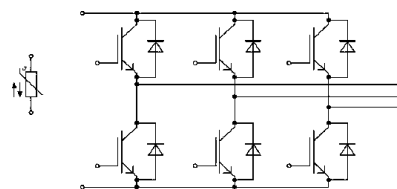


High Speed IGBT in Trench and Fieldstop Technology



Equivalent circuit

Features:

- 1200V 100A, $V_{CE(sat)} = 1.7V @ 25^{\circ}C$
- High RBSOA capability
- Trench/FS technology
- Low reverse-recovery losses
- High SC capability

Applications:

- Motor drives
- Solar applications
- Servo drives
- Auxiliary inverters
- Uninterruptible power supply

Mechanical Features:

- High power and thermal cycling capability
- Maximum junction temperature $175^{\circ}C$
- High power density
- PressFIT contact technology
- Isolated base plate

Key Performance and Package Parameters

Type	V_{CES}	I_{Cnom}	$V_{CESat}, T_{vj}=25^{\circ}C$	T_{vjmax}	Marking
PM100T5120FS1	1200V	100A	1.7V	$175^{\circ}C$	PM100T5120FS1

IGBT Inverter

Maximum Rated Values at $T_{vj}=25^{\circ}C$ (unless otherwise specified)

Parameter	Symbols	Value	Units
Collector-emitter voltage	V_{CES}	1200	V
Continuous DC collector current $T_c = 100^{\circ}C$	I_C	100	A
Repetitive peak collector current $t_p = 1ms$	I_{RM}	200	A
Diode forward current	I_F	100	A
Gate-emitter peak voltage	V_{GES}	± 30	V
Repetitive peak forward current	I_{FRM}	200	A
Operating junction temperature	T_{vj}	$-40 \sim +150$	$^{\circ}C$
Storage temperature	T_{stg}	$-40 \sim +125$	$^{\circ}C$

IGBT ,Inverter

Characteristic Values (unless otherwise specified)

Parameter	Symbols	Conditions	Value			Unit	
			Min	Typ	Max		
Collector-emitter saturation voltage	V _{CEsat}	I _C =100A, V _{GE} =15V, T _{vj} =25°C	-	1.7	2.2	V	
		I _C =100A, V _{GE} =15V, T _{vj} =125°C	-	2.08	-		
		I _C =100A, V _{GE} =15V, T _{vj} =150°C	-	2.23	-		
Gate-emitter threshold voltage	V _{GE(th)}	I _C =100mA, V _{CE} =V _{GE} , T _{vj} =25°C	5.5	6.1	6.7	V	
Internal gate resistor	R _{Gint}	T _{vj} =25°C	-	3.0	-	Ω	
Collector-emitter leakage current	I _{CES}	V _{CE} =1200V, V _{GE} =0V, T _{vj} =25°C	-	-	200	μA	
Gate-emitter leakage current	I _{GES}	V _{CE} =0V, V=20V T _{vj} =25°C	-	-	±300	nA	
Input capacitance	C _{ies}	f=1MHz, V _{CE} =25V, V _{GE} =0V	-	21	-	nF	
Reverse transfer capacitance	C _{res}	f=1MHz, V _{CE} =25V, V _{GE} =0V	-	0.12	-	nF	
Gate charge	Q _G	V _{CC} = 600V, V _{GE} = 15V	-	1.80	-	nC	
Turn-on delay time, inductive load	t _{d(on)}	V _{CC} =600V I _C =100A V _{GE} =15V R _G =10Ω	T _{vj} =25°C	-	0.36	-	μs
			T _{vj} =125°C	-	0.34	-	
			T _{vj} =150°C	-	0.33	-	
Rise time, inductive load	t _r		T _{vj} =25°C	-	0.09	-	μs
			T _{vj} =125°C	-	0.10	-	
			T _{vj} =150°C	-	0.11	-	
Turn-off delay time ,inductive load	t _{d(off)}		T _{vj} =25°C	-	0.39	-	μs
			T _{vj} =125°C	-	0.41	-	
			T _{vj} =150°C	-	0.44	-	
Fall time, inductive load	t _f		T _{vj} =25°C	-	0.08	-	μs
			T _{vj} =125°C	-	0.10	-	
			T _{vj} =150°C	-	0.15	-	
Turn-on switching loss	E _{on}		T _{vj} =25°C	-	12.92	-	mJ
			T _{vj} =125°C	-	16.08	-	
			T _{vj} =150°C	-	21.09	-	
Turn-off switching loss	E _{off}		T _{vj} =25°C	-	5.35	-	mJ
			T _{vj} =125°C	-	6.19	-	
			T _{vj} =150°C	-	7.34	-	
SC data	I _{SC}	V _{CC} = 600V R _G = 20Ω V _{GE} ≤ 15V V _{CEmax} =V _{CE} -L _{SCE} •di/dt	t _p ≤ 10μs T _{vj} =150°C	-	400	-	A

