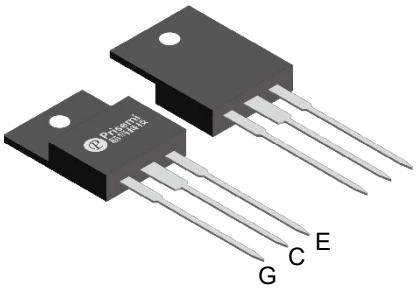
Prisemi®

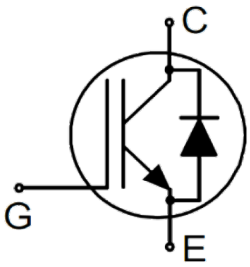
PI20L65TBH1A7

Insulate-Gate Bipolar Transistor

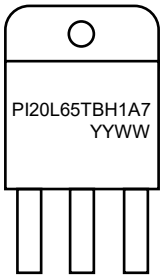
Description



TO-220F



Circuit Diagram



Marking (Top View)

Features

- High Ruggedness Performance
- 10μs Short Circuit Capability
- Positive $V_{CE\ (sat)}$ Temperature Coefficient
- High Efficiency for Motor Control
- Excellent Current Sharing in Parallel Operation
- RoHS Compliant

Applications

- Home Appliances
- General Inverter
- Motor Drives

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	40	A
	T_c= 100℃		20	
Pulsed Collector Current		I_{CM}	80	A
Diode Current	T_c= 100℃	I_F	20	A
Diode Pulsed Current		I_{FM}	80	A
Power Dissipation	T_c= 25℃	P_D	53	W
	T_c= 100℃		26	
Operating Junction Temperature		T_{VJ}	-40~+175	℃
Storage Temperature		T_{STG}	-55~+150	℃
Short circuit time		T_{SC}	10	us

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Collector-Emitter Breakdown Voltage	BV_{CE}	V_{GE}=0V, I_{CE}=250uA		650	-	-	V
C-E Leakage Current	I_{CES}	V_{GE}=0V, V_{CE}=650V		-	-	50	μA
G-E Leakage Current	I_{GES}	V_{GE}=20V		-	-	100	nA
		V_{GE}=-20V		-	-	-100	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C=1mA, V_{CE}=V_{GE}		5.2	5.7	6.2	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=20A, V_{GE}=15V	T_{VJ}=25℃	-	1.6	-	V
			T_{VJ}=175℃	-	1.9	-	
Diode forward voltage	V_F	I_C=20A	T_{VJ}=25℃	-	1.5	-	V
			T_{VJ}=175℃	-	1.2	-	
Input Capacitance	C_{ies}	V_{CE}=30V, V_{GE}=0V, f=1MHz		-	1700	-	pF
Output Capacitance	C_{oes}			-	72	-	
Reverse Transfer Capacitance	C_{res}			-	13	-	
Total Gate Charge	Q_g	V_{CC}=520V, I_C=20A, V_{GE}=15V		-	71	-	nC
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V, I_C=20A, V_{GE}=15V, R_G=10Ω, Inductive Load		-	21	-	ns
Rise Time	t_r			-	23	-	
Turn-off Delay Time	$t_{d(off)}$			-	120	-	
Fall Time	t_f			-	63	-	
Turn-on Energy Loss	E_{on}	V_{CC}=400V, I_C=20A, V_{GE}=15V, R_G=10Ω, Inductive Load		-	0.37	-	mJ
Turn-off Energy Loss	E_{off}			-	0.46	-	
Total Switching Loss	E_{st}			-	0.83	-	
Diode Reverse Recovery Time	T_{rr}	V_R=400V, I_F=20A, di/dt=500A/μS		-	62	-	ns
Diode Reverse Recovery Charge	Q_{rr}			-	472	-	nC
Diode Reverse Recovery Current	I_{rm}			-	12	-	A

Electrical characteristics per line@175℃ (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V, I_C=20A, V_{GE}=15V, R_G=10Ω, Inductive Load	-	21	-	ns
Rise Time	t_r		-	23	-	
Turn-off Delay Time	$t_{d(off)}$		-	141	-	
Fall Time	t_f		-	108	-	
Turn-on Energy Loss	E_{on}	V_{CC}=400V, I_C=20A, V_{GE}=15V, R_G=10Ω, Inductive Load	-	0.59	-	mJ
Turn-off Energy Loss	E_{off}		-	0.67	-	
Total Switching Loss	E_{st}		-	1.26	-	
Diode Reverse Recovery Time	T_{rr}	V_R=400V, I_F=20A, di/dt=500A/μS	-	90	-	ns
Diode Reverse Recovery Charge	Q_{rr}		-	1130	-	nC
Diode Reverse Recovery Current	I_{rm}		-	19	-	A

