

1700V/150A PIM

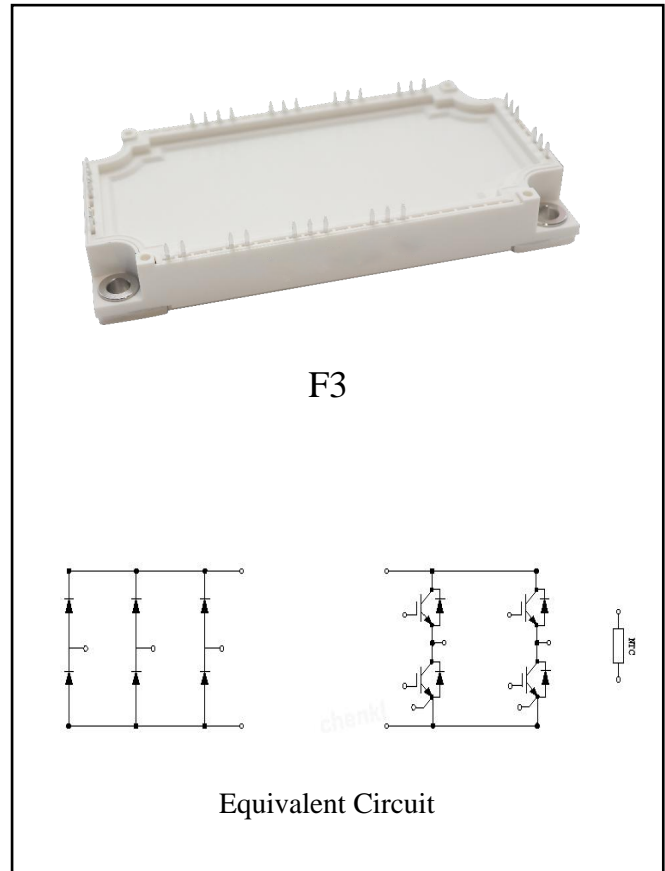
$V_{CES} = 1700V$, $I_{C\text{nom}} = 150A$ / $I_{CRM} = 300A$

Features :

- 1700V Trench / Field Stop process
- Low switching losses
- V_{cesat} has a positive temperature coefficient

Applications:

- middle and high voltage VFD
- UPS
- AC/ DC Servo drive
- SVG



IGBT, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	$T_{vj} = 25^{\circ}C$	V_{CES}	1700	V
Continuous DC collector current	$T_C = 100^{\circ}C$, $T_{vj\text{max}} = 175^{\circ}C$	$I_{C\text{nom}}$	150	A
Repetitive peak collector current	$t_p = 1\text{ ms}$	I_{CRM}	300	A
Gate emitter voltage		V_{GE}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	$V_{GE}=15V, I_C=150A$ $V_{GE}=15V, I_C=150A$ $V_{GE}=15V, I_C=150A$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	V_{CEsat}	2.26 2.75 2.87	2.80	V
Gate-Emitter threshold voltage	$I_C=6mA, V_{GE}=V_{CE}$	$T_{vj}=25^{\circ}C$	$V_{GE(th)}$	4.9	5.5	6.1
Gate charge	$V_{GE}=-15V...+15V$		Q_G	1.07		μC
Internal gate resistor	$T_{vj}=25^{\circ}C$		R_{Gint}	4.8		Ω
Input capacitance	$f=100KHz, V_{CE}=25V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	C_{ies}	14.57		nF
Reverse transfer capacitance			C_{res}	0.45		
Collector-emitter cut-off current	$V_{CE}=1700V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	I_{CES}		1.0	mA
Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$	I_{GES}		400	nA
Turn-on delay time	$I_C=150A, V_{CE}=900V$ $V_{GE}=\pm 15V, R_G=1\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	t_{don}	148 164 170		ns
Rise time	$I_C=150A, V_{CE}=900V$ $V_{GE}=\pm 15V, R_G=1\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	t_r	44 67 69		
Turn-off delay time	$I_C=150A, V_{CE}=900V$ $V_{GE}=\pm 15V, R_G=1\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	t_{doff}	269 333 348		
Fall time	$I_C=150A, V_{CE}=900V$ $V_{GE}=\pm 15V, R_G=1\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	t_f	146 154 155		
Turn-on energy loss per pulse	$I_C=150A, V_{CE}=900V$ $V_{GE}=\pm 15V, R_G=1\Omega$ $di/dt=1700A/\mu s(T_{vj}=150^{\circ}C)$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	E_{on}	34.62 46.28 50.43		mJ
Turn-off energy loss per pulse	$I_C=150A, V_{CE}=900V$ $V_{GE}=\pm 15V, R_G=1\Omega$ $du/dt=5800V/\mu s(T_{vj}=150^{\circ}C)$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	E_{off}	17.18 19.87 20.85		
SC data	$V_{GE}\leq 15V, V_{CC}=1000V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$	$t_p\leq 10\mu s, T_{vj}=150^{\circ}C$	I_{SC}	600		A
Temperature under switching conditions			T_{vjop}	-40	150	$^{\circ}C$

