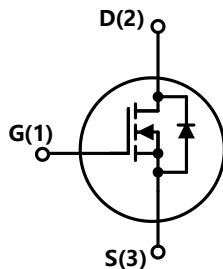
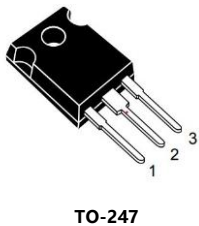




N-channel 600V 29mΩ (Typ) Power MOSFET

1 FEATURES

- 600V break down 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 recovery 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} max @ $V_{gs}=10V$	34	mΩ
Q_g (Typ)	136	nC
$I_{D-pulse}$	235	A
$E_{oss}@400V$	18	μJ
Body diode recovery time	155	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	$T_C=25^{\circ}\text{C}$	58	A
		$T_C=100^{\circ}\text{C}$	36	
$I_{D\text{-pulse}}$	Pulsed drain current		235	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		227	W
dv/dt	MOSFET dv/dt ruggedness	$V_{DS}=0\sim 400\text{V}$	60	V/ns
I_S	Continuous diode forward current		58	A
$I_{S\text{-pulse}}$	Diode pulsed current		235	A
dv/dt	Reverse diode dv/dt	$V_{DS}=0\sim 400\text{V}, I_{SD}<25\text{A}$	50	V/ns
T_J	Operating junction temperature		-55 ~ 150	$^{\circ}\text{C}$
T_{stg}	Storage temperature		-55 ~ 150	$^{\circ}\text{C}$

6.2 THERMAL INFORMATION

SYMBOL	PARAMETER	VALUE	UNIT
$R_{\theta JC \text{ max.}}$	Max. Thermal resistance, junction - case	0.54	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA \text{ max.}}$	Max. Thermal resistance, junction - ambient	62	$^{\circ}\text{C}/\text{W}$
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						
$V_{(BR)DSS}$		$V_{GS}=0\text{V}, I_D=10\text{mA}$	600			V



SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT	
	Drain-source breakdown voltage	$V_{GS}=0V, I_D=10mA, T_j=150^{\circ}C$	650				
$V_{(GS)th}$	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	
		$V_{GS}=10V, I_D=25A, T_j=125^{\circ}C$		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	
		$V_{GS}=0V, V_{DS}=600V, T_j=125^{\circ}C$			500		
DYNAMIC CHARACTERISTICS							
C_{iss}	Input capacitance	$V_{GS}=0V$		6300		pF	
C_{oss}	Output capacitance	$V_{DS}=400V, f=250KHz$		110		pF	
C_{rss}	Reverse transfer capacitance			9		pF	
$C_{o(er)}$	Effective output capacitance, energy related	$V_{GS} = 0V, V_{DS} = 0V\sim 400V$		225		pF	
$C_{o(tr)}$	Effective output capacitance, time related			2435		pF	
$t_{d(on)}$	Turn-on delay time	$V_{GS}=14V, V_{DS}=400V, R_G=3\Omega$		50		ns	
t_r	Rise time			6		ns	
$t_{d(off)}$	Turn-off delay time			140		ns	
t_f	Fall time			7		ns	
GATE CHARGE CHARACTERISTICS							
Q_g	Gate charge total	$V_{DS}=400V, I_D=25A$		136		nC	
Q_{gd}	Gate to drain charge			54		nC	
Q_{gs}	Gate to source charge		$V_{GS}=0\sim 10V$		38		nC
$V_{plateau}$	Gate plateau voltage				6.2		V
BODY DIODE CHARACTERISTICS							
V_{SD}	Diode forward voltage	$V_{GS}=0V, I_F=25A, T_j=25^{\circ}C$			1.3	V	



SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
t_{rr}	Reverse recovery time	$V_{DS}=400V, I_F=25A$ $di_F/dt=100A/\mu s$		155		ns
Q_{rr}	Reverse recovery charge			1.1		μC
I_{rr}	Peak reverse recovery current			13		A

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7 Electrical Characteristic Diagram

