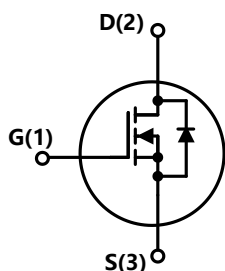
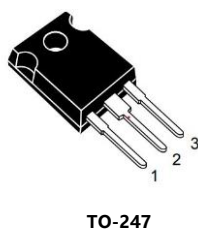


N-channel 650V 34mΩ (Typ) Power MOSFET

1. FEATURES

- 650V break down voltage
- Ultra-low R_{DS-ON} & FOM
- Fast switching on/off
- Excellent stability



2. APPLICATIONS

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

3. ORDERING INFORMATION

TYPE	MARKING	PACKAGE
GBS65041CTOB	65041C	TO-247

4. DESCRIPTION

The 650V high voltage Super Junction MOSFET achieves ultra-low ON-resistance and gate charge. Thanks to excellent balance between switching performance and conduction performance, the GBS65041C provides very high efficiency in various switch topology.

The Ultra-low gate charge makes the GBS65041C suitable for high switching frequency application and supports high power density application. The GBS65041C is available in TO-247 package.

5. KEY PERFORMANCE PARAMETERS

PARAMETER	VALUE	UNIT
$V_{DS} @ T_{j_max}$	700	V
$R_{DS-ON} \text{ max } @ V_{gs}=10V$	40	mΩ
$Q_g \text{ (Typ)}$	130	nC
$I_{D-pulse}$	216	A
$E_{oss}@400V$	18	μJ
Body diode recovery time	370	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		650	V
I_D	Continuous drain current	$T_C=25^{\circ}\text{C}$	54	A
		$T_C=100^{\circ}\text{C}$	34	
$I_{D\text{-pulse}}$	Pulsed drain current		216	A
V_{GS}	Gate-source voltage		± 30	V
E_{AS}	Single pulsed avalanche energy	$I_D=6\text{A}$, $V_{DD}=50\text{V}$	200	mJ
E_{AR}	Repetitive avalanche energy	$I_D=6\text{A}$, $V_{DD}=50\text{V}$	1	mJ
I_{AS}	Single pulsed avalanche current		6	A
P_D	Power dissipation		450	W
dv/dt	MOSFET dv/dt ruggedness	$V_{DS}=0\sim 400\text{V}$	60	V/ns
I_S	Continuous diode forward current		54	A
$I_{S\text{-pulse}}$	Diode pulsed current		216	A
dv/dt	Reverse diode dv/dt	$V_{DS}=0\sim 400\text{V}$, $I_{SD}<25\text{A}$	50	V/ns
T_J , T_{stg}	Operating and 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	0.54	$^{\circ}\text{C/W}$
$R_{\theta JA \text{ max.}}$	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						
$V_{(BR)DSS}$		$V_{GS}=0\text{V}$, $I_D=10\text{mA}$	650			V



SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
	Drain-source breakdown voltage	$V_{GS}=0V$, $I_D=10mA$, $T_j=150^{\circ}C$	700			
$V_{(GS)th}$	Gate threshold voltage	$V_{DS}=V_{GS}$, $I_D=1mA$	3		4	V
R_{DS-ON}	Drain-source on state resistance	$V_{GS}=10V$, $I_D=25A$		34	40	mΩ
		$V_{GS}=10V$, $I_D=25A$, $T_j=125^{\circ}C$		74		
I_{GSS}	Gate-source leakage current	$V_{GS}=30V$, $V_{DS}=0V$			100	nA
I_{DSS}	Drain-source leakage current	$V_{GS}=0V$, $V_{DS}=650V$			1	uA
		$V_{GS}=0V$, $V_{DS}=650V$, $T_j=125^{\circ}C$			500	
DYNAMIC CHARACTERISTICS						
C_{iss}	Input capacitance	$V_{GS}=0V$		6300		pF
C_{oss}	Output capacitance	$V_{DS}=400V$, $f=250KHz$		95		pF
C_{rss}	Reverse transfer capacitance			4		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			11		ns
$t_{d(off)}$	Turn-off delay time			110		ns
t_f	Fall time			6		ns
GATE CHARGE CHARACTERISTICS						
Q_g	Gate charge total	$V_{DS}=400V$, $I_D=25A$ $V_{GS}=0\sim 10V$		130		nC
Q_{gd}	Gate to drain charge			48		nC
Q_{gs}	Gate to source charge			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	$V_{DS}=400V, I_F=25A$ $di_F/dt=100A/\mu s$		370		ns
Q_{rr}	Reverse recovery charge			6.7		μC
I_{rr}	Peak reverse recovery current			36		A

