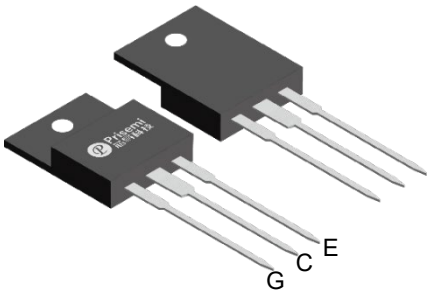
Prisemi®

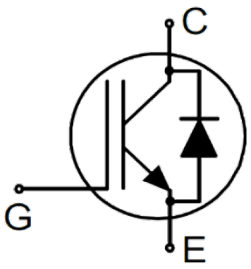
PI15F65TBK1B7

Insulate-Gate Bipolar Transistor

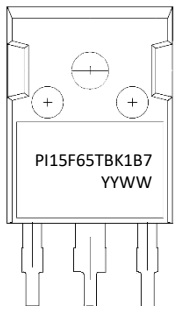
Description



TO-220F



Circuit Diagram



Marking (Top View)

Feature

- Easy paralleling capability due to positive temperature coefficient in $V_{CE(SAT)}$
- Low EMI
- Low Gate Charge
- Low Saturation Voltage $V_{CE(SAT)}$
- RoHS compliant*1
- Halogen-free*2

Applications

- UPS
- EV-Charger
- Three-Phase Solar String Inverter
- Energy Storage

Absolute maximum rating@25℃

Parameter		Symbol	Value	Units
Collector-Emitter Voltage		V_{CE}	650	V
Gate-Emitter Voltage		V_{GE}	±20	V
Collector Current	T_c= 25℃	I_C	30*2	A
	T_c= 100℃		15	
Pulsed Collector Current		I_{CM}	60*2	A
Diode Current	T_c= 25℃	I_F	30	A
	T_c= 100℃		15	
Diode Pulsed Current		I_{FM}	150	A
Power Dissipation	T_c= 25℃	P_D	250	W
	T_c= 100℃		125	
Operating Junction Temperature		T_{VJ}	-55~+175	℃
Storage Temperature		T_{STG}	-40~+150	℃

Note:

1.Contact sales for detail information.

2.Limited by package and process

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Collector-Emitter Breakdown Voltage	BV_{CE}	-		650	-	-	V
C-E Leakage Current	I_{CES}	V_{CE}=650V, V_{GE}=0V		-	-	1	μA
G-E Leakage Current	I_{GES}	V_{CE}=0V	V_{GE}=20V	-	-	100	nA
			V_{GE}=-20V	-100	-	-	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C=0.4mA, V_{CE}=V_{GE}		-	6.4	-	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=15A, V_{GE}=15V	T_{VJ}=25℃	-	1.79	-	V
			T_{VJ}=125℃	-	2.2	-	
			T_{VJ}=175℃	-	2.4	-	
Diode forward voltage	V_F	I_C=15A, V_{GE}=0V	T_{VJ}=25℃	-	1.68	-	V
			T_{VJ}=125℃	-	1.48	-	
			T_{VJ}=175℃	-	1.4	-	
Gate input resistance	R_G	f=1MHz		-	1.2	-	Ω
Input Capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1MHz		-	1470	-	pF
Output Capacitance	C_{oes}			-	34	-	
Reverse Transfer Capacitance	C_{res}			-	11	-	
Total Gate Charge	Q_g	V_{CE}=520V, V_{GE}=0/15V, I_C=15A		-	51	-	nC
Gate to Emitter Charge	Q_{ge}			-	8	-	
Gate to Collector Charge	Q_{gc}			-	20	-	
Gate to collector charge	Q_{gth}			-	7	-	
Internal Emitter Inductance	L_E	-		-	13	-	nH
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V, I_C=15A, V_{GE}=0/15V, R_G=39Ω, Inductive Load		-	46	-	ns
Rise Time	t_r			-	32	-	
Turn-off Delay Time	$t_{d(off)}$			-	156	-	
Fall Time	t_f			-	40	-	
Turn-on Energy Loss	E_{on}	V_{CC}=400V, I_C=15A, V_{GE}=15V, R_G=39Ω, Inductive Load		-	0.4	-	mJ
Turn-off Energy Loss	E_{off}			-	0.19	-	
Total Switching Loss	E_{st}			-	0.59	-	
Diode Reverse Recovery Time	T_{rr}	V_{CC}=400V, I_C=15A, V_{GE}=15V, R_G=39Ω		-	159	-	ns
Diode Reverse Recovery Charge	Q_{rr}			-	0.65	-	μC
Diode Reverse Recovery Current	I_{rm}			-	7.8	-	A
Diode Reverse Recovery Loss	E_{rec}			-	-420	-	mJ