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Units
Thermal Resistance, IGBT Junction-Ambient	$R_{th(J-A)}$	-	-	50	K/W
Thermal Resistance, IGBT Junction to Case	$R_{th(J-C)}$	-	-	2.8	K/W
Thermal Resistance, FRD Junction to Case	$R_{th(J-C)}$	-	-	4.1	K/W

Typical Characteristics

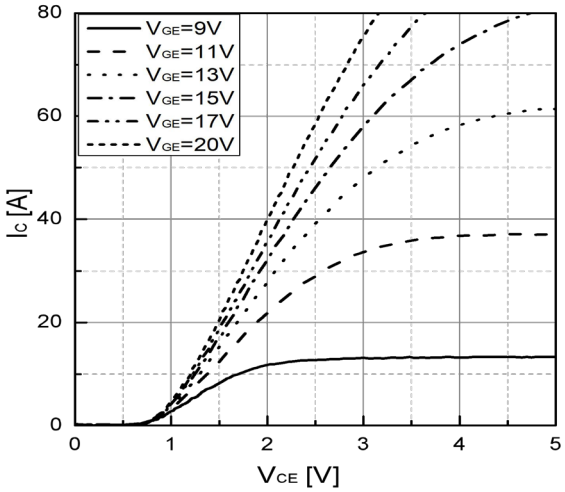


Fig 1. Typical Output Characteristics (T_{VJ}=25℃)

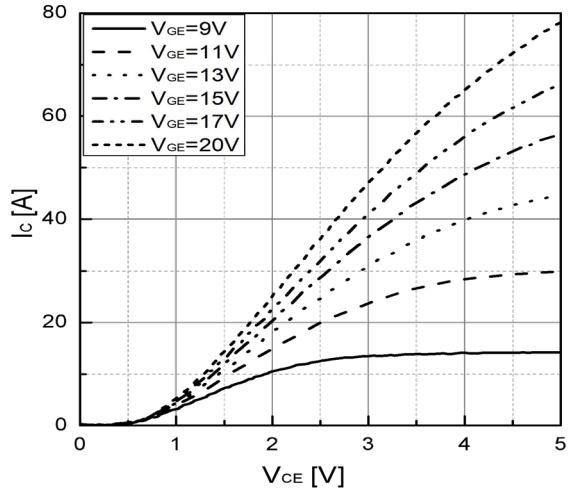


Fig 2. Typical Output Characteristics (T_{VJ}=175℃)