Diode, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	$T_{vj}=25^{\circ}\text{C}$	V_{RRM}	1700	V
Continuous DC forward current		I_F	150	A
Repetitive peak forward current	$t_p=1\text{ms}$	I_{FRM}	300	A
I^2t -value	$t_p=10\text{ms}$, $\sin 180^{\circ}$, $T_j=125^{\circ}\text{C}$	I^2t	7400	A^2S

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=150\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=25^{\circ}\text{C}$	V_F		2.09	2.70	V
	$I_F=150\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=125^{\circ}\text{C}$		2.34			
	$I_F=150\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=150^{\circ}\text{C}$		2.31			
Peak reverse recovery current	$I_F=150\text{A}$, $-di_F/dt=1700\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $V_R=900\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=25^{\circ}\text{C}$	I_{RM}		64.0	A	
	$T_{vj}=125^{\circ}\text{C}$		80.0			
	$T_{vj}=150^{\circ}\text{C}$		86.4			
Recovered charge	$I_F=150\text{A}$, $-di_F/dt=1700\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $V_R=900\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=25^{\circ}\text{C}$	Q_r		24.79	μC	
	$T_{vj}=125^{\circ}\text{C}$		39.70			
	$T_{vj}=150^{\circ}\text{C}$		43.54			
Reverse recovered energy	$I_F=150\text{A}$, $-di_F/dt=1700\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $V_R=900\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=25^{\circ}\text{C}$	E_{rec}		14.03	mJ	
	$T_{vj}=125^{\circ}\text{C}$		23.58			
	$T_{vj}=150^{\circ}\text{C}$		24.02			
Temperature under switching conditions		$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$	

Diode, Rectifier

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	$T_{vj}=25^{\circ}\text{C}$	V_{RRM}	1800	V
Non-Repetitive peak reverse voltage	$T_{vj}=25^{\circ}\text{C}$	V_{RSM}	2100	V
Maximum Average Forward Current		$I_{F(AV)}$	150	A
Surge forward current	$t_p=10\text{ms}$, $\sin 180^{\circ}$, $T_j=25^{\circ}\text{C}$	I_{FSM}	1320	A
I^2t -value	$t_p=10\text{ms}$, $\sin 180^{\circ}$, $T_j=125^{\circ}\text{C}$	I^2t	20000	A^2S

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=150A, T_j=25^\circ C$	V_F		1.3	1.6	V
Reverse current	$V_R=V_{RRM}$ $T_{vj}=25^\circ C$ $T_{vj}=150^\circ C$	I_R			50 2	μA mA
Temperature under switching conditions		$T_{vj op}$	-40		150	$^\circ C$

NTC-Thermistor

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Rated resistances	$T_c=25^\circ C, \pm 5\%$	R_{25}		5.0		$K\Omega$
B-value	$\pm 1\%$	$B_{25/50}$		3375		K

Module

Parameter	Conditions	Symbol	Value			Unit
Isolation test voltage	RMS, $f=50Hz, t=1min$	V_{ISOL}	4000			V
Internal isolation			Al_2O_3			
Storage temperature		T_{stg}	-40		125	$^\circ C$
Mounting torque for modul mounting		M	3.0		6.0	Nm
Weight		W		309		g

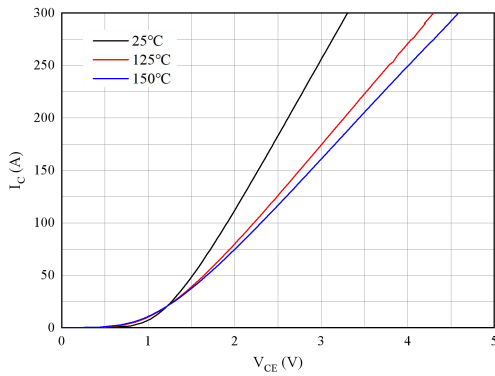


Fig 1. Typical output characteristics ($V_{GE}=15V$)