Electrical characteristics per line@175℃

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V, I_C=15A, V_{GE}=15V, R_G=39Ω, Inductive Load	-	34	-	ns
Rise Time	t_r		-	36	-	
Turn-off Delay Time	$t_{d(off)}$		-	166	-	
Fall Time	t_f		-	70	-	
Turn-on Energy Loss	E_{on}	V_{CC}=400V, I_C=15A, V_{GE}=15V, R_G=39Ω, Inductive Load	-	0.7	-	mJ
Turn-off Energy Loss	E_{off}		-	0.29	-	
Total Switching Loss	E_{st}		-	0.99	-	

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, IGBT Junction-Ambient	$R_{th(J-A)}$	-	-	60	℃/W
Thermal Resistance, IGBT Junction to Case	$R_{th(J-C)}$	-	-	1.5	℃/W
Thermal Resistance, FRD Junction to Case	$R_{th(J-C)}$	-	-	2	℃/W

Typical Characteristics

Fig 1. Output Characteristics (25°C)

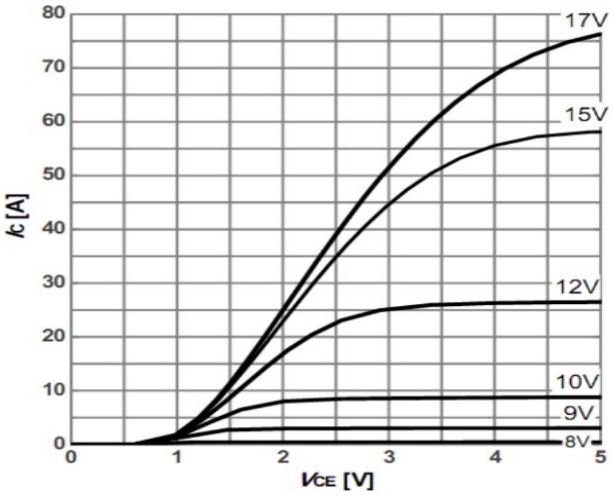


Fig 2. Saturation Voltage vs. V_{GE}(25°C)

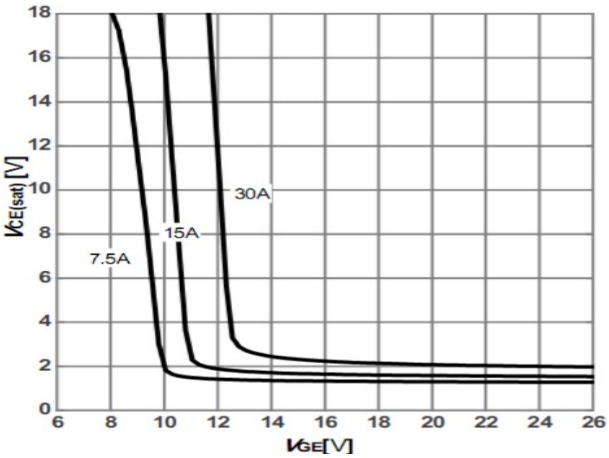


Fig 3. Reverse Bias SOA (25°C)