Thermal resistance

Parameter	Symbols	Value			Units
		Min	Typ	Max	
Thermal resistance, per IGBT junction to case	$R_{th(j-c)}$	-	-	0.20	K/W
Thermal resistance, per Diodes junction to case	$R_{th(j-c)}$	-	-	0.44	
Thermal resistance, case to heatsink(IGBT+FRD) With 1 W/(m·K) thermal grease	$R_{th(c-s)}$	-	0.05	-	K/W

Diode, Inverter**Characteristic Values (unless otherwise specified)**

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Forward voltage	V _F	I _F =100A, V _{GE} =0V	T _{vj} =25°C	-	1.49	2.0
			T _{vj} =125°C	-	1.38	-
			T _{vj} =150°C	-	1.36	-
Recovery Charge	Q _r	I _F =100A, V _R =600V -diF/dt= 1200A/us, V _{GE} = -15V	T _{vj} =25°C	-	7.90	-
			T _{vj} =125°C	-	16.77	-
			T _{vj} =150°C	-	22.31	-
Reverse recovery energy	E _{rec}	I _F =100A, V _R =600V -diF/dt=1200A/us V _{GE} = -15V	T _{vj} =25°C	-	3.17	-
			T _{vj} =125°C	-	6.41	-
			T _{vj} =150°C	-	8.91	-

Module

Parameter	Symbols	Conditions	Value			Unit
Isolation voltage	V _{ISOL}	f=50Hz, t=1min, RMS	-	4000	-	V
Material of Module base plat			-	Cu	-	
Internal isolation			-	Al ₂ O ₃	-	
Creepage distance	d _{Creep}	Terminal to terminal	-	10.0	-	mm
Clearance	d _{Clear}	Terminal to terminal	-	7.5	-	mm
Comparative tracking index	CTI		-	200	-	

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Stray inductance module	L _{sCE}		-	35.2	-	nH
Module lead resistance ,terminals-chip	R _{CC'+EE'}	TC= 25°C, Per switch	-	4.3	-	mΩ
Mounting torque for module mounting	M	Screw M5	3.0		6.0	Nm
Weight	G		-	180	-	g

NTC Characteristics

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Rated resistance	R ₂₅	T _{NTC} =25°C	-	5.0	-	KΩ
Deviation of R ₁₀₀	ΔR/R	T _{NTC} =100°C, R ₁₀₀ =493Ω	-	-	5	%
Power dissipation	P ₂₅		-	-	20	mW
B-value	B _{25/50}	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]	-	3388	-	K
B-value	B _{25/80}	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ -1/(298.15K))]	-	3454	-	K
B-value	B _{25/100}	R ₂ =R ₂₅ exp[B _{25/100} (1/T ₂ -1/(298.15K))]	-	3485	-	K

Typical Characteristics

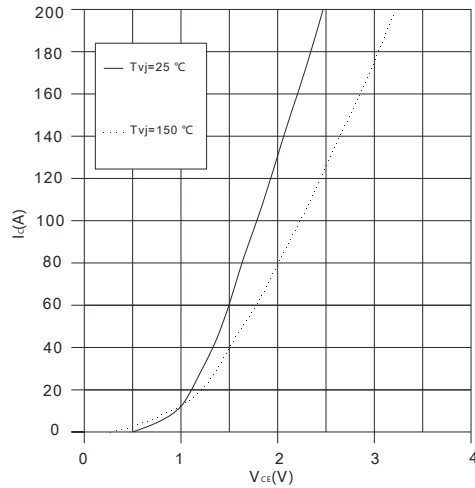


Fig 1. Output characteristic (typical), IGBT, Inverter $I_c = f(V_{CE})$ $V_{GE} = 15V$