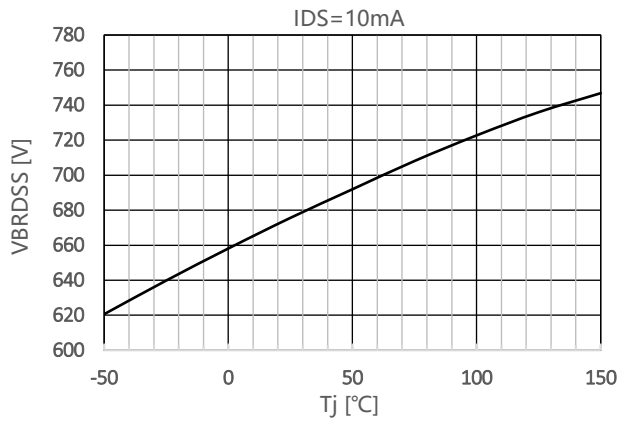


Figure 1. Drain-source Breakdown Voltage

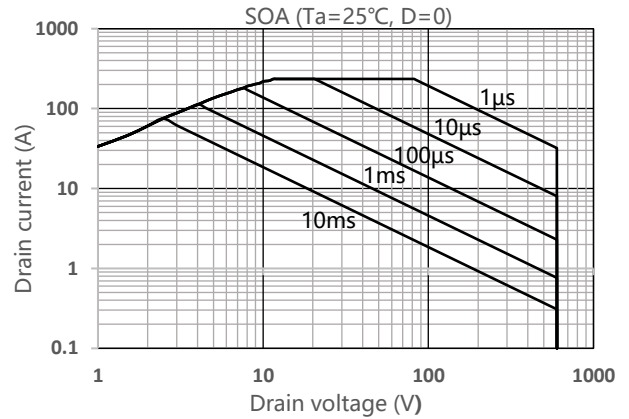


Figure 2. Safety Operating Area

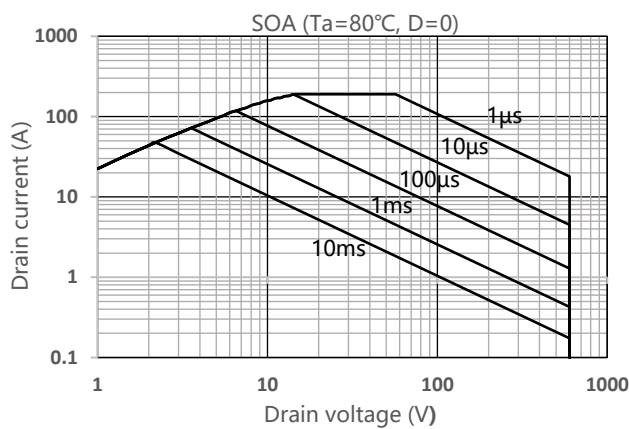


Figure 3. Safety Operating Area(Ta=80°C)

