

BKW65N75HZ1

650V 75A Trench FS IGBT



Description

The BKW65N60HZ1 is a Trench FS IGBT utilizing bestirpower's advanced technology, which achieves an exceptionally low gate charge. It achieves significantly higher efficiency through optimized gate charge management, while its user-friendly design offers designers advantages such as low EMI and reduced switching losses.

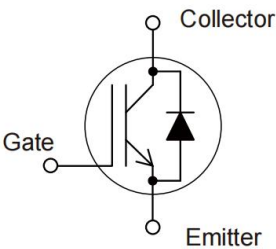
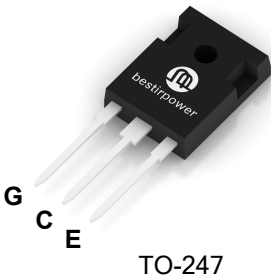
V _{CE}	I _C (T _C = 100°C)	V _{CEsat}	Q _{g,typ}
650 V	75 A	1.63 V	0.74 μC

Applications

- Charging station
- Uninterruptible power supply
- Inverters

Features

- 650V trench gate/field termination process
- Low switching losses
- Vcesat has a positive temperature coefficient



Absolute Maximum Ratings

Symbol	Parameter		Value max	Unit	Note
V _{CE}	Collector-emitter voltage (T _{vj} ≥ 25 °C)		650	V	
V _{GE}	Gate-emitter voltage		±20		
I _C	DC collector current, limited by T _{vjmax}	T _C = 25°C	80	A	
		T _C = 100°C	75		
I _{Cpulse}	Pulsed collector current, t _p limited by T _{vjmax}		300	A	
P _D	Power Dissipation	P _{D_IGBT}	440	W	Fig.2
		P _{D_FWD}	220		
I _F	Diode forward current, limited by T _{vjmax}	T _C = 25°C	80	A	
		T _C = 100°C	75		
T _{SC}	Short circuit withstand time, V _{GE} = 15V, V _{CE} ≤ 400V		5	μs	
T _J	Operating junction temperature		-40~ 175	°C	
T _{STG}	Storage temperature range		-55~ 150	°C	

Thermal Resistance

Symbol	Parameter	Value	Unit
R _{th(j-a)}	Thermal resistance, junction-ambient	65	°C/W
R _{th(j-c)}	Thermal resistance, IGBT junction to case	0.34	
R _{th(j-c)}	Thermal resistance, diodes junction to case	0.49	

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit	Note
Statistic Characteristics								
V _{(BR)CES}	Collector-emitter Breakdown Voltage	V _{GE} =0V, I _C =0.25mA		650	-	-	V	
I _{CES}	Collector Cut-off Current	V _{CE} =650V, V _{GE} =0V		-	-	50	μA	
I _{GES}	Gate-emitter Leakage Current	V _{GE} =±20V, V _{CE} =0V		-	-	100	nA	
V _{GE(TH)}	Gate Threshold Voltage	V _{CE} =V _{GE} , I _C =0.75mA		4.2	5.1	6.0	V	Fig.5
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V I _C =75A	T _J =25°C	-	1.63	2.10	V	Fig.3 4
			T _J =150°C	-	2.13	-		

Dynamic Characteristics

C_{ies}	Input Capacitance	$V_{CE}=25V,$ $V_{GE}=0V,$ $f=1MHz$	$T_J=25^\circ\text{C}$	-	7.44	-	nF	Fig.11
C_{oes}	Output Capacitance			-	0.24	-		
C_{res}	Reverse Transfer Capacitance			-	0.13	-		

Switching Parameters

$t_{d(on)}$	Turn-on Delay Time	$I_C=75A$ $V_{CE}=400V$ $V_{GE}=15V$ $R_G=8\Omega$	$T_J=25^{\circ}C$	-	34	-	ns	
			$T_J=150^{\circ}C$	-	40	-		
t_r	Rise Time		$T_J=25^{\circ}C$	-	153	-		
			$T_J=150^{\circ}C$	-	163	-		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$	-	183	-		
			$T_J=150^{\circ}C$	-	208	-		
t_f	Fall Time		$T_J=25^{\circ}C$	-	67	-		
			$T_J=150^{\circ}C$	-	73	-		
E_{on}	Turn-on Switching Energy		$T_J=25^{\circ}C$	-	4.28	-	mJ	
			$T_J=150^{\circ}C$	-	4.57	-		
E_{off}	Turn-off Switching Energy		$T_J=25^{\circ}C$	-	1.08	-		
			$T_J=150^{\circ}C$	-	1.20	-		