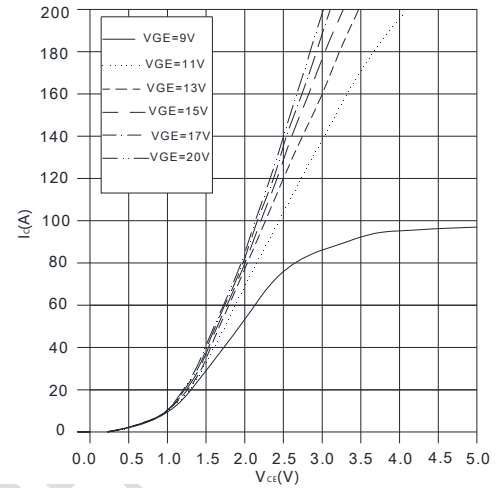


Fig 2. Output characteristic (typical), $I_c = f(V_{CE})$ $T_j = 150^\circ C$

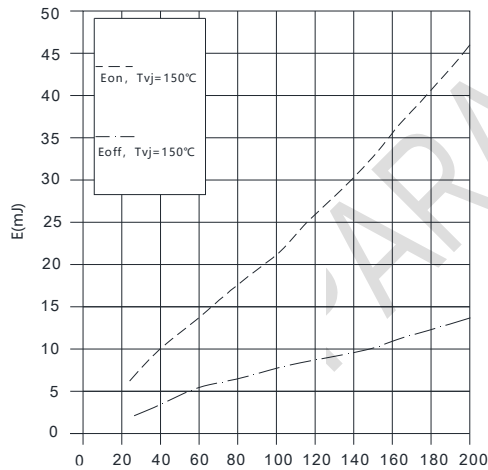


Fig 3. Switching losses (typical), IGBT, Inverter $E = f(I_c)$ $R_{Goff} = 10\Omega$, $R_{Gon} = 10\Omega$, $V_{GE} = \pm 15V$, $V_{CC} = 600V$

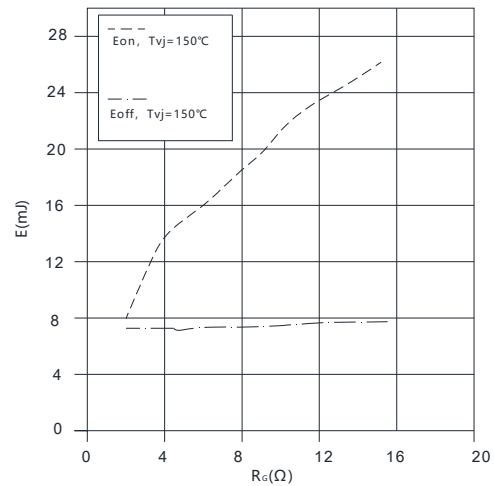


Fig 4. Switching losses (typical), IGBT, Inverter $E = f(R_g)$ $V_{GE} = 15V$, $I_c = 100A$, $V_{CC} = 600V$

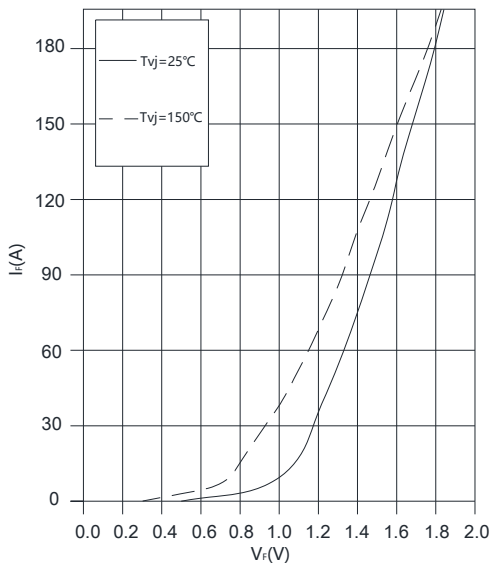


Fig 5. Forward characteristic (typical), Diode, Inverter $I_F = f(V_f)$

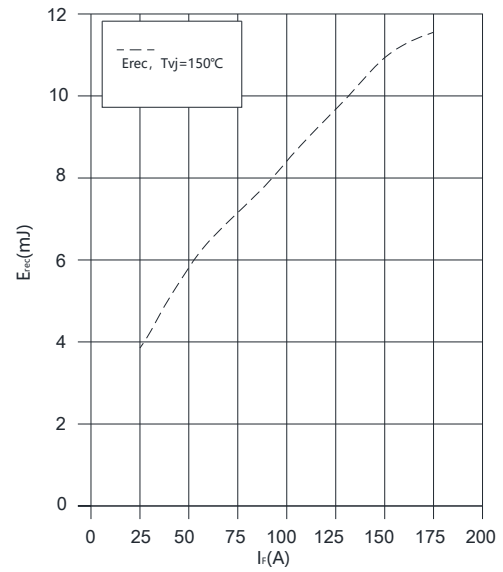


Fig 6. Switching losses (typical), Diode, Inverter $E_{rec} = f(I_F)$ $R_{Gon} = 10\Omega$, $V_{CC} = 600V$

