BKF65N10MH1

650V 10A Trench FS IGBT

bestirpower

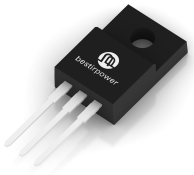
Description

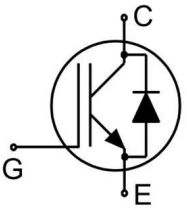
The BKF65N10MH1 is a Trench FS IGBT utilizing bestirpower's advanced technology, which achieves an exceptionally low gate charge.
It achieves significantly higher efficiency through optimized gate charge management, while its user-friendly design offers designers advantages such as low EMI and reduced switching losses.

V_{CE}	$I_{C\ (TC = 100°C)}$	V_{CEsat}	$Q_{g,typ}$
650 V	10 A	1.7 V	34.9 nC

Applications

- Motor Drives
- Air Condition
- Home appliances





Features

- Low Saturation Voltage $V_{CE(sat)\_typ}$=1.7V@V_{GE}=15V, I_C=10A
- Trench field-stop IGBT technology
- Low Switching Losses
- Low Temperature Dependence of $V_{CE(sat)}$ and E_{SW}
- High ruggedness performance
- Stable Temperature Behavior
- Improved EMI Behavior with Lower dv/dt

RoHS compliant

HF

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit	Note
V_{CE}	Collector-emitter voltage (T_{vj} ≥ 25 °C)		650	V	
V_{GE}	Gate-emitter voltage		±20	V	
I_C	DC collector current, limited by T_{vjmax}	T_C = 25℃	20	A	
		T_C = 100℃	10	A	
I_{Cpulse}	Pulsed collector current, t_p limited by T_{vjmax}		40	A	
P_{tot}	Power Dissipation	T_C = 25℃	40	W	Fig.3
		T_C = 100℃	20		
T_J	Junction temperature range		-40 ~ 175	℃	
T_{STG}	Storage temperature range		-40 ~ 175	℃	

Thermal Resistance

Symbol	Parameter	Value	Unit
R_{thJC}	IGBT thermal resistance, junction-case	3.8	℃/W
R_{thJC}	Thermal Resistance, Junction-to-Case for Diode	4.2	℃/W
T_{sold}	Soldering temperature, wave soldering only allowed at leads	260	℃

Electrical Characteristics (T_J= 25℃ 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=1mA		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	μA	
$V_{GE(TH)}$	Gate Threshold Voltage	V_{CE}=V_{GE}, I_C=1mA		5	5.8	6.5	V	Fig.2
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V I_C=10A	T_J=25℃	-	1.7	2.3	V	Fig.7
			T_J=175℃	-	3.2	-		
Dynamic Characteristics								
C_{ies}	Input Capacitance	V_{CE}=30V, V_{GE}=0V, f=1MHz		-	524	-	pF	Fig.4
C_{oes}	Output Capacitance			-	35	-		
C_{res}	Reverse Transfer Capacitance			-	6	-		
Switching Parameters								
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=400V, I_C=10A, R_G=10Ω, V_{GE}=15V	T_J=25℃	-	19.6	-	ns	
t_r	Rise Time		T_J=25℃	-	42	-	ns	
$t_{d(off)}$	Turn-off Delay Time		T_J=25℃	-	49	-	ns	
t_f	Fall Time		T_J=25℃	-	66.4	-	ns	
E_{on}	Turn-on Switching Energy		T_J=25℃	-	0.35	-	mJ	Fig.10
E_{off}	Turn-off Switching Energy		T_J=25℃	-	0.34	-	mJ	

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit	Note
Gate Charge Characteristics							
Q_g	Gate Charge Total	V_{CE}=520V, I_C=10A V_{GE}=15V	-	34.9	-	nC	Fig.5
Q_{ge}	Gate-emitter charge		-	7.7	-		
Q_{gc}	Gate-collector charge		-	16.4	-		
Drain-Source Body Diode Characteristics							
V_F	Diode Forward Voltage	V_{GE} = 0V, I_C = 10A, T_j = 25 ºC	-	1.5	2	V	Fig.6
		V_{GE} = 0V, I_C = 10A, T_j = 175 ºC	-	1.16	-		
T_{rr}	Reverse Recovery Time	V_R=400V, I_F = 10A diF/dt = 200A/us, T_j = 25 °C	-	198	-	ns	
Q_{rr}	Reverse Recovery Charge		-	0.51	-	uC	
I_{rr}	Diode Peak Reverse Recovery Current		-	4.6	-	A	