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit	Note
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Gate Charge Characteristics

Q_g	Gate Charge Total	$V_{CE}=520V$, $I_C=75A$ $V_{GE}=15V$	-	0.74	-	μC	
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Drain-Source Body Diode Characteristics

V_F	Diode Forward Voltage	$I_F = 75A$, $T_j = 25\text{ }^{\circ}C$	-	1.48	2	V	Fig.13
		$I_F = 75A$, $T_j = 150\text{ }^{\circ}C$	-	1.62	-		
T_{rr}	Reverse Recovery Time	$V_R=400V$, $I_F=75A$ $diF/dt=460A/\mu s$, $V_{GE}=-15V$, $T_j = 25\text{ }^{\circ}C$	-	200	-	ns	Fig.14 15 16
Q_{rr}	Reverse Recovery Charge		-	2.43	-	μC	
I_{rr}	Diode Peak Reverse Recovery Current		-	17	-	A	

Typical Performance Characteristics

Figure 1. Typical output characteristics ($V_{GE}=15V$)

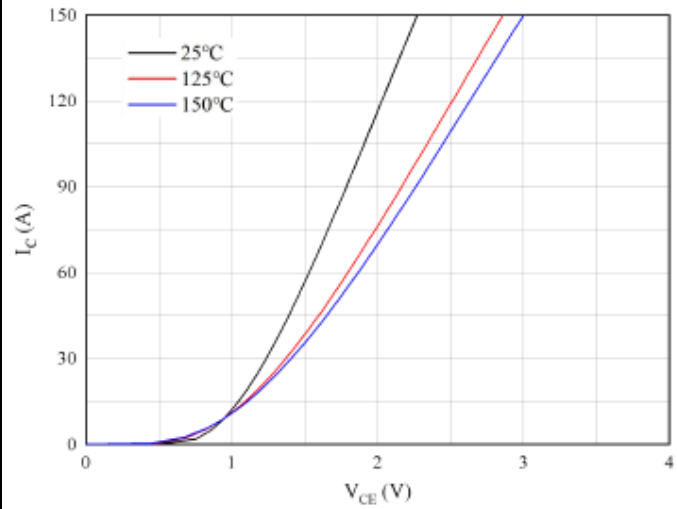


Figure 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

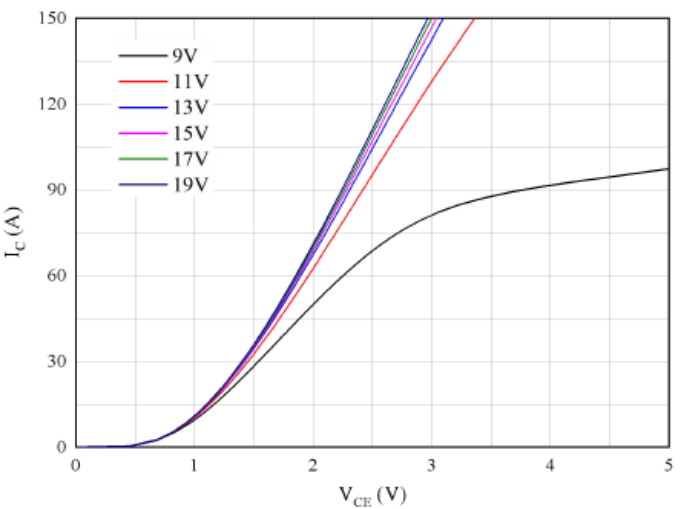


Figure 3. Typical transfer characteristic ($V_{CE}=20V$)

