

Futures : Integrated in 3Phase Diode Bridge, Thyristor Switch, Inverter, Brake, and Snubber  
For 11kw 400V Inverter

Approximate Weight : 400g

**MAXMUM RATINGS (Tc=25°C)**

Item		Symbol	Rated Value	Unit	
3 Phase Rectification Diode	Repetitive Peak Reverse Voltage	$V_{RRM}$	1600	V	
	Non-Repetitive Peak Reverse Voltage	$V_{RSM}$	1700		
	Average Rectified Out -Put Current	$I_{O(AV)}$	50	A	
	Surge Forward Current	$I_{FSM}$	440		
	I Squared t	$I^2t$	968	A <sup>2</sup> s	
	Critical Rate of Fall of Forward Current	-di/dt	200(@ : $I_{FM}=25A, V_R=1000V$ )	A/ $\mu$ s	
Switch Thyristor	Repetitive Peak Off-State Voltage	$V_{DRM}$	1600	V	
	Non-Repetitive Peak Off-State Voltage	$V_{RSM}$	1700		
	Average Rectified Out-Put Current	$I_{O(AV)}$	50	A	
	Surge Forward Current	$I_{TSM}$	440		
	I Squared t	$I^2t$	968	A <sup>2</sup> s	
	Critical Rate Of Rise Of Turn-On Current	di/dt	100	A/ $\mu$ s	
	Peak Gate Power	$P_{GM}$	5	W	
	Average Gate Power	$P_{GM(AV)}$	1		
	Peak Gate Current	$I_{GM}$	2	A	
	Peak Gate Voltage	$V_{GM}$	10	V	
	Peak Gate Reverse Voltage	$V_{RGM}$	5		
	Inverter IGBT	Collector-Emitter Voltage	$V_{CES}$	1200	V
Gate-Emitter Voltage		$V_{GES}$	+/- 20V		
Collector Current		DC	$I_C$	50	A
		1ms	$I_{CP}$	100	
Forward Current		DC	$I_F$	50	
		1ms	$I_{FM}$	100	
Collector Power Dissipation	$P_C$	312	W		
Brake IGBT	Collector-Emitter Voltage	$V_{CES}$	1200	V	
	Gate Emitter Voltage	$V_{GES}$	+/- 20V		
	Collector Current	DC	$I_C$	25	A
		1ms	$I_{CP}$	50	
	Collector Power Dissipation	$P_C$	186	W	
Snubber Diode	Repetitive Peak Reverse Voltage	$V_{RRM}$	1200	V	
	Forward Current, DC	$I_F$	15	A	
	Surge Forward Current	$I_{FSM}$	70		
Operating Junction Temperature Range	$T_{jw}$	-40 to +150°C (notes: +125 °C > Can not be biased.)		°C	
Storage Temperature Range	$T_{stg}$	-40 to +125°C			
Isolation Voltage(Terminal to Base)	Viso	2500(@AC, 1minute), 3000(@AC, 1second)		V	
Isolation Resistance(Terminal to Base, @DC=500V)	Riso	500		M.ohm	
Mounting Torque(Module Base to Heatsink)	Ftor	(M4), 1.4		N·m	

**ELECTRICAL CHARACTERISTICS (Tc=25°C Unless otherwise noted)**

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit	
3 Phase Rectification Diode	Peak Reverse Current *1	$I_R$	$T_J=150^\circ C, V_{RM}=V_{RRM}$	-	-	10	mA	
	Peak Reverse Voltage *1	$V_F$	$I_F=50A$	-	-	1.45	$\mu A$	
Switch Thyristor	Peak OFF-State Current	$I_{DM}$	$T_J=125^\circ C, V_{DM}=V_{DRM}$	-	-	50	mA	
	Peak Reverse Current	$I_{RM}$	$T_J=125^\circ C, V_{RM}=V_{RRM}$	-	-	50		
	Peak On-State Voltage	$V_{TM}$	$I_T=50A$	-	-	1.30	V	
	Gate Current to Trigger	$I_{GT}$	$V_D=6V$ $I_T=1A$	$T_J=-40^\circ C$	-	-	200	mA
				$T_J=25^\circ C$	-	-	100	
				$T_J=125^\circ C$	-	-	50	
	Gate Voltage to Trigger	$V_{GT}$	$V_D=6V$ $I_T=1A$	$T_J=-40^\circ C$	-	-	40	V
				$T_J=25^\circ C$	-	-	25	
$T_J=125^\circ C$				-	-	20		
Gate Voltage to Non-Trigger	$V_{GD}$	$T_J=125^\circ C, V_D=2/3V_{DRM}$		0.25	-	-	V	
Critical Rate Of Rise Of Off-State Voltage	dv/dt			500	-	-	V/ $\mu$ s	