Typical Performance Characteristics

Figure 1 . Output Characteristics

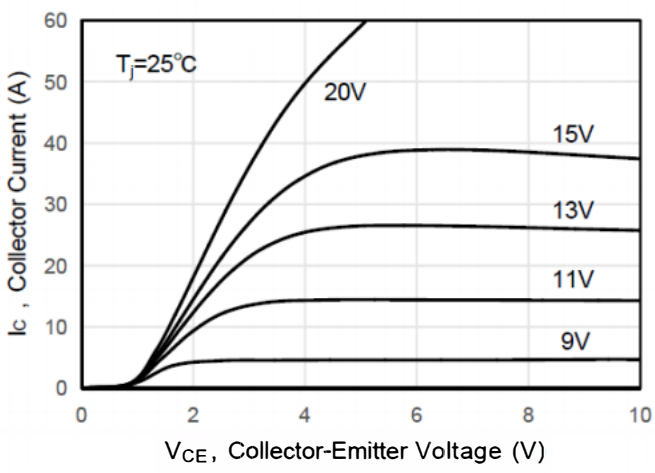


Figure 2 . Transfer Characteristics

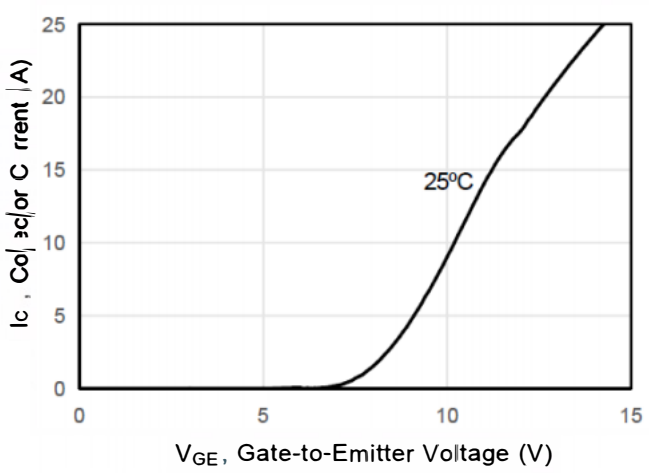


Figure 3 . Power Dissipation vs. Case Temperature

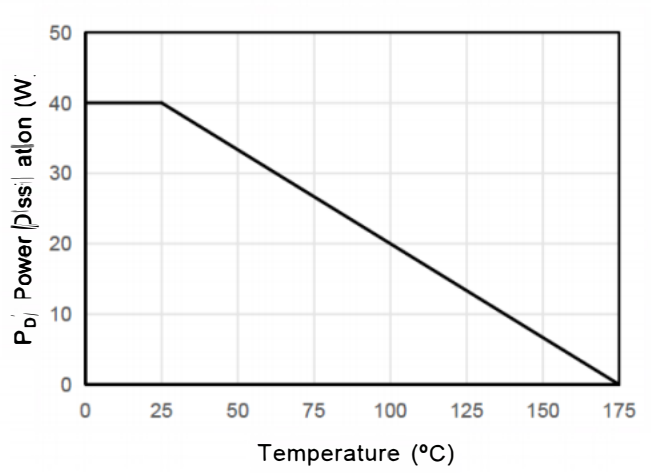
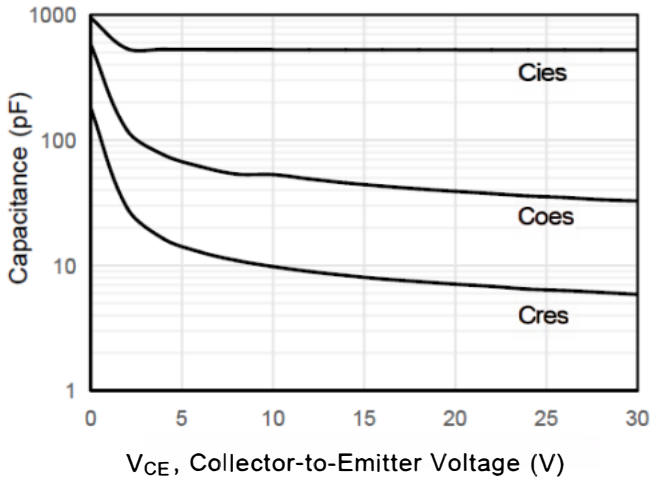


