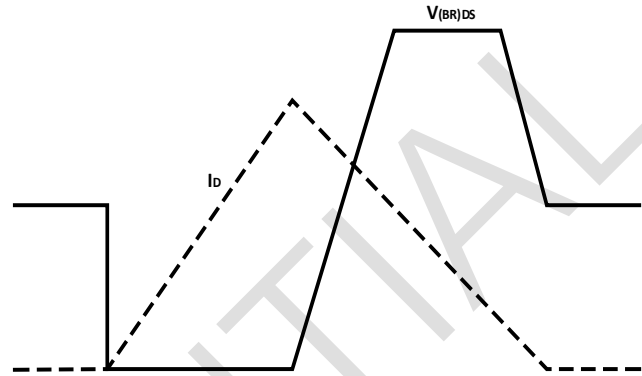


Figure 15. Unclamped inductive switching test circuit



Waveform 1. Unclamped inductive switching waveform

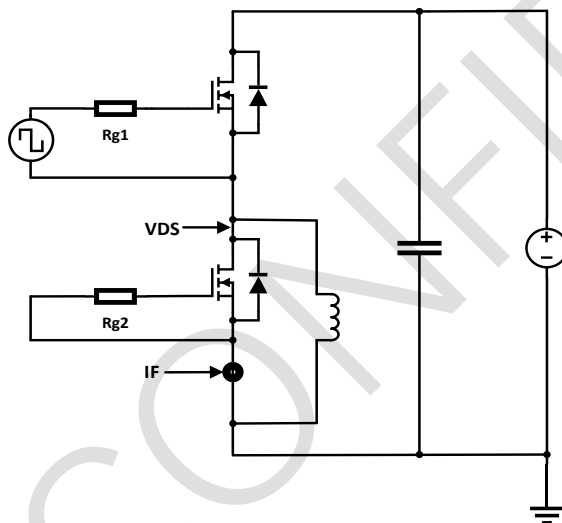
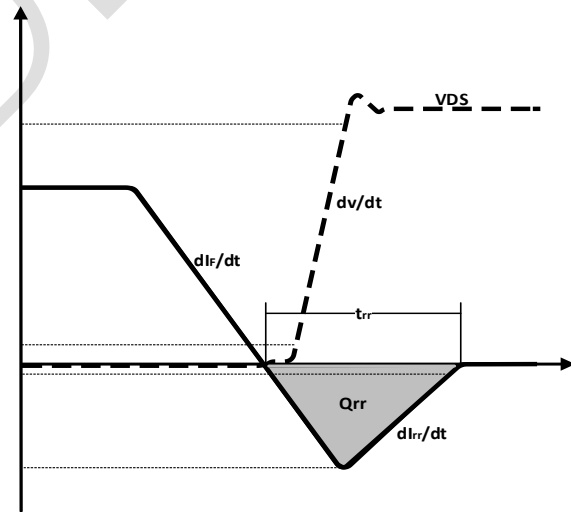