Switch Thyristor	Turn-Off Time	tq	T <sub>J</sub> =125°C, V <sub>D</sub> =2/3V <sub>DRM</sub> V <sub>RM</sub> =100V, dv/dt=20V/μs -di/dt=20A/μs	-	100	-	μs	
	Turn-On Time	tgt	T <sub>J</sub> =25°C, V <sub>D</sub> =2/3V <sub>DRM</sub>	-	6	-		
	Delay Time	td	I <sub>C</sub> =200mA	-	2	-		
	Rise Time	tr	-dic/dt=0.2A/μs	-	4	-		
	Latching Current	I <sub>L</sub>		-	100	-	mA	
	Holding Current	I <sub>H</sub>		-	80	-		
Inverter IGBT	Collector-Emitter Out-Off Current	I <sub>CEs</sub>	V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V	-	-	1.0	mA	
	Gate-Emitter Leakage Current	I <sub>GES</sub>	V <sub>GE</sub> =±20V, V <sub>CE</sub> =0V	-	-	1.0	μA	
	Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> =50A, V <sub>GE</sub> =15V	-	1.9	2.4	V	
	Gate-Emitter Threshold Voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =50mA	4.0	-	8.0	V	
	Input Capacitance	C <sub>ies</sub>	V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=1MHz	-	4200	-	pF	
	Switching Time	Rise Time	t <sub>r</sub>	V <sub>CC</sub> =600V	-	0.25	0.45	μs
		Turn-On Time	t <sub>on</sub>	R <sub>L</sub> =12 ohm	-	0.40	0.70	
		Fall Time	t <sub>f</sub>	R <sub>G</sub> =20 ohm	-	0.25	0.35	
		Turn-Off Time	t <sub>off</sub>	V <sub>GE</sub> =±15V	-	0.80	1.10	
	Peak Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =50A	-	1.9	2.4	V	
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =50A, V <sub>CE</sub> =-10V, di/dt=100A/μs	-	0.2	0.3	μs		
Brake IGBT	Collector-Emitter Cut-Off Current	I <sub>CEs</sub>	V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V	-	-	1.0	mA	
	Gate-Emitter Leakage Current	I <sub>GES</sub>	V <sub>GE</sub> =±20V, V <sub>CE</sub> =0V	-	-	1.0	μA	
	Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> =25A, V <sub>GE</sub> =15V	-	2.0	3.3	V	
	Gate-Emitter Threshold Voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =25mA	3.0	-	7.0	V	
	Input Capacitance	C <sub>ies</sub>	V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=1MHz	-	2500	-	pF	
	Switching Time	Rise Time	t <sub>r</sub>	V <sub>CC</sub> =600V	-	0.3	0.6	μs
		Turn-on Time	t <sub>on</sub>	R <sub>L</sub> =24 ohm	-	0.5	1.0	
Fall Time		t <sub>f</sub>	R <sub>G</sub> =91 ohm	-	0.3	0.5		
Turn-off Time		t <sub>off</sub>	V <sub>GE</sub> =±15V	-	0.80	1.5		
Snubber Diode	Peak Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =15A	-	-	2.5	V	
	Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =15A, di/dt=50A/μs	-	-	0.3	μs	

\*1: per 1arm

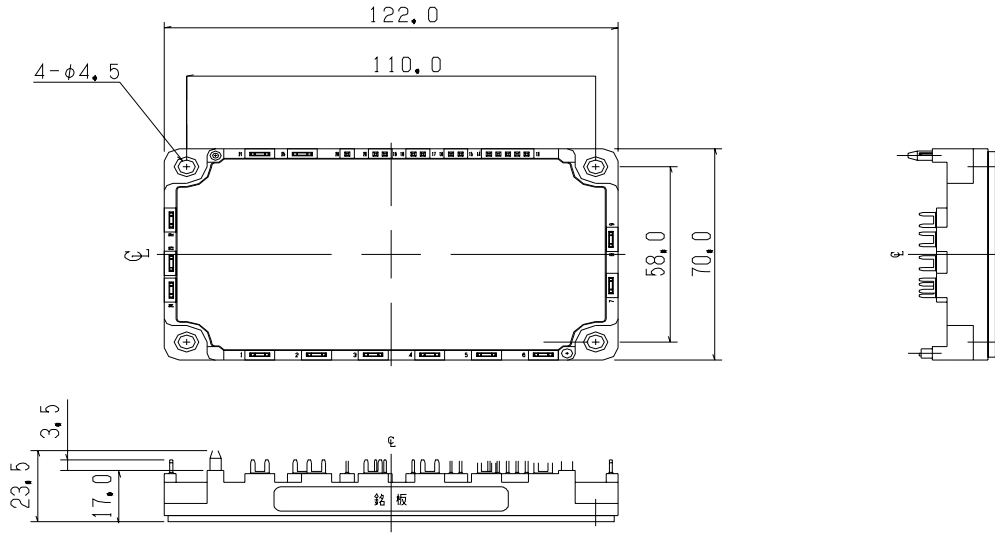
ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C Unless otherwise noted)

Thermister	Resistance	25°C	-	5.00	-	k. ohm
		75°C	-	0.97	-	
		125°C	-	0.27	-	
	B-Value	25°C/50°C	-	3375	-	K
		25°C/85°C	-	3420	-	
Thermal Time Constant		-	10	-	s	

THERMAL CHARACTERISTICS

Characteristic		Test Condition	Min.	Typ.	Max.	Unit
Thermal Impedance	R <sub>th(j-c)</sub> Junction to Case	3 Phase Rectification Diode	-	-	0.53	°C/W
		Switch Thyristor	-	-	0.50	
		Inverter IGBT	-	-	0.40	
		Inverter Free Wheeling Diode	-	-	0.70	
		Brake IGBT	-	-	0.67	

PVD110-12 OUTLINE DRAWING  
(Dimensions in mm)



CIRCUIT