CONFIDENTIAL



7. Electrical Characteristic Diagram

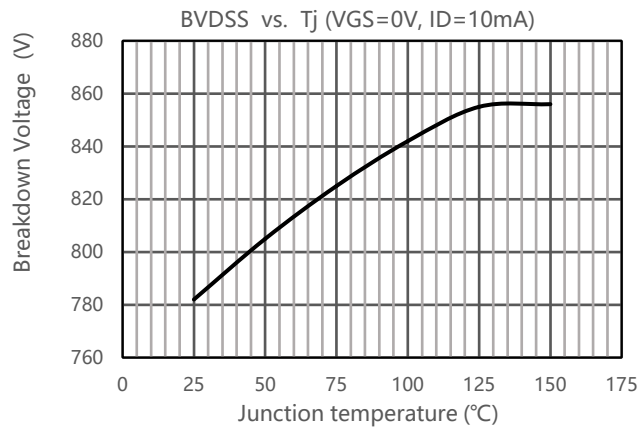


Figure 1. Drain-source Breakdown Voltage

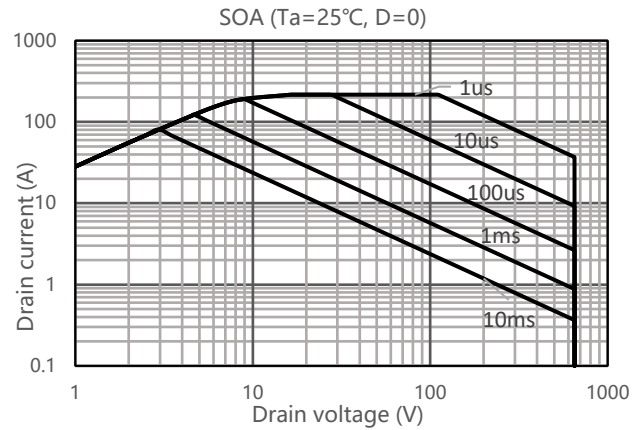


Figure 2. Safety Operating Area

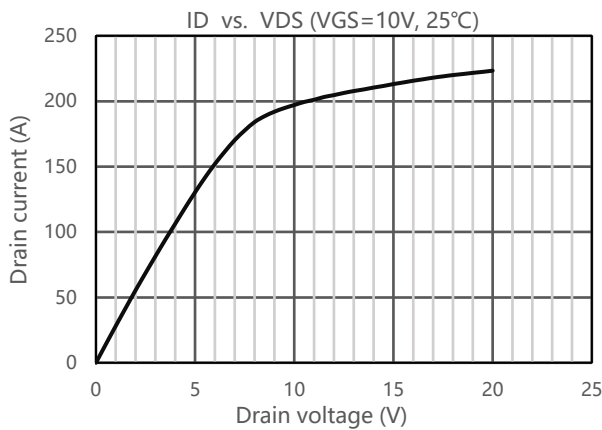


Figure 3. Typ. Output Characteristics

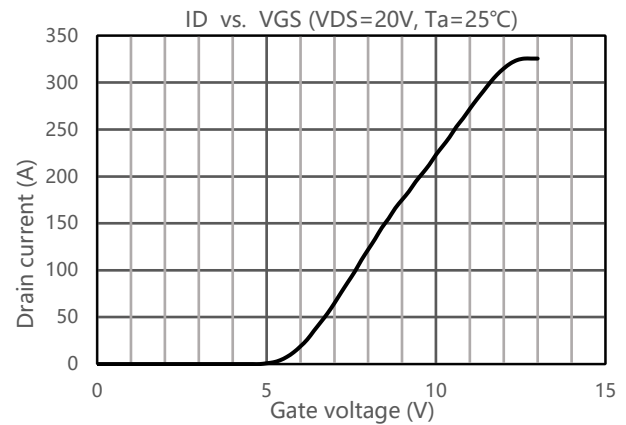