Figure 16. Body diode characteristics test circuit



Waveform 2. Body diode characteristics waveform

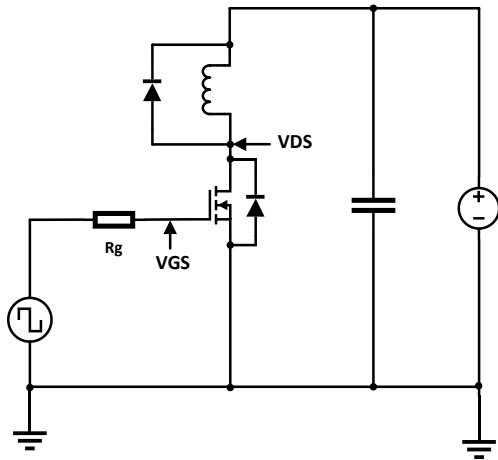
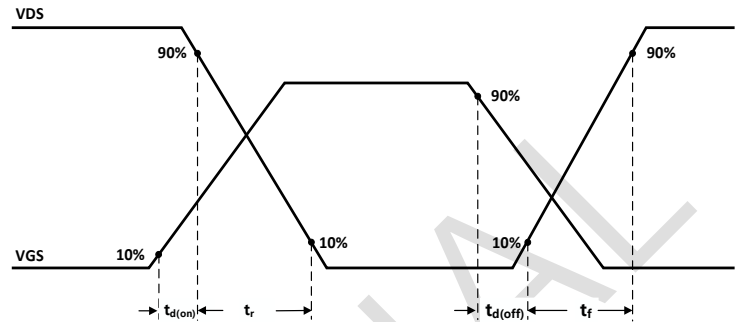
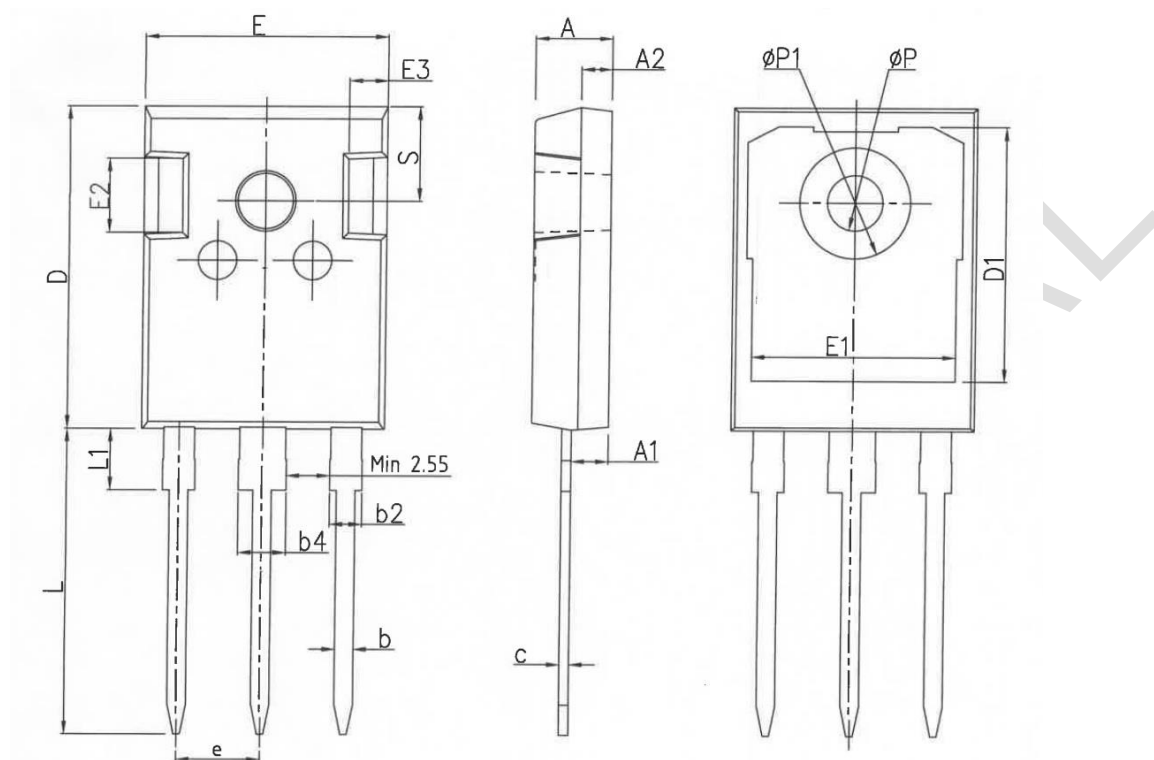


Figure 17. Switching time test circuit



Waveform 3. Switching time waveform

**PACKAGE INFORMATION**

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ϕP	3.40	3.60	3.80
$\phi P1$	-	-	7.30
S	6.15BSC		