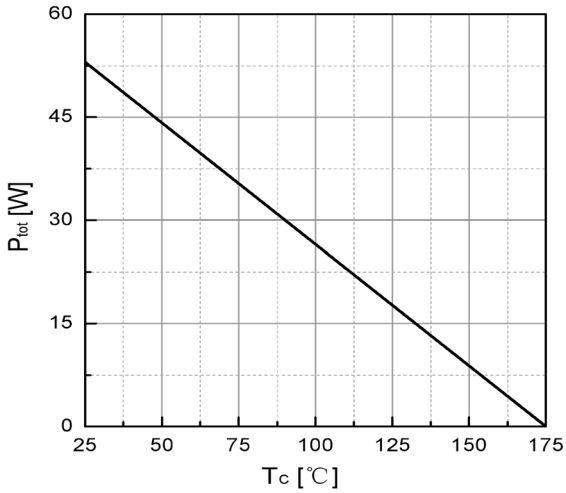


Fig 3. Power dissipation vs T_C

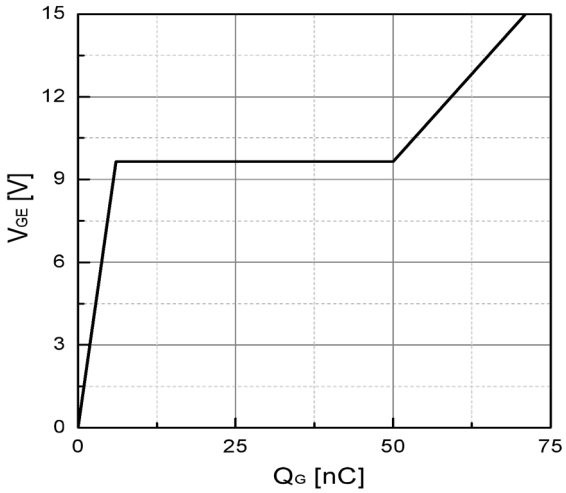


Fig 4. Typical Gate Charge

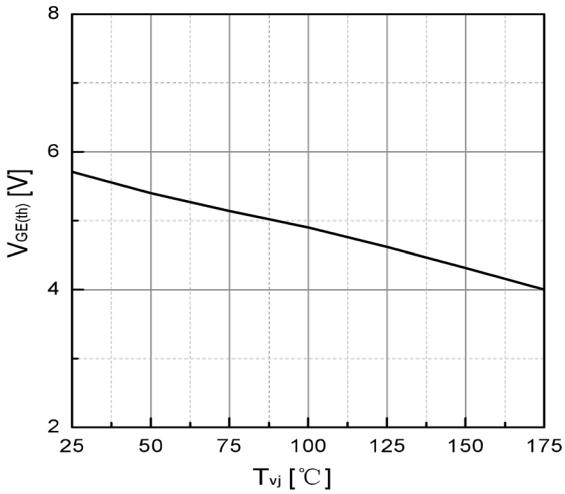


Fig 5. Typical $V_{GE(th)}$ vs T_{VJ} (I_C=1mA)