Figure 4 . Capaticance



Typical Performance Characteristics

Figure 5 . Gate Charge

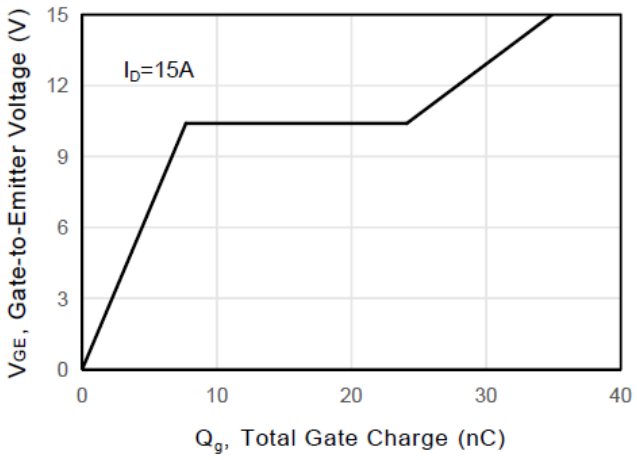


Figure 6 . Diode Forward Voltage

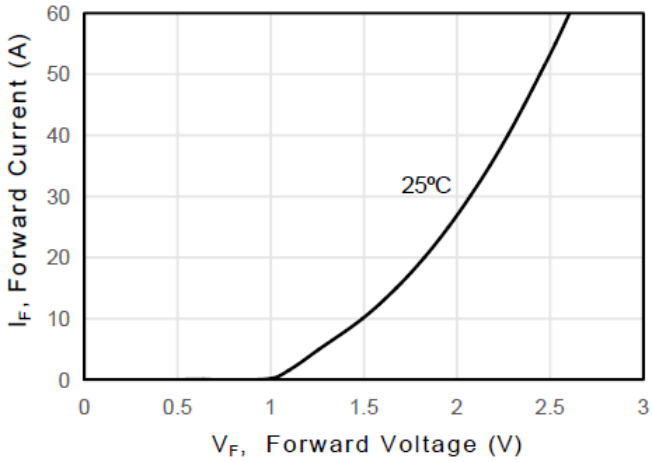


Figure 7. Collector-Emitter Saturation Voltage vs Junction Temperature

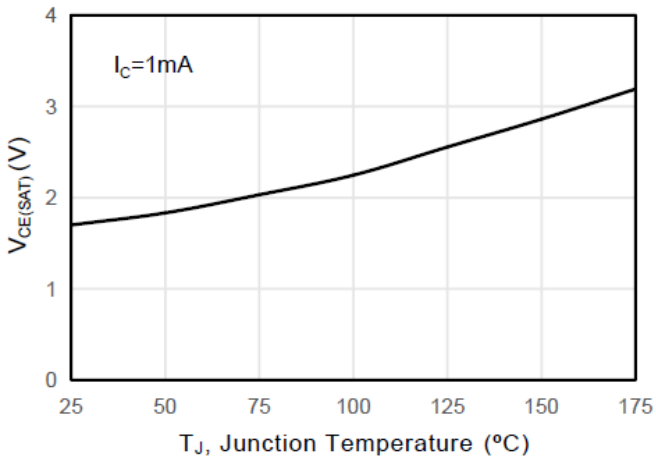
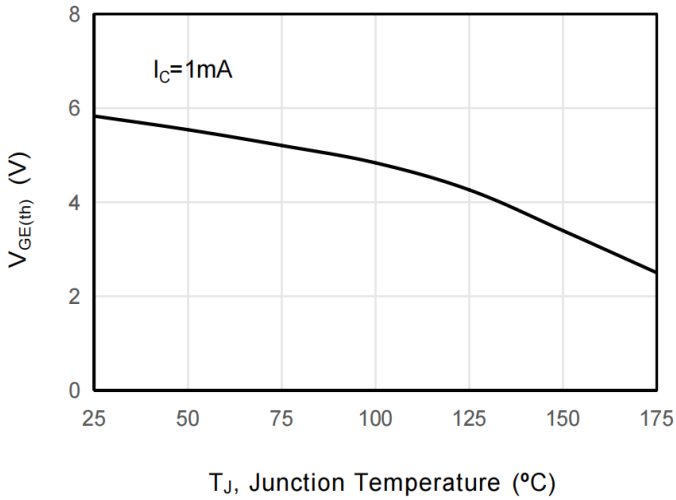