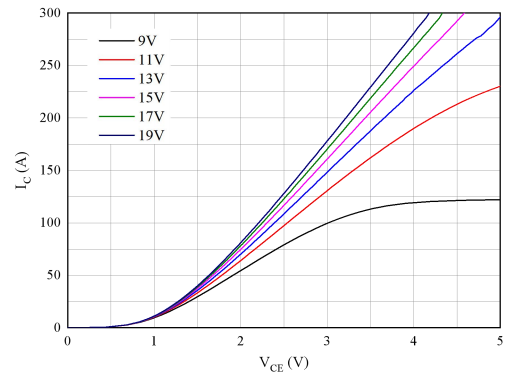


Fig 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

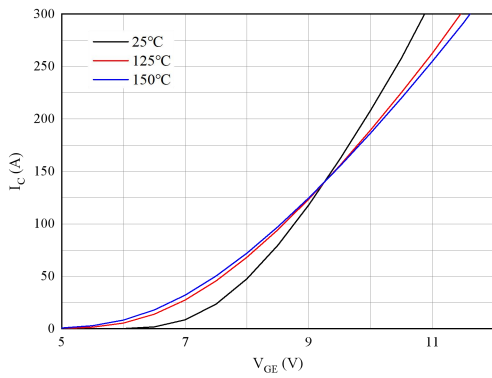


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

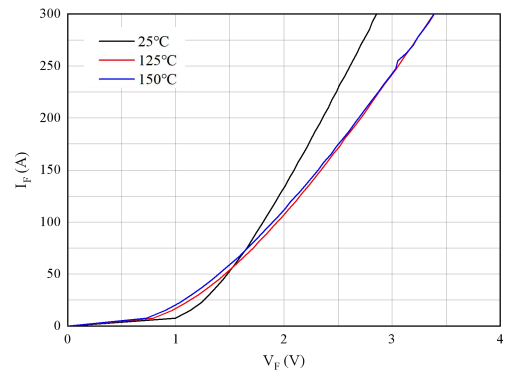


Fig 4. Forward characteristic of Inv. Diode

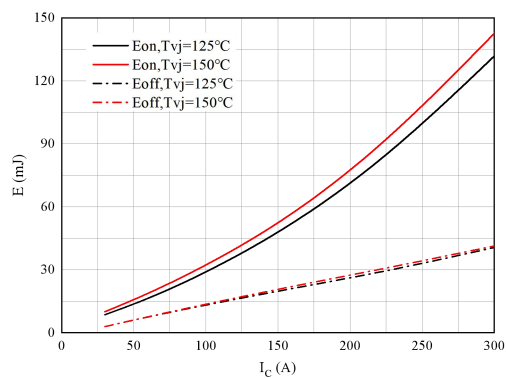


Fig 5. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $R_{Gon}=1.0\Omega$, $R_{Goff}=1.0\Omega$, $V_{CE}=900V$

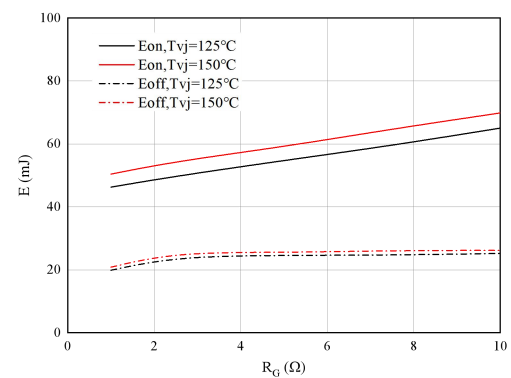


Fig 6. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $I_C=150A$, $V_{CE}=900V$