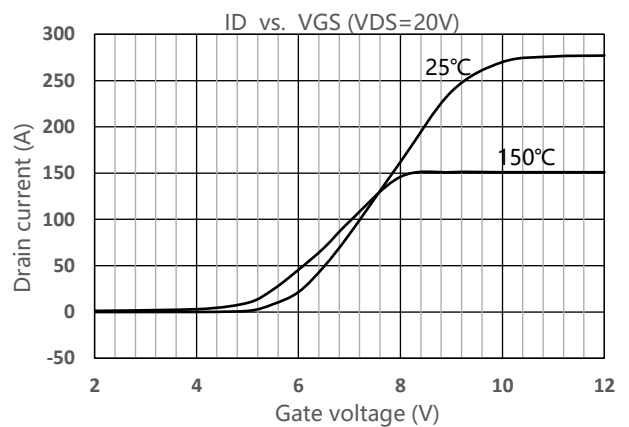


Figure 4. Typ. Transfer Characteristics

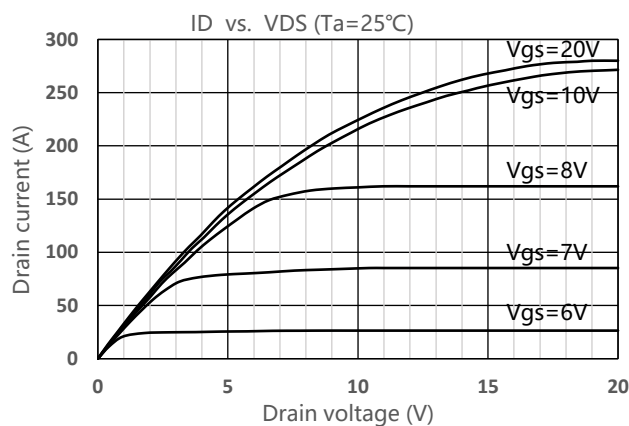


Figure 5. Typ. Output Characteristics

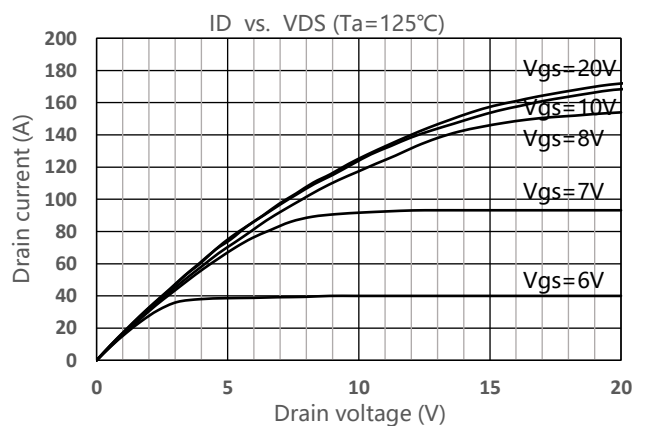


Figure 6. Typ. Output Characteristics

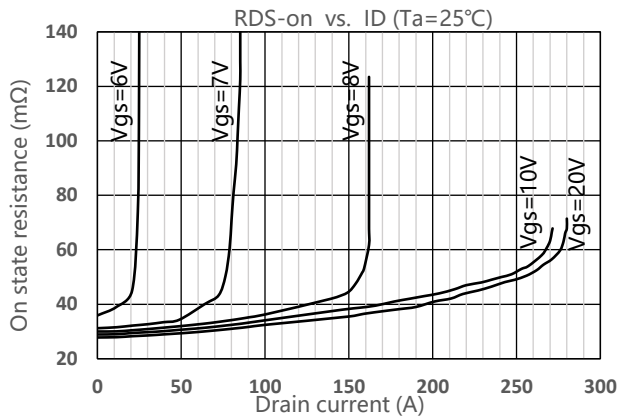


Figure 7. Typ. Drain Source On-state Resistance

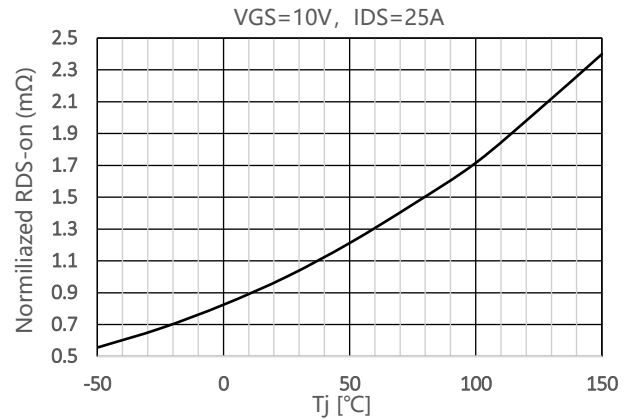


Figure 8. RDS-ON vs. Tj