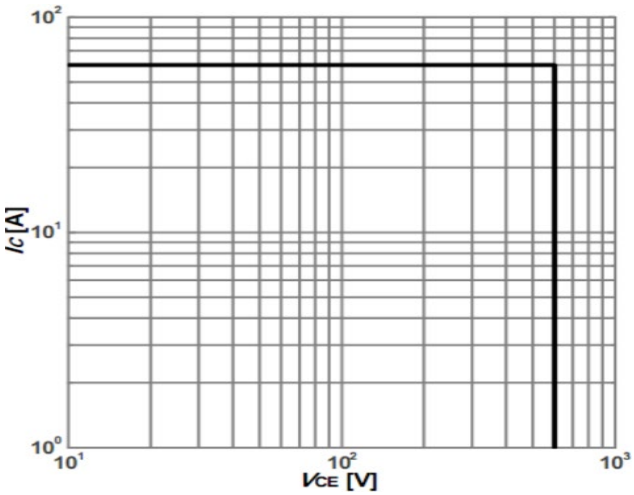


Fig 4. Transfer Characteristics

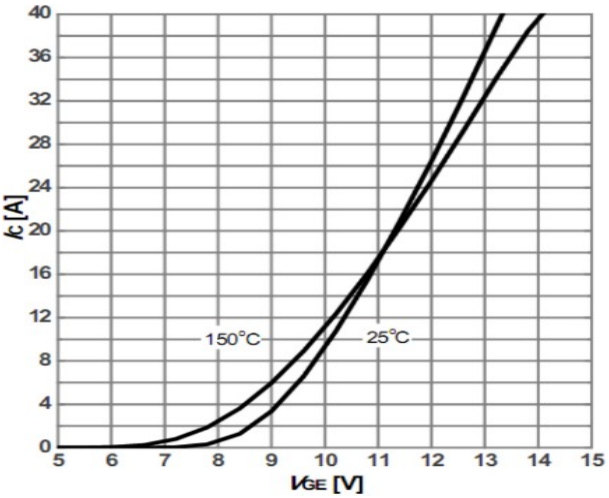


Fig 5. Gate Charge

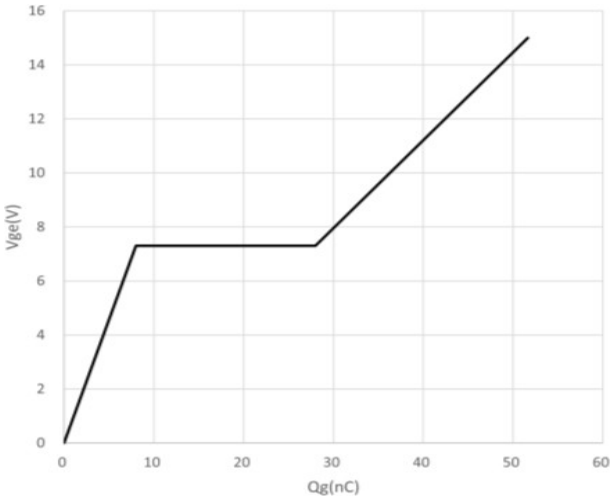


Fig 6. Typical Capacitance

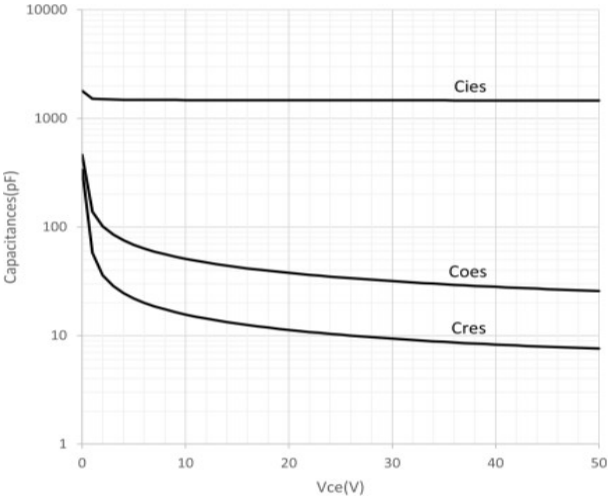


Fig 7. Gate Charge Test Circuit

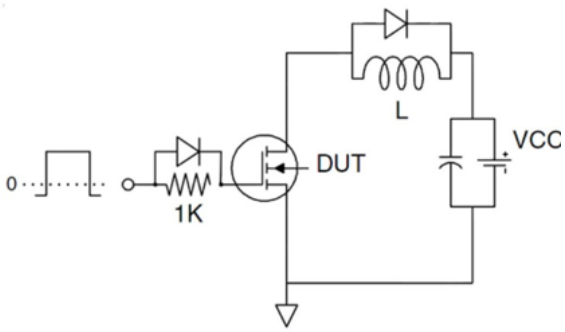


Fig 8. Switching Time Test Circuit

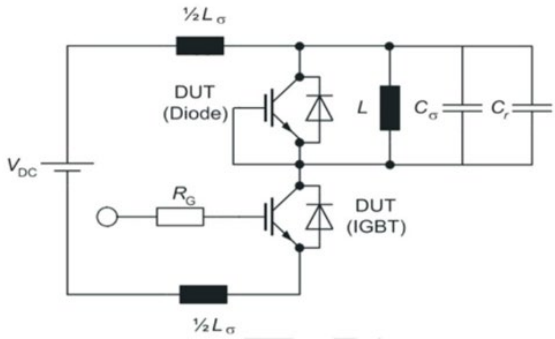


Fig 9. Definition of Switching Times

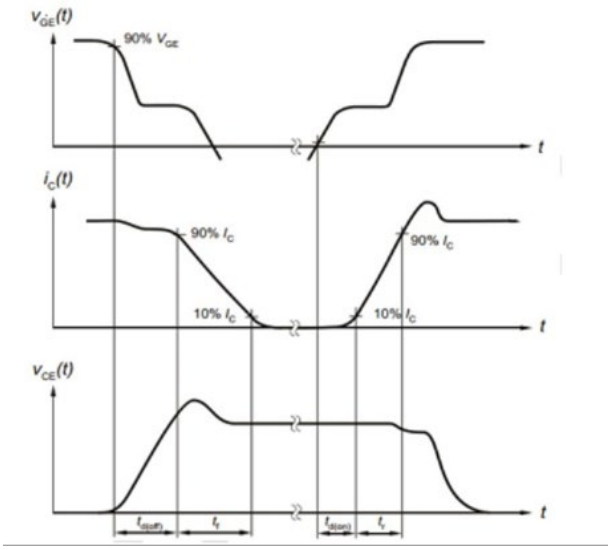


Fig 10. Definition of Switching Energy Losses

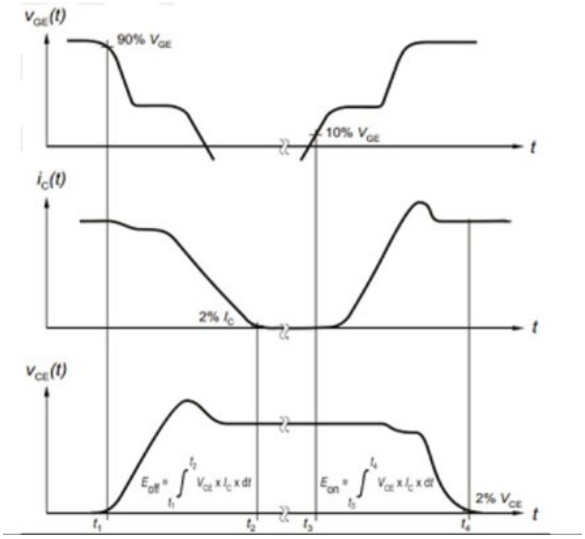
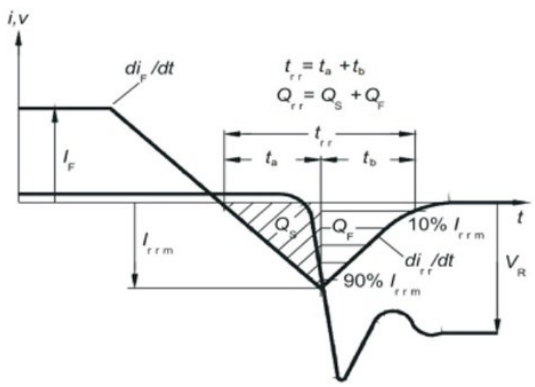