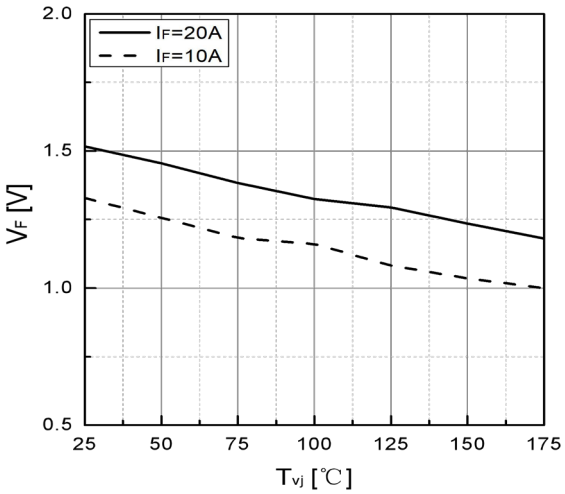


Fig 6. Typical V_F vs T_{VJ}

Typical Characteristics

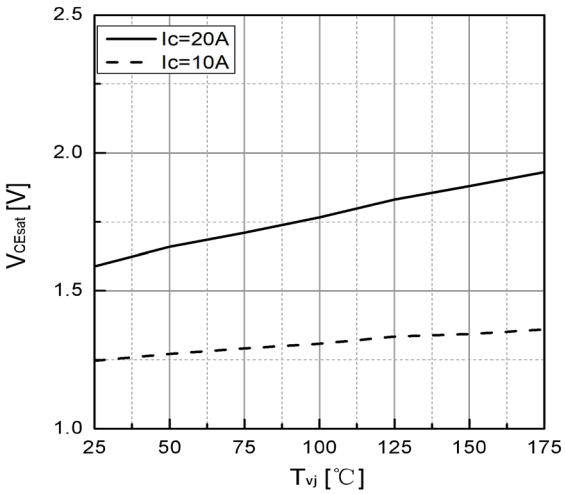


Fig 7. Typical V_{CEsat} vs T_{VJ}

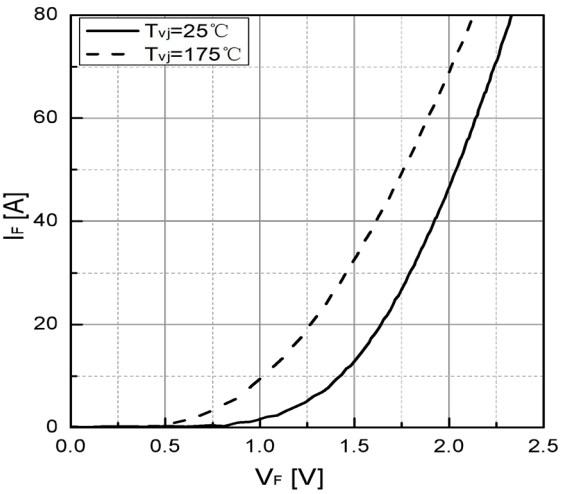


Fig 8. Typical I_F vs V_F

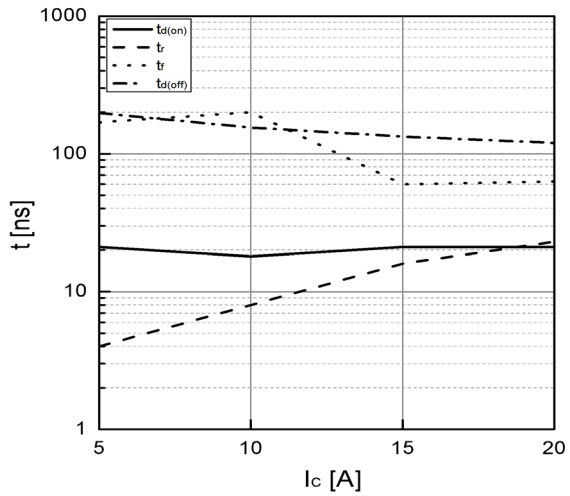


Fig 9. Typical switching time vs I_C

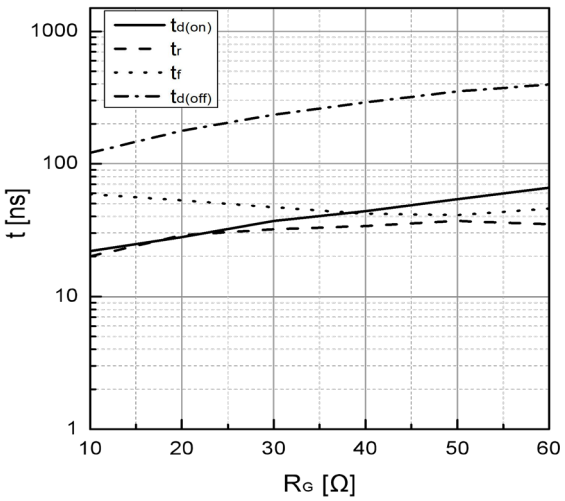


Fig 10. Typical switching time vs R_G

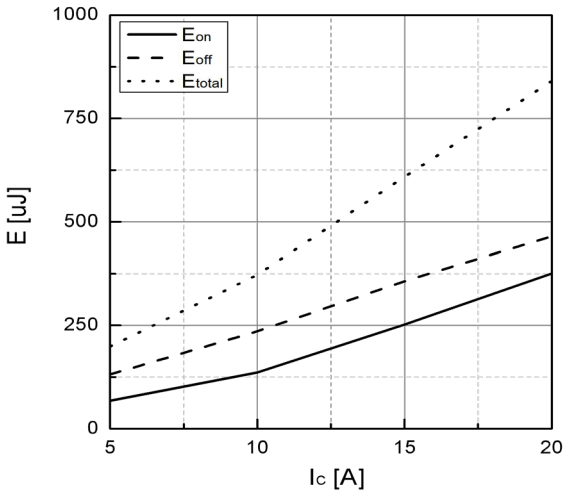


Fig 11. Typical switching energy losses vs I_C

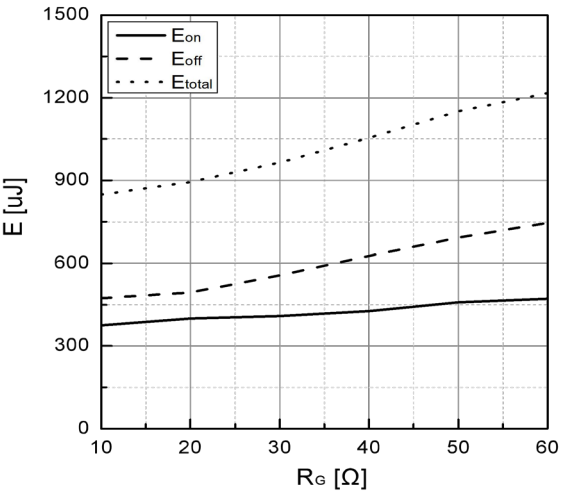


Fig 12. Typical switching energy losses vs R_G

Typical Characteristics

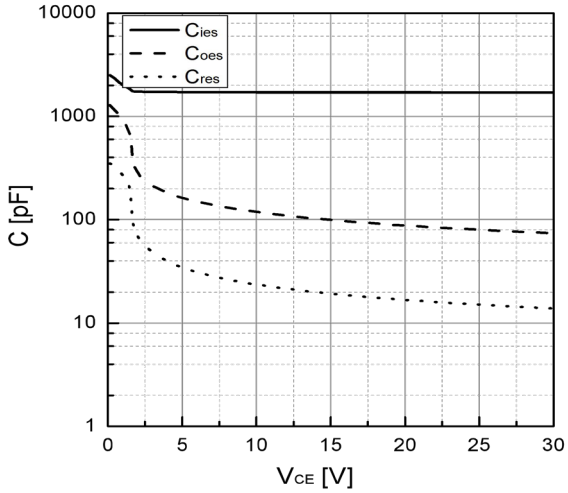