Figure 4. Typ. Transfer Characteristics

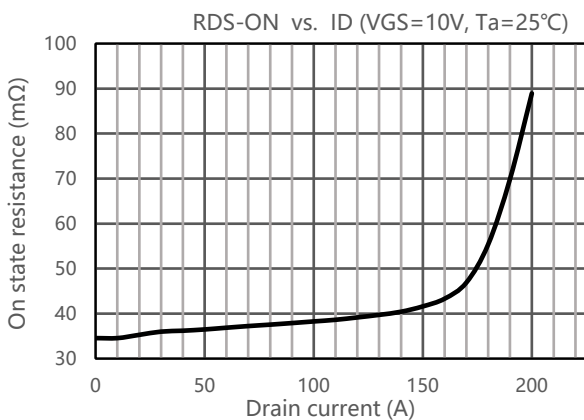


Figure 5. Typ. Drain Source On-state Resistance

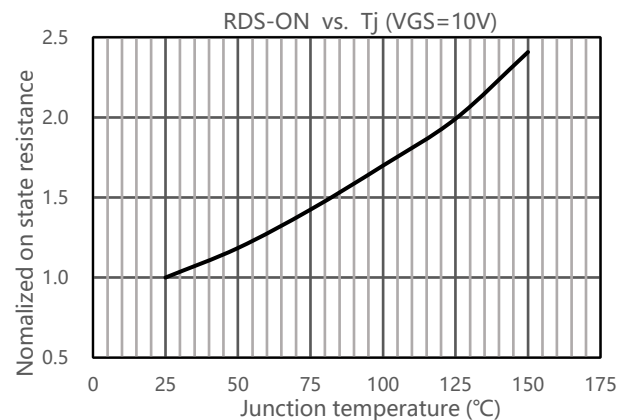


Figure 6. R_{DS-ON} vs. T_j

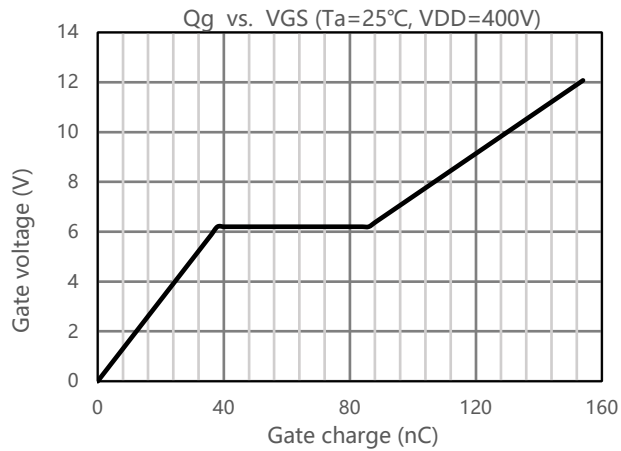


Figure 7. Typ. Gate Charge

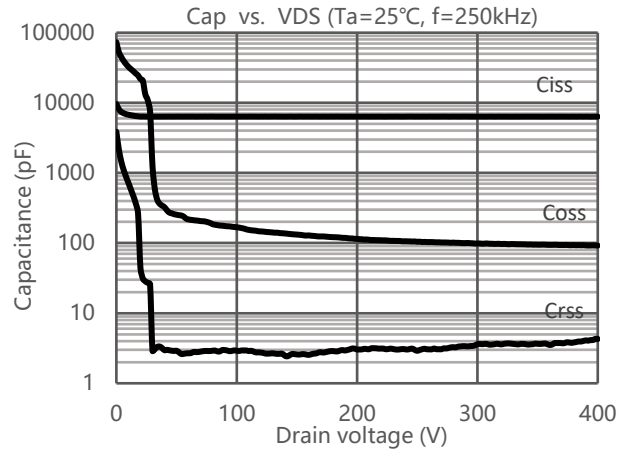