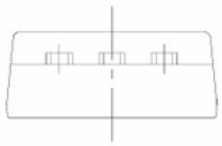


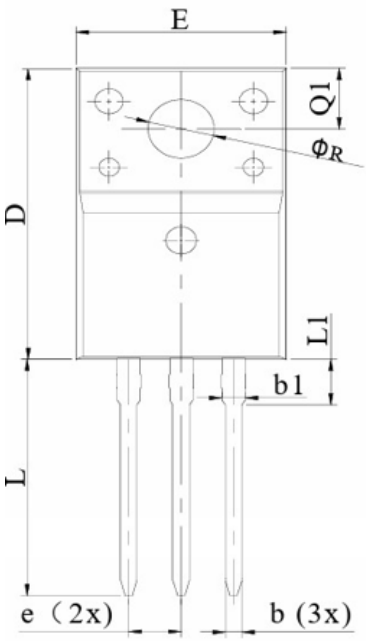
Fig 11. Definition of Diode Switching Characteristics



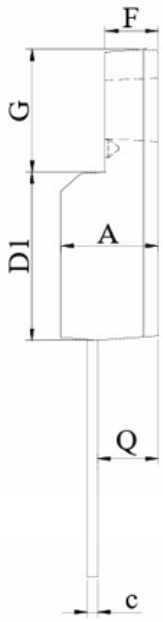
Product Dimension (TO-220F)



Front View



Top View



Side View

Dim	Millimeters			Dim	Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	4.50	4.70	4.90	e	2.54 BSC		
D	15.20	15.87	16.10	G	6.40	6.70	6.90
D1	8.80	-	9.50	L	12.00	13.10	14.50
E	9.70	10.10	10.40	L1	3.13	-	3.57
F	2.44	-	2.75	Q	2.60	2.75	2.85
b	0.70	0.80	0.91	Q1	3.20	3.30	3.40
b1	1.10	1.35	1.55	R	3.05	-	3.28
c	0.45	0.50	0.65				

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