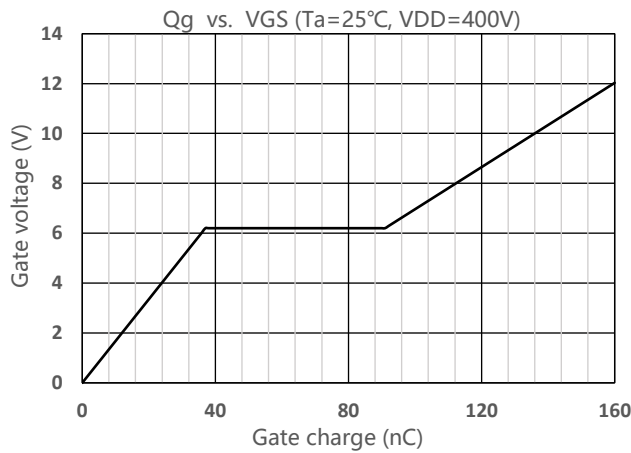


Figure 9. Typ. Gate Charge

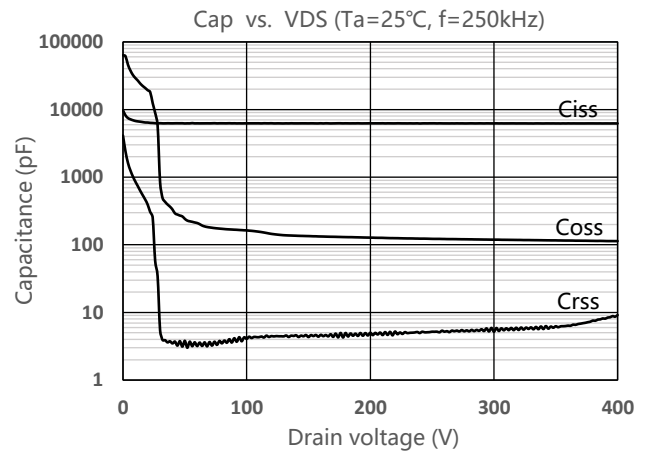


Figure 10. Typ. Capacitance

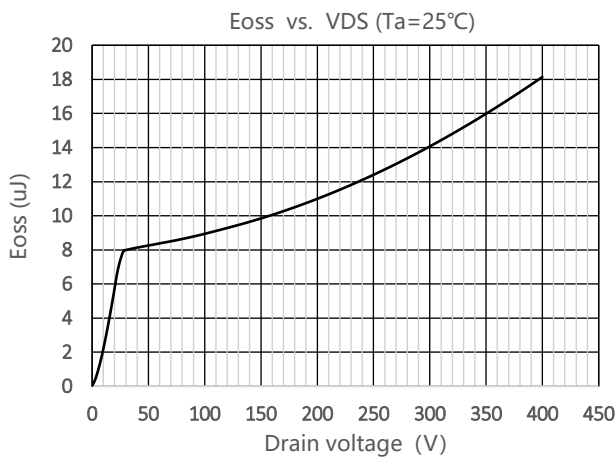


Figure 11. Typ. Coss Stored Energy

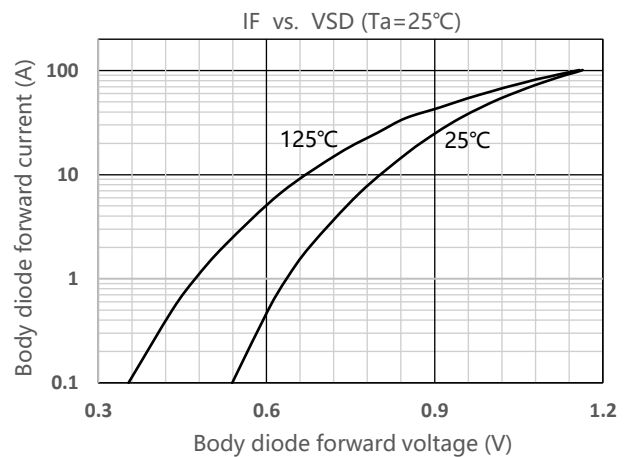


Figure 12. Body diode forward characteristics

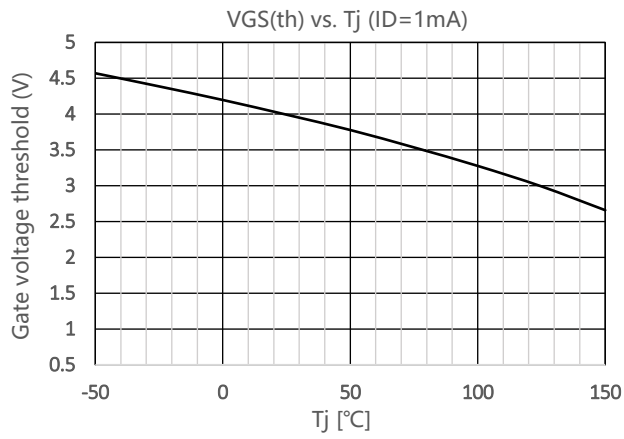


Figure 13. Threshold Voltage vs. Tj