Figure 8. Typ. Capacitance

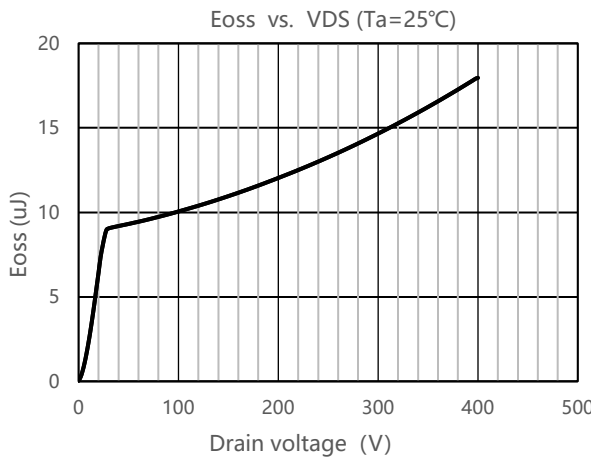


Figure 9. Typ. Coss Stored Energy

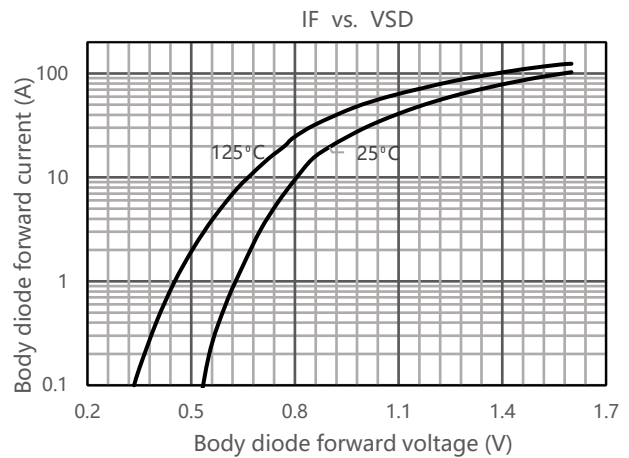


Figure 10. Body diode forward characteristics

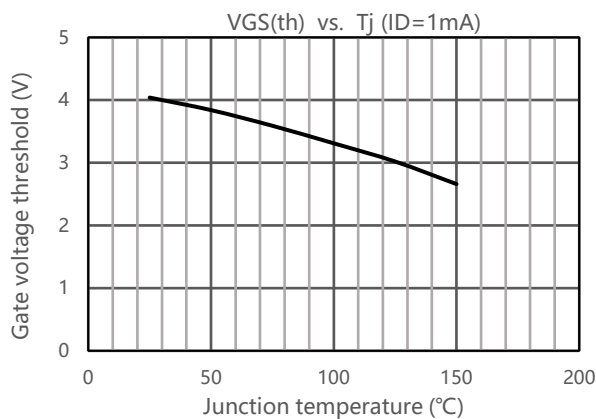


Figure 11. Threshold Voltage vs. Tj

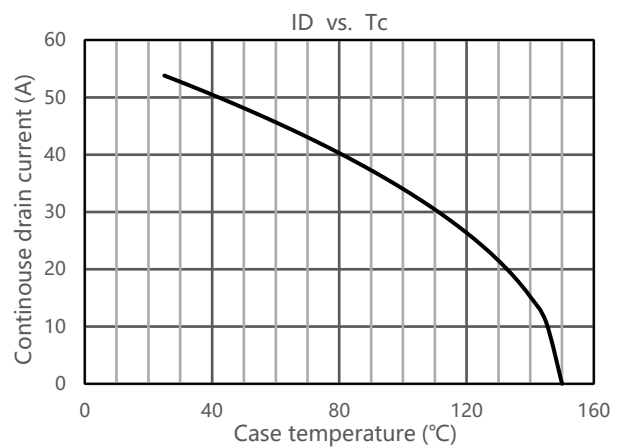