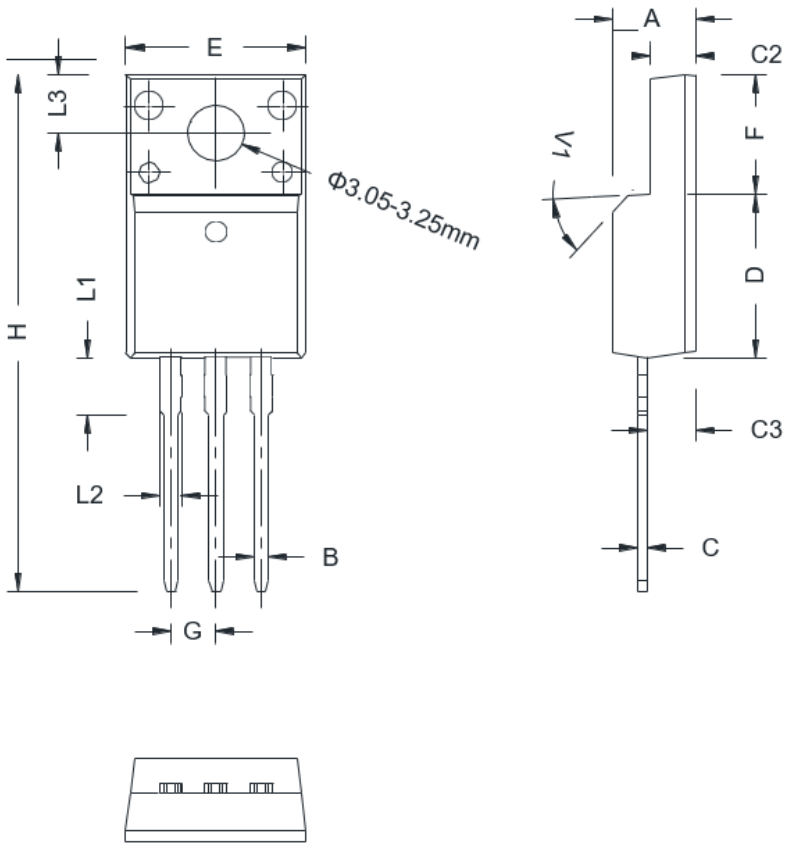


Fig 13. Typical capacitance as a function of V_{CE} ($f=1Mhz$, $V_{GE}=0V$)

Product Dimension (TO-220F)



Dim	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.50	-	4.90	0.177	-	0.193
B	0.74	0.80	0.83	0.029	0.031	0.033
C	0.47	-	0.66	0.019	-	0.026
C2	2.45	-	2.75	0.096	-	0.108
C3	2.60	-	3.00	0.102	-	0.118
D	8.80	-	9.30	0.346	-	0.366
E	9.80	-	10.40	0.386	-	0.410
F	6.40	-	6.80	0.252	-	0.268
G	2.40	-	2.70	0.094	-	0.106
H	28.0	-	29.80	1.102	-	1.173
L1	-	3.63	-	-	0.143	-
L2	1.14	-	1.70	0.045	-	0.067
L3	-	3.30	-	-	0.130	-
V1	-	45°	-	-	45°	-

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