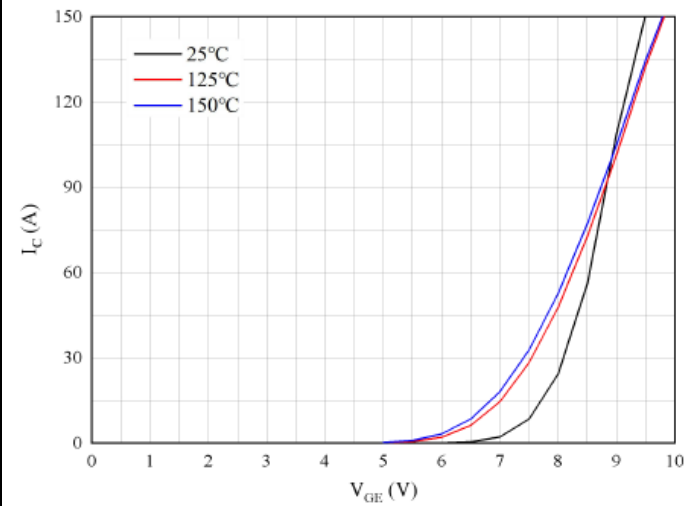


Figure 4. Forward characteristic of Diode

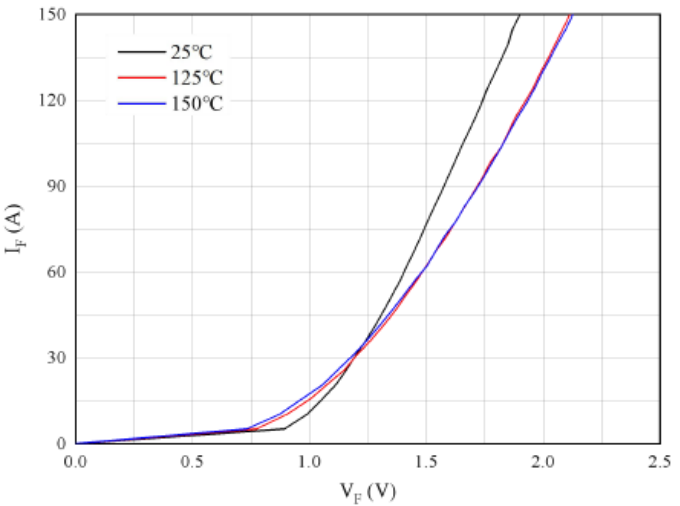


Figure 5. Transient thermal impedance IGBT

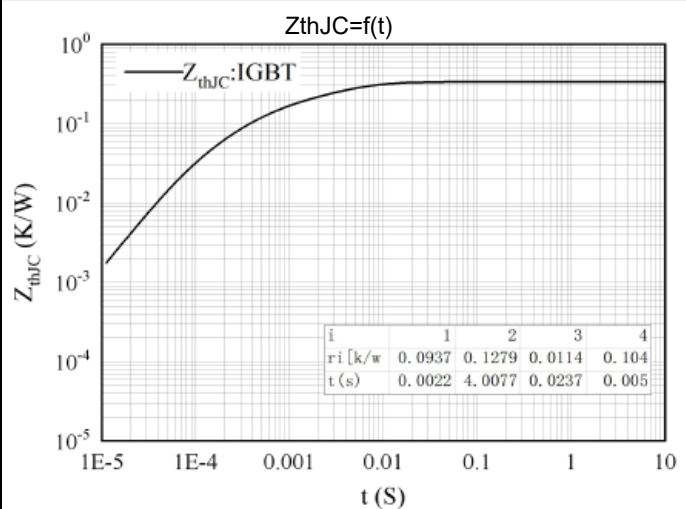
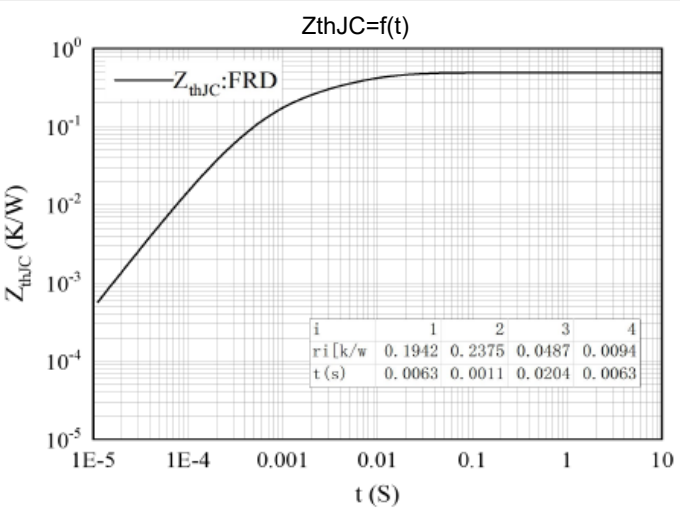