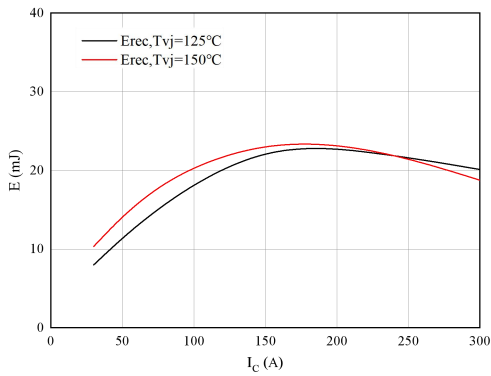


Fig 7. Switching losses of Diode

R_{Gon}=1.0Ω, VCE=900V

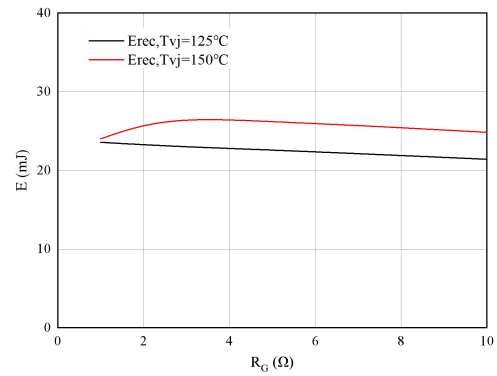


Fig 8. Switching losses of Diode

I_F=150A, VCE=900V

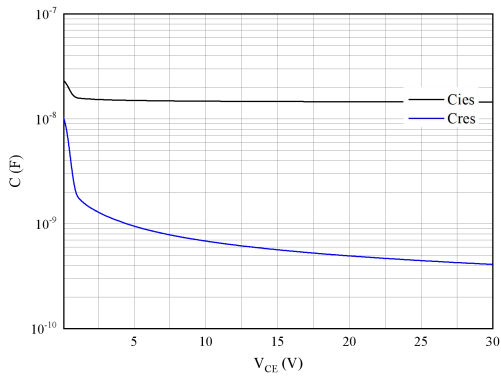


Fig 9. Capacitance characteristic

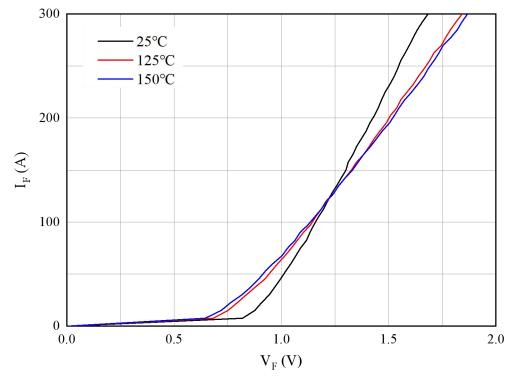


Fig 10. Forward characteristic of Rec. Diode

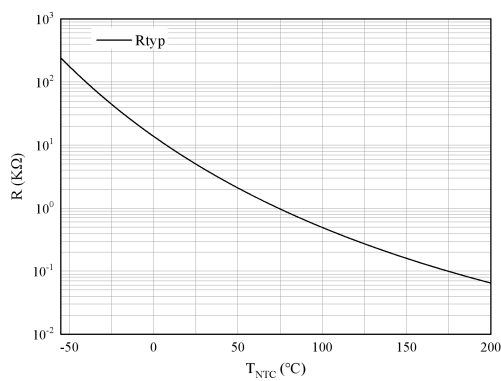
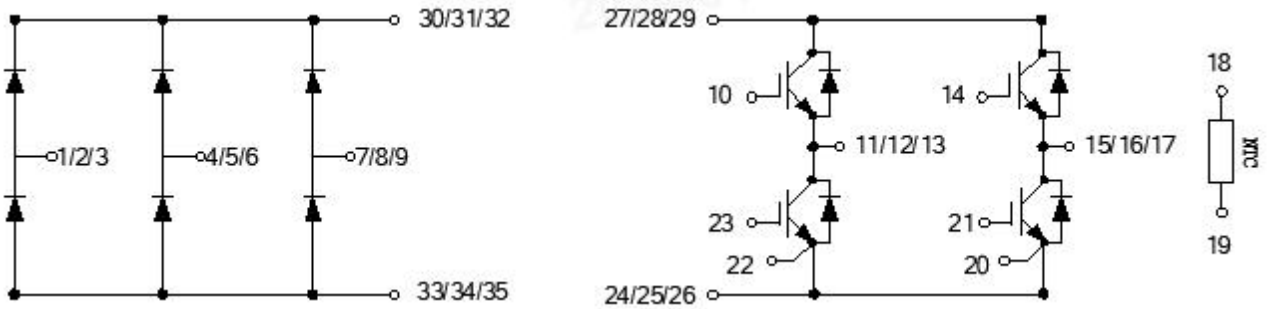


Fig 11. NTC-Themistor-temperature characteristic

Circuit diagram



Package outlines