Figure 12. Maximum drain current vs. Case temperature



8. Test Circuit

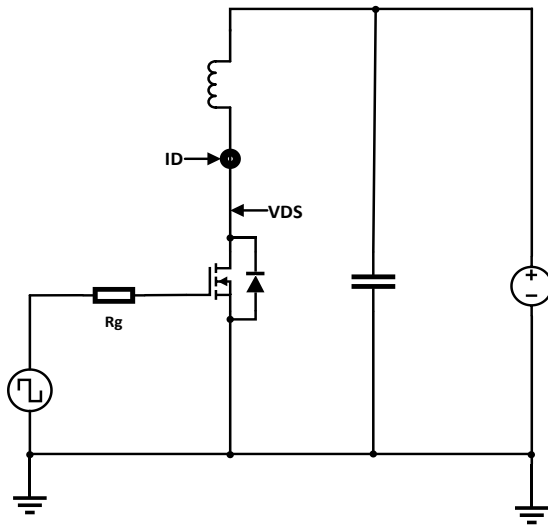
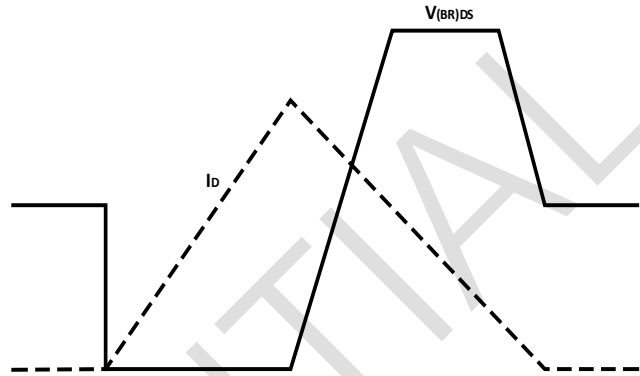


Figure 13. Unclamped inductive switching test circuit



Waveform 1. Unclamped inductive switching waveform

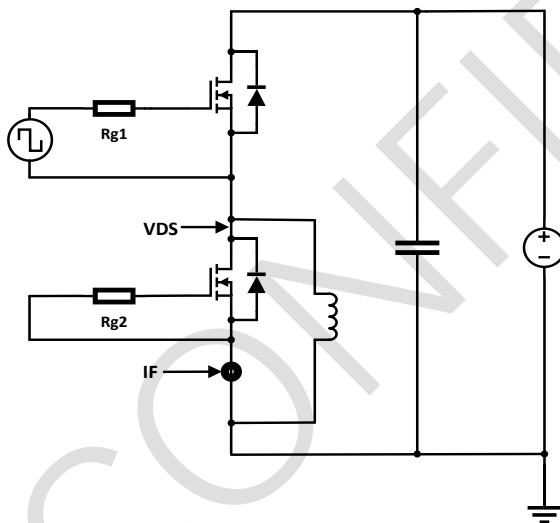
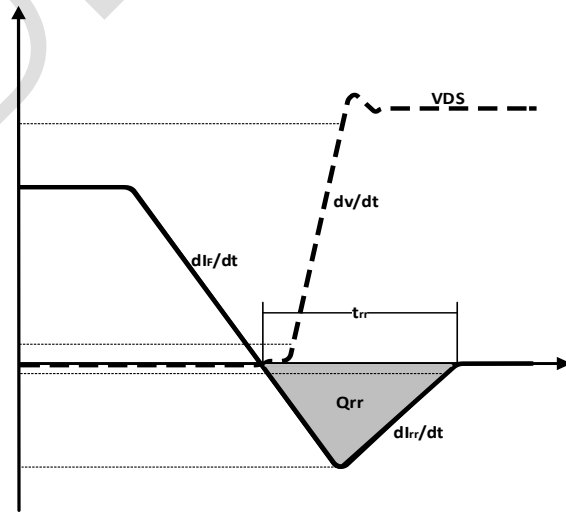