Figure6. Transient thermal impedance FRD



Typical Performance Characteristics

Figure 7. Switching losses of IGBT

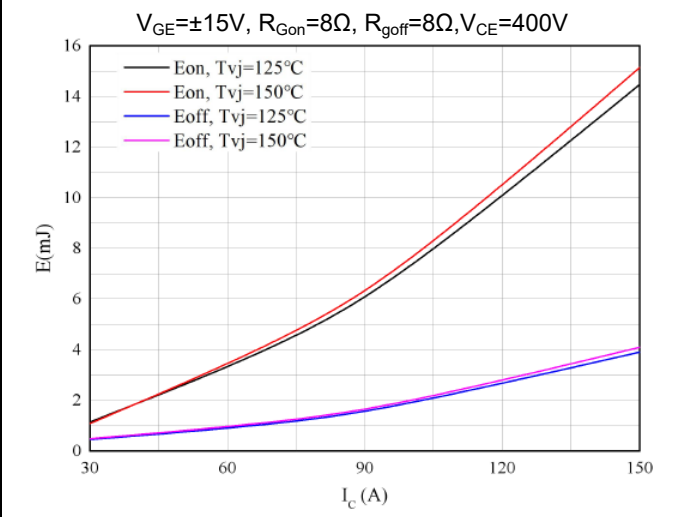


Figure 8. Switching losses of IGBT

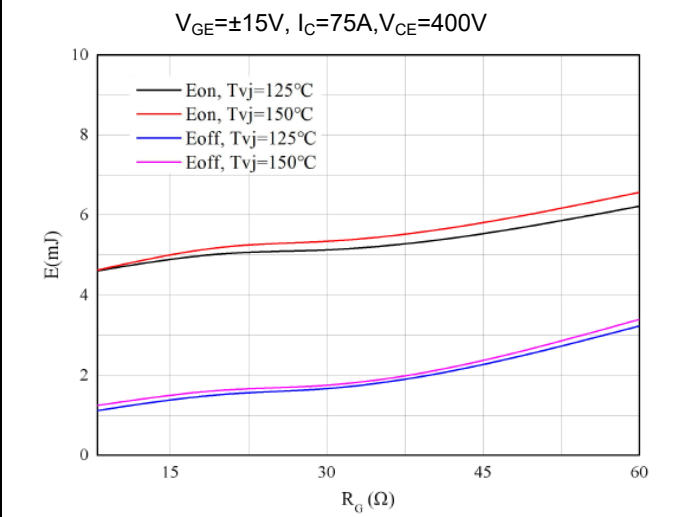


Figure 9. Switching losses of Diode

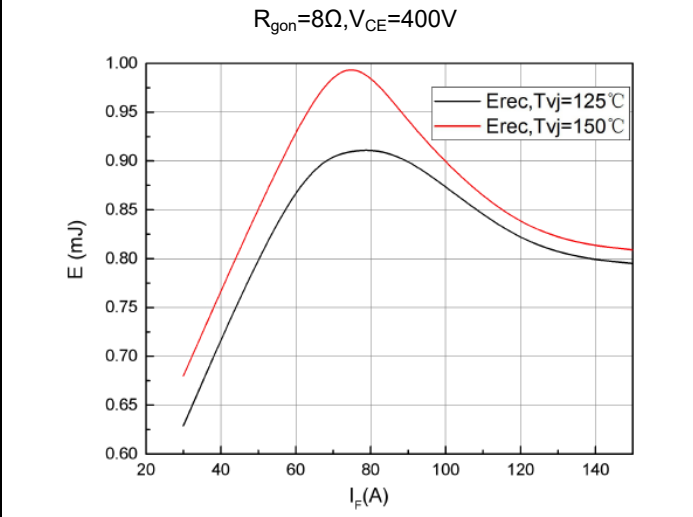


Figure10. Switching losses of Diode

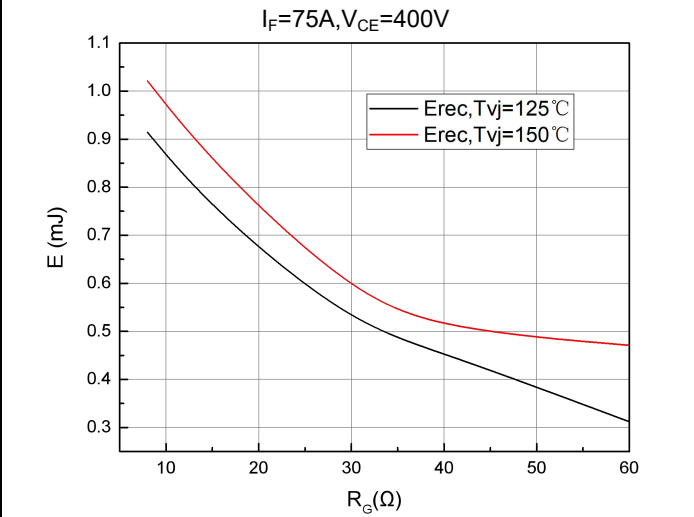