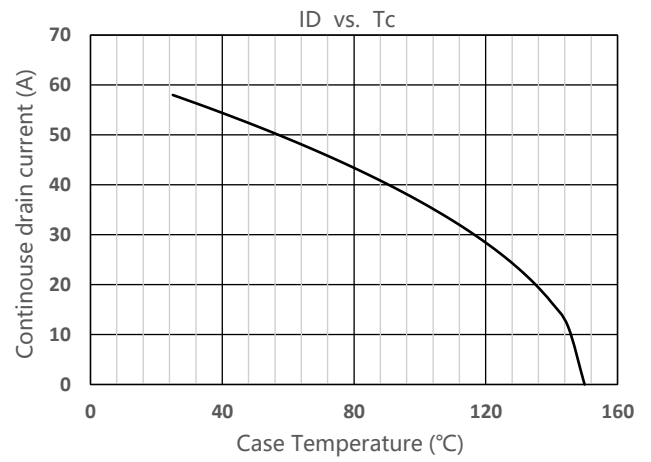


Figure 14. Maximum Drain current vs. Tj

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8 Test Circuit

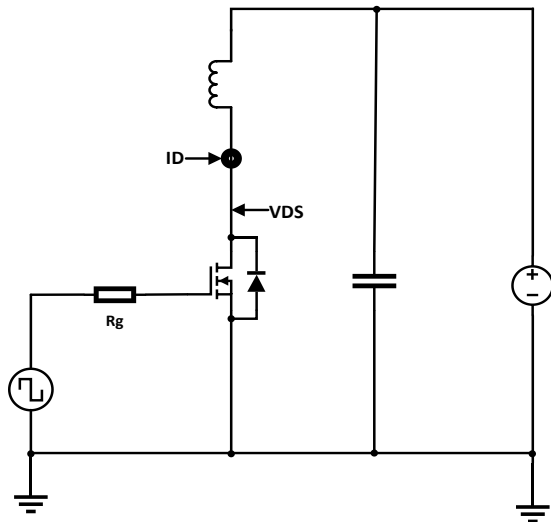
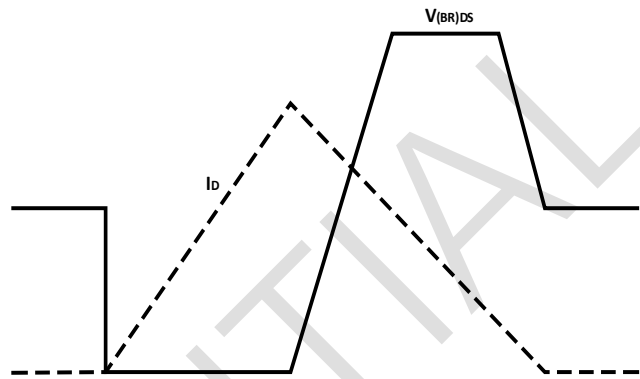


Figure 15. Unclamped inductive switching test circuit



Waveform 1. Unclamped inductive switching waveform

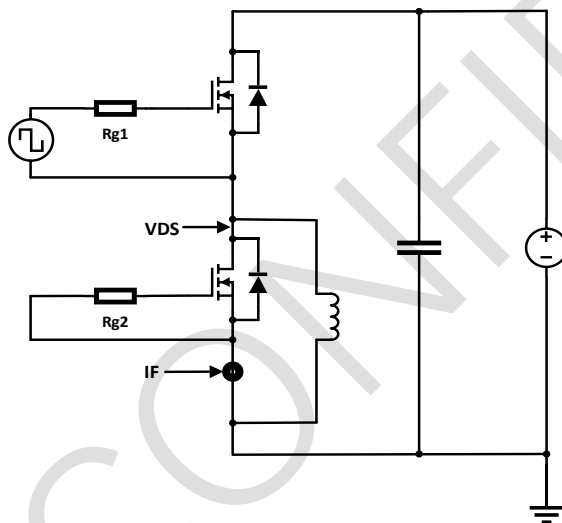
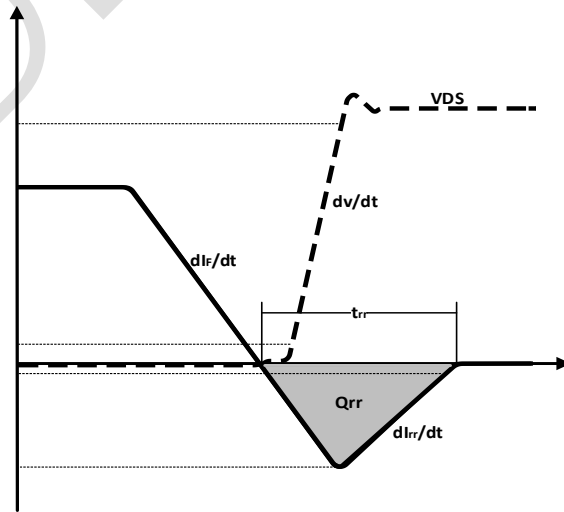