Figure 8. Gate Threshold Voltage vsJunction Temperature



Typical Performance Characteristics

Figure 9. Diode Forward Voltage vs Junction Temperature

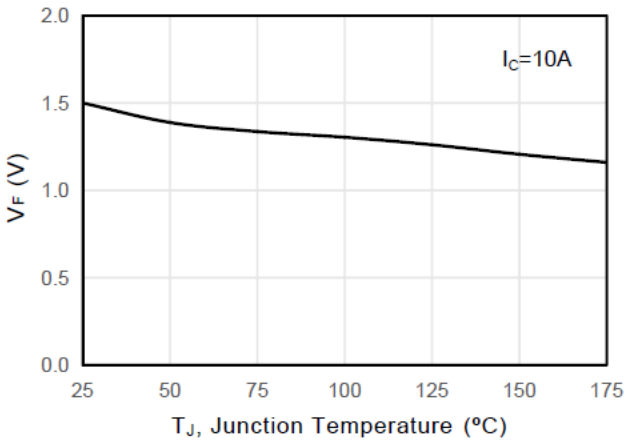


Figure 10. Switching Loss vs Temperature

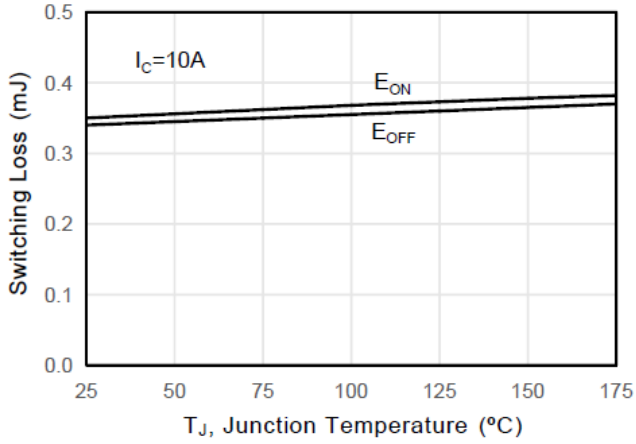


Figure 11. Switching Loss vs Gate Resistor

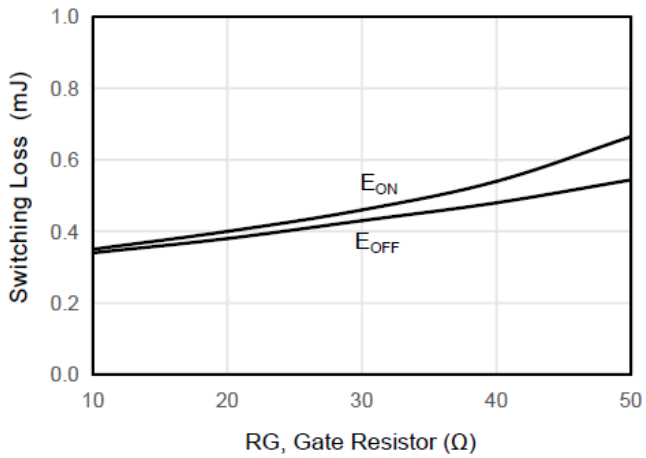
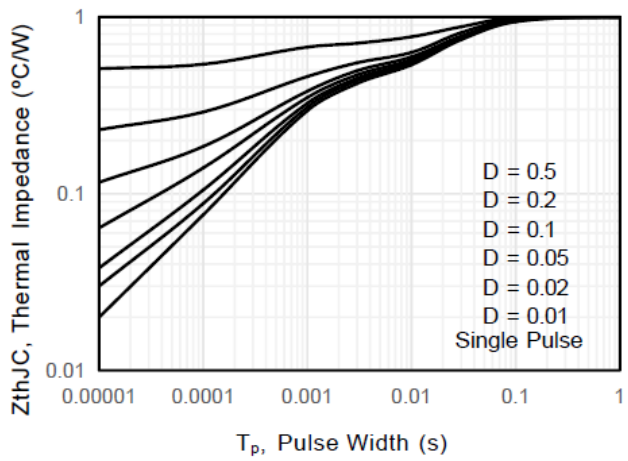