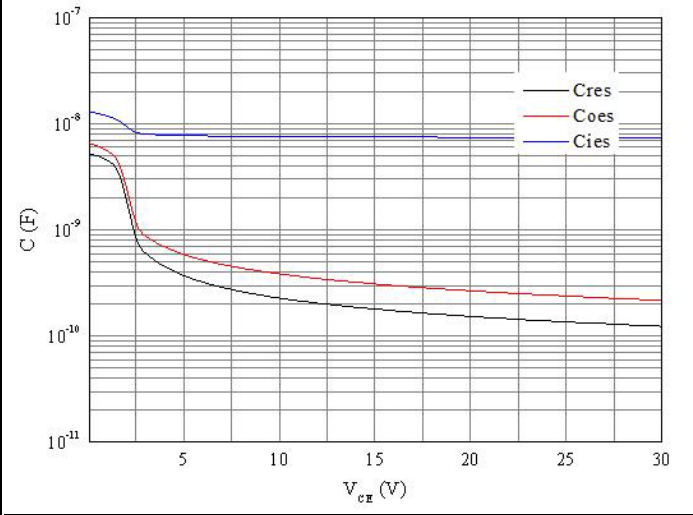
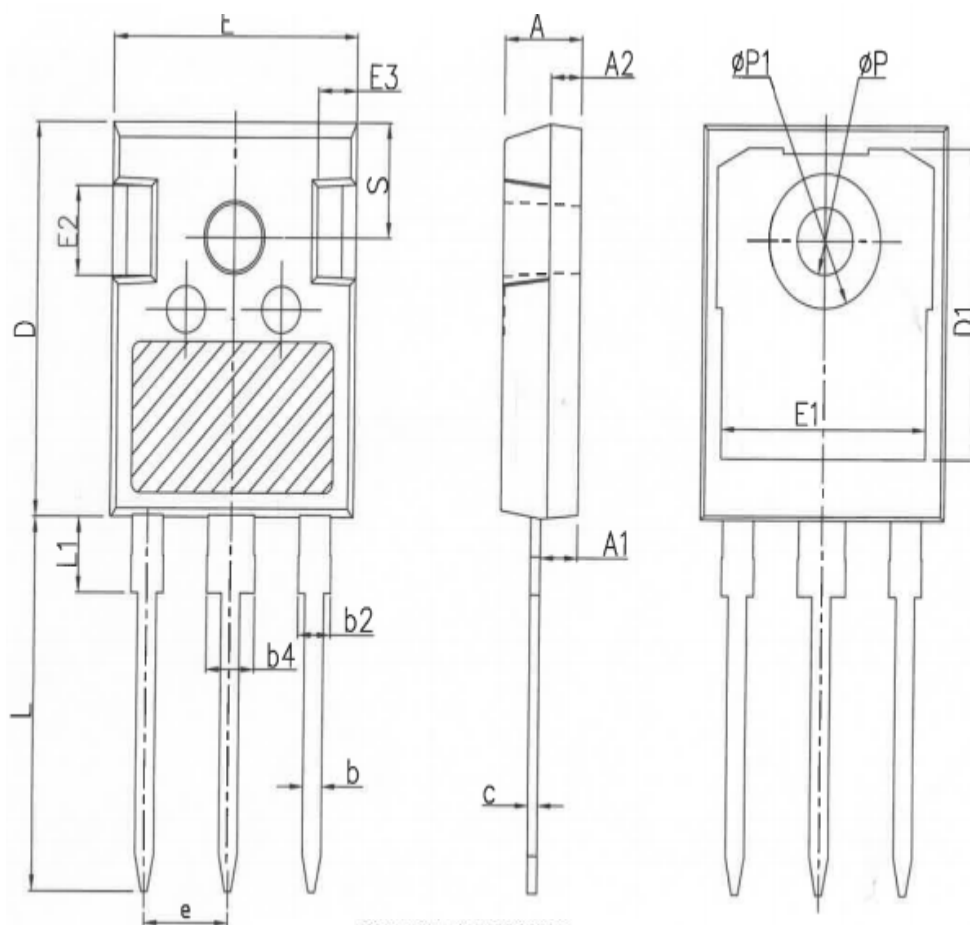


Figure 11. Capacitance characteristic



Package Outlines

TO247-3



COMMON DIMENSIONS

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		

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BKW65N75HZ1	BKW65N75HZ1	TO247-3L	Tube	30 units

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