Figure 16. Body diode characteristics test circuit



Waveform 2. Body diode characteristics waveform

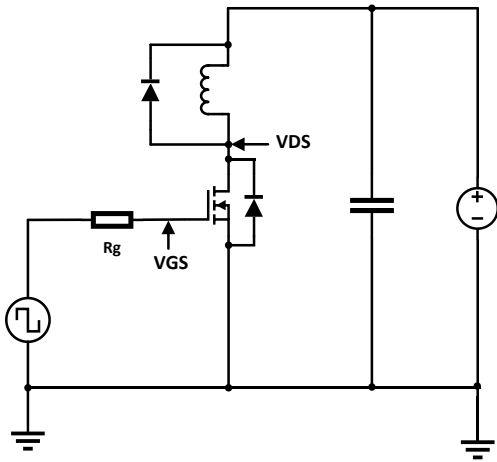
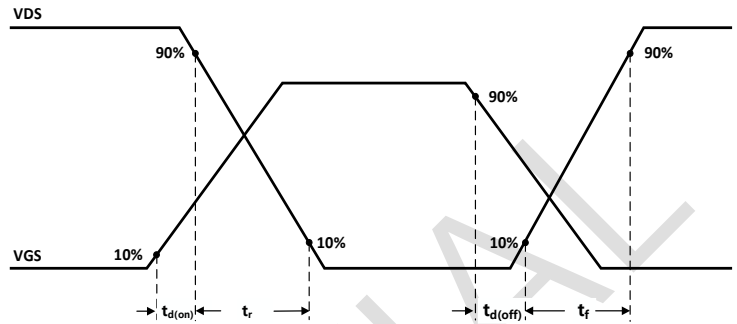


Figure 17. Switching time test circuit

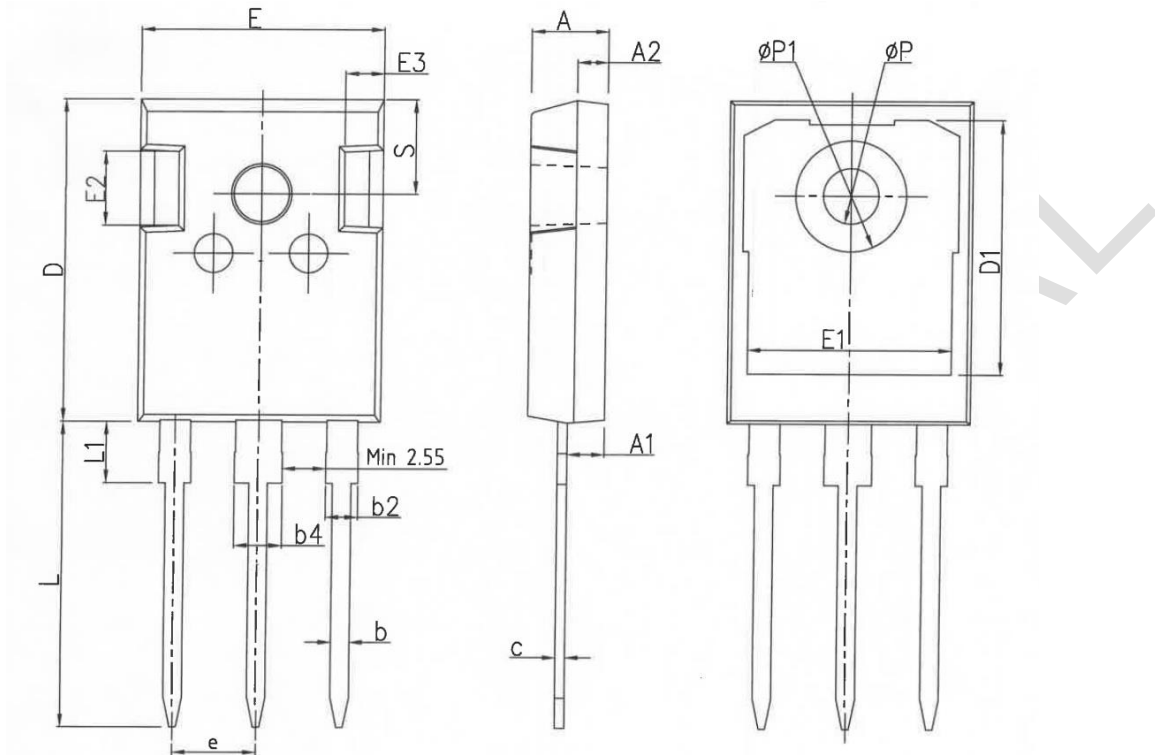


Waveform 3. Switching time waveform

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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
ΦP1	-	-	7.30
S	6.15BSC		