Figure 12. Transient Thermal Impedance



Test Circuit

Figure 13: Gate Charge Test Circuit	Figure 14: Switch Time Test Circuit

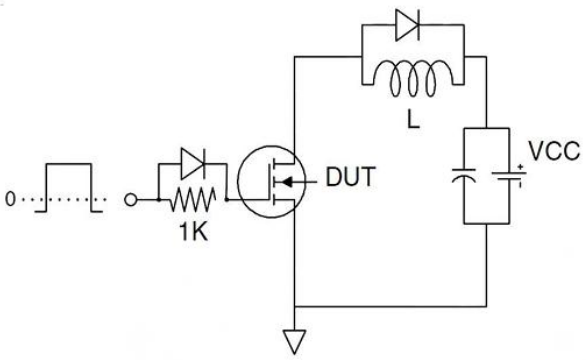
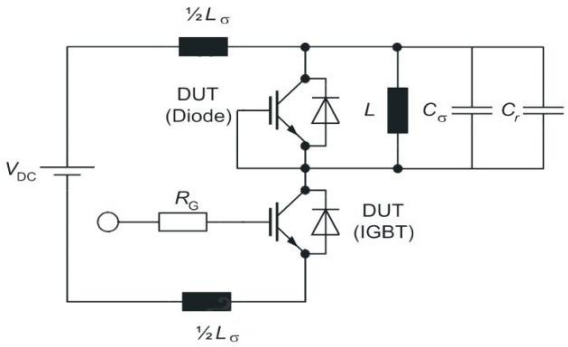
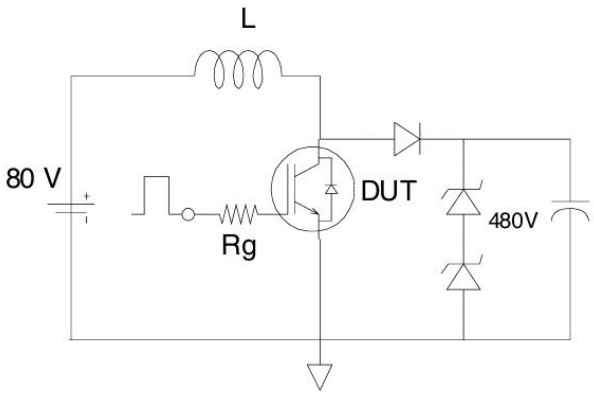
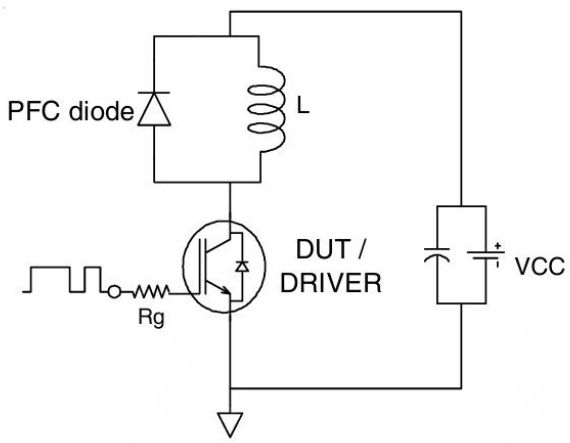
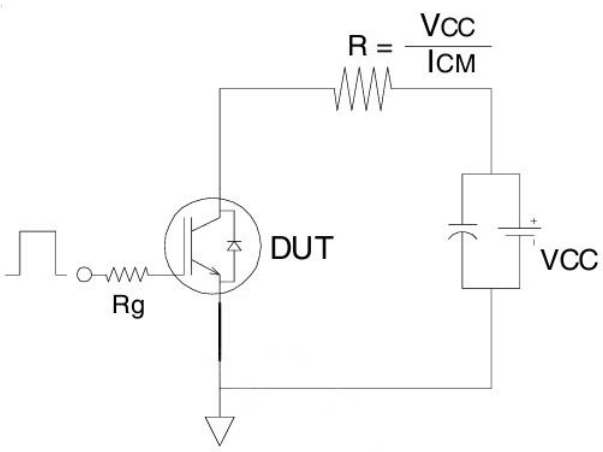
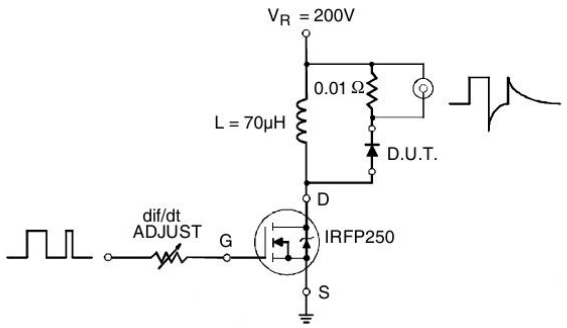