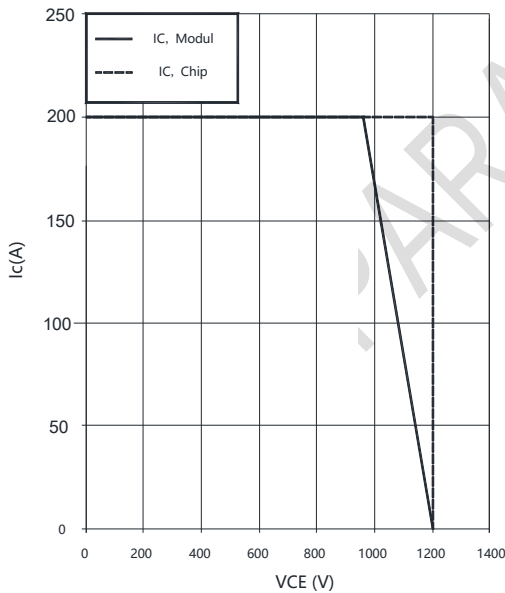
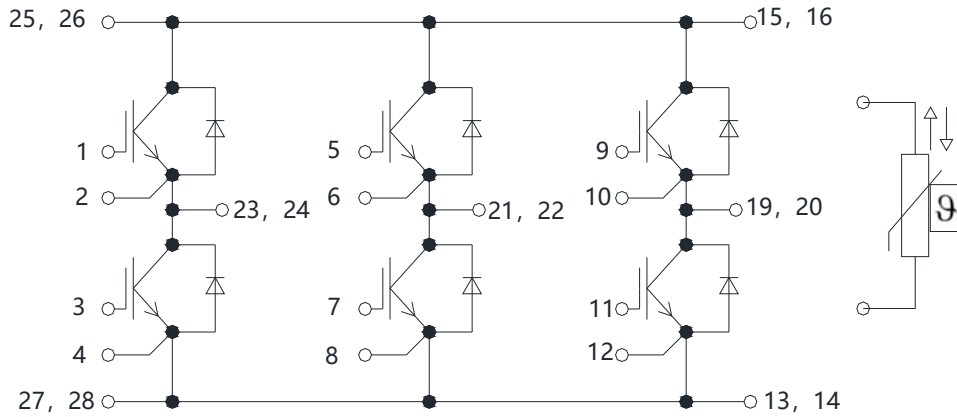
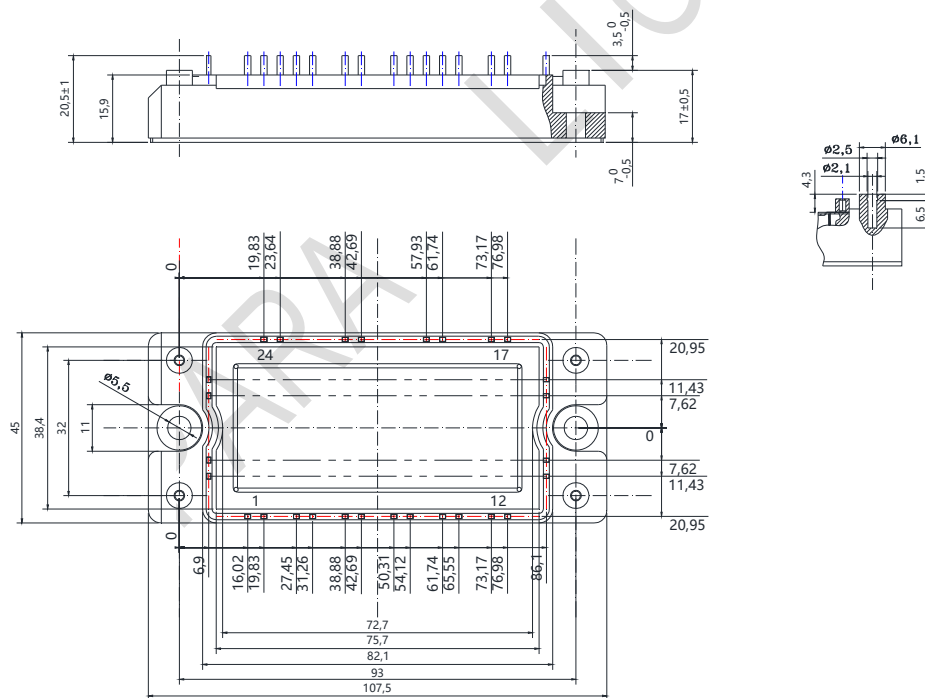