Figure 14. Body diode characteristics test circuit



Waveform 2. Body diode characteristics waveform

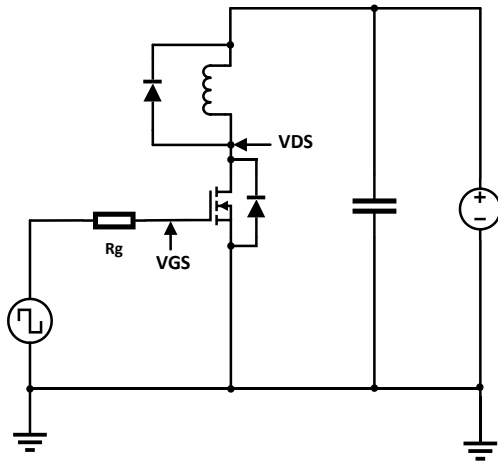
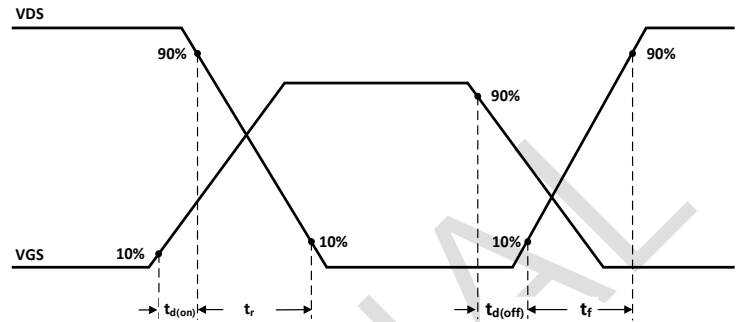
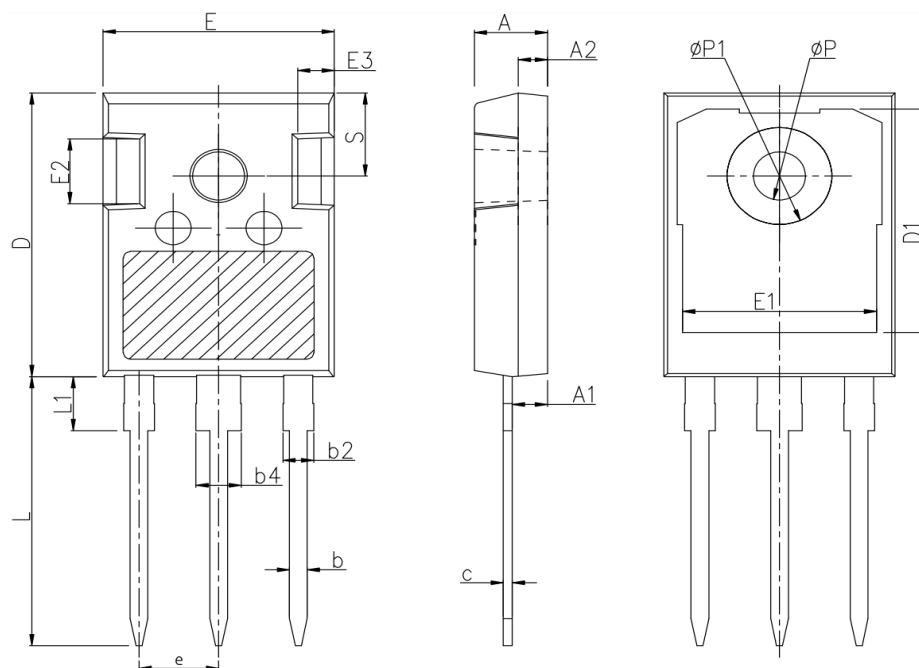


Figure 15. Switching time test circuit



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	20.80	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	19.82	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
$\Phi P1$	-	-	7.30
S	6.15BSC		