	

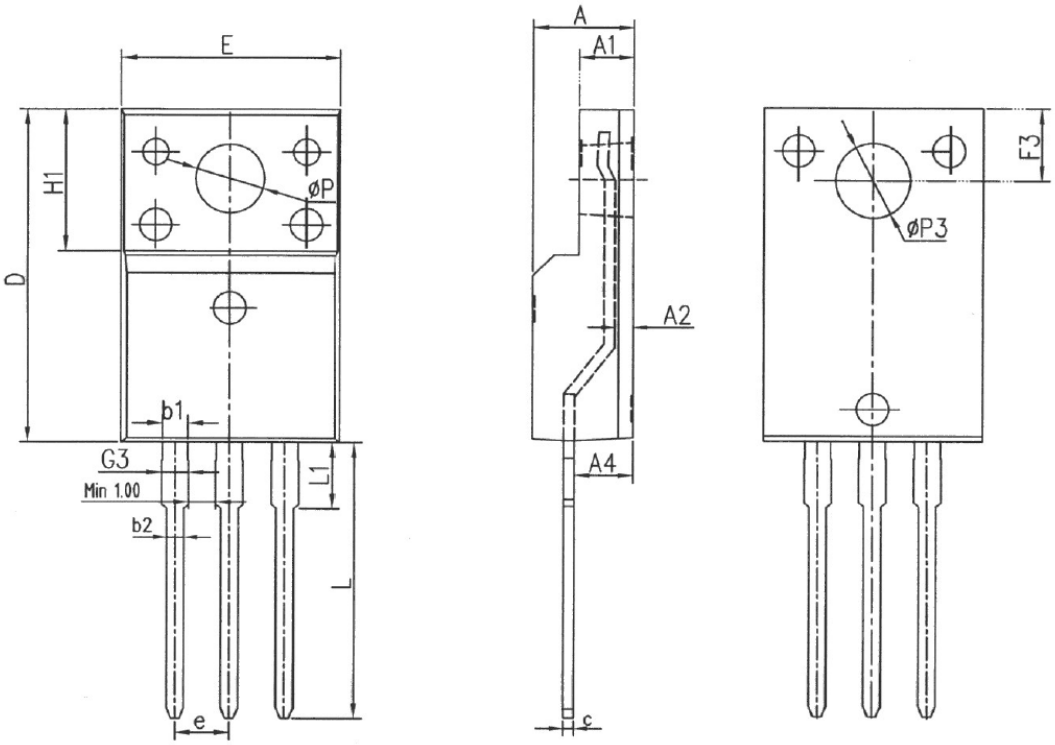
Figure 15: RBSOA Circuit	**Figure 16 Switching Loss Circuit**
	

Test Circuit

Figure 17. Resistive Load Circuit	Figure 18 . Reverse Recovery Parameter Test Circuit
	

Package Outlines

TO-220F



SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.20	10.40
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.65	0.85	1.30
A4	2.55	2.75	2.95
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
ΦP	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
ΦP3	3.45REF		
F3	3.10	3.30	3.50
G3	1.10	1.30	1.50
b1	1.05	1.20	1.35
b2	0.70	0.80	0.92

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BKF65N10MH1	BKF65N10MH1	TO220F-3L	Tube	50 units

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