Fig 7. Reverse bias safe operating area (RBSOA), IGBT, Inverter $I_c = f(V_{CE})$ $R_{Goff} = 10\Omega$, $V_{GE} = \pm 15V$, $T_{vj} = 150^\circ\text{C}$

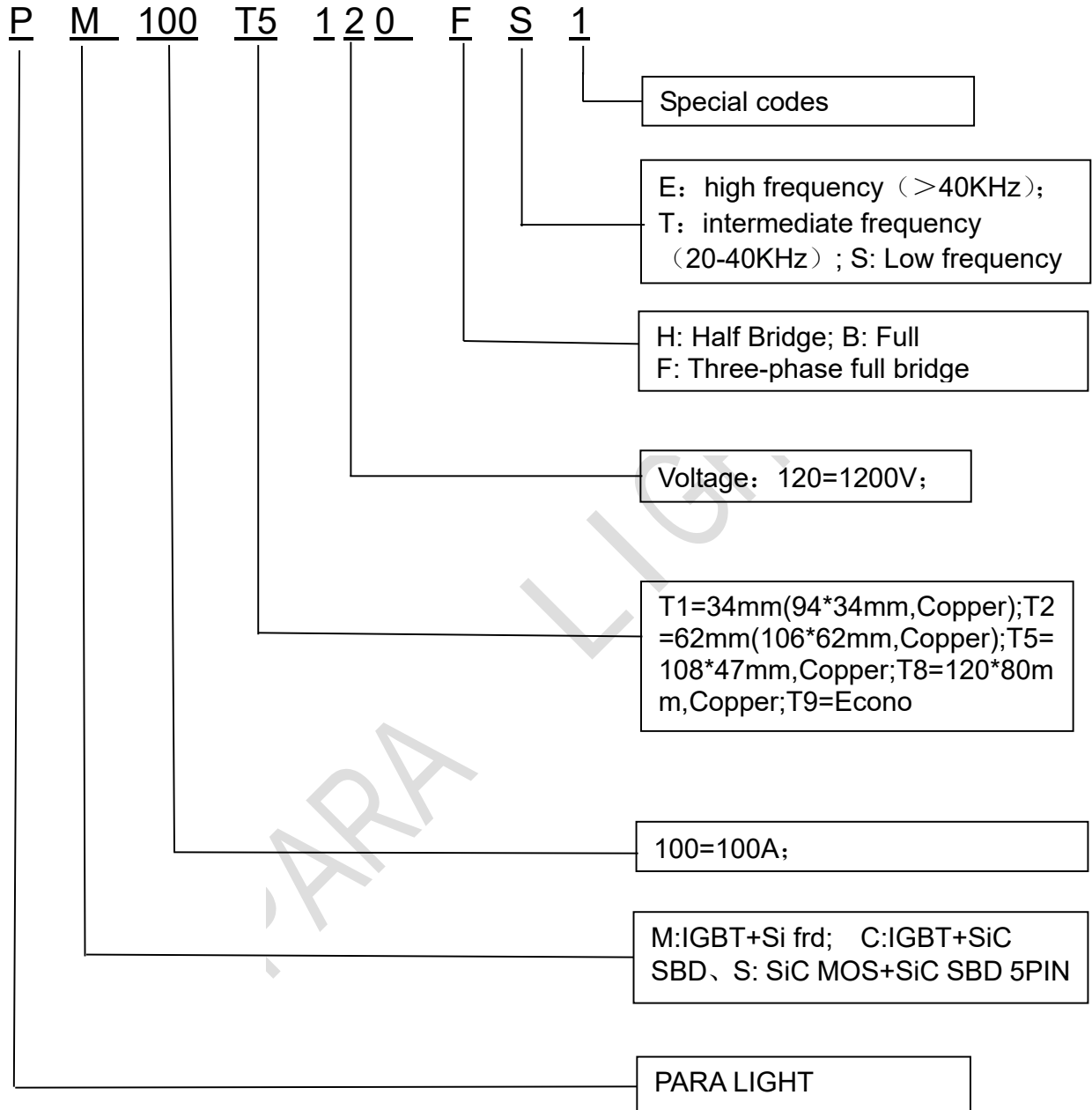
Circuit_diagram_headline



Package outline



PART NO. SYSTEM :



Revision history

Document revision history

Date	Version	Changes
2024.09.23	A / 0	First release.