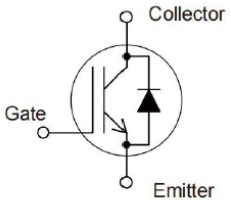
1200V 100A CoolFAST™ 7 Technology IGBT

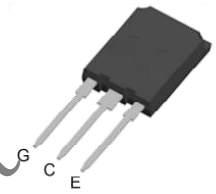
Features:

- Low switching power loss
- Low switching surge and noise
- Advanced field stop technology
- Low EMI
- Maximum junction temperature 175°C
- Qualified according to JEDEC for target applications
- Pb-free lead plating, halogen-free mold compound, RoHS compliant



Applications:

- Industrial UPS
- Welding machine
- Solar converters
- EV charger



Key Performance and Package Parameters

Type	V_{CE}	I_C	V_{CEsat}, T_{vj}=25°C	T_{vjmax}	Marking	Package
PCA0N120GH7S	1200V	100A	1.8V	175°C	PCA0N120GH7S	TO247 PLUS-3L

Maximum Ratings and Characteristics

Absolute Maximum Ratings at T_{vj}= 25°C (unless otherwise specified)

Parameter	Symbols	Value	Units
Collector-emitter voltage	V_{CES}	1200	V
DC collector current, limited by Tvjmax Tc= 25°C Tc= 100°C	I_C	 140 110	A
Pulsed collector current, tp limited by Tvjmax	I_{Cpuls}	400	A
Diode forward current, limited by Tvjmax Tc= 25°C Tc= 100°C	I_F	 140 110	A
Short circuit withstand time, V_{GE}= 15V, V_{CE}≤ 400V	T_{SC}	5	µs
Gate-emitter voltage Transient gate-emitter voltage (t_p ≤10µs, D <0.010)	V_{GES}	±20 ±30	V
IGBT max. power dissipation	P_{D_IGBT}	420	W
FWD max. power dissipation	P_{D_FWD}	375	W
Operating junction temperature	T_{vj}	-40 ~ +175	°C
Storage temperature	T_{stg}	-55 ~ +175	°C

Thermal Resistance

Parameter	Symbols	Value			Unit
		Min	Typ	Max	
Rth Characteristics					
Thermal resistance, junction-ambient	$R_{th(j-a)}$	-	50	-	°C /W
Thermal resistance, IGBT junction-case	$R_{th(j-c)}$	-	0.2	-	
Thermal resistance, diodes junction-case	$R_{th(j-c)}$	-	0.3	-	

Electrical Characteristics at T_{vj}= 25°C (unless otherwise specified)

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=0.25mA	1200	-	-	V
Collector-emitter saturation voltage	V_{CEsat}	V_{GE}= 15V, I_C=100A Tvj= 25°C Tvj= 175°C	 - -	 1.8 2.0	 2.2	V
Diode forward voltage	V_F	I_F= 100A Tvj= 25°C Tvj= 175°C	 - -	 2.2 1.9	 3.0	V
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE}= V_{GE}, I_C= 100mA	6.0	6.6	7.2	V
Zero gate voltage collector current	I_{CES}	V_{CE}=1200V, V_{GE}= 0V	-	-	200	μA
Gate-emitter leakage current	I_{GES}	V_{CE}= 0V, V_{GE}= ±20V	-	-	±200	nA

Electrical Characteristics at T_{vj}= 25°C (unless otherwise specified)

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Dynamic Characteristic						
Input capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V f= 1MHz	-	25	-	pF
Output capacitance	C_{oes}		-	220	-	pF
Reverse transfer capacitance	C_{res}		-	130	-	pF
Gate charge	Q_G	V_{CC}= 960V, I_C=100A, V_{GE}= 15V	-	950	-	nC

Switching Characteristics at T_{vj}= 25°C

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
IGBT Characteristics						
Turn-on delay time	$t_{d(on)}$	V_{CC}= 600V I_C= 100A V_{GE}= 15V R_G= 10Ω Inductive load	-	212	-	ns
Rise time	t_r		-	87	-	ns
Turn-off delay time	$t_{d(off)}$		-	534	-	ns
Fall time	t_f		-	170	-	ns
Turn-on energy	E_{on}		-	8.6	-	mJ
Turn-off energy	E_{off}		-	5.3	-	mJ
Total switching energy	E_{ts}		-	13.9	-	mJ

Switching Characteristics at T_{vj}= 25°C

Parameter	Symbols	Conditions	Value			Unit
			Min	Typ	Max	
Diode Characteristics						
Diode reverse recovery time	t_{rr}	V_{DD} = 600V I_F= 100A di_F/dt= 896A/μs	-	369	-	ns
Diode reverse recovery charge	Q_{rr}		-	4.99	-	μC
Diode peak reverse recovery current	I_{rrm}		-	31.8	-	A

Typical Characteristics

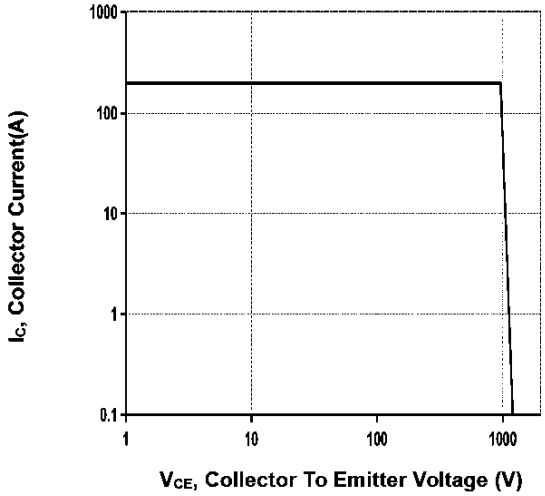


Fig. 1 Reverse bias safe operating area
(D= 0, T_C= 25°C, T_{vj}≤ 175°C; V_{GE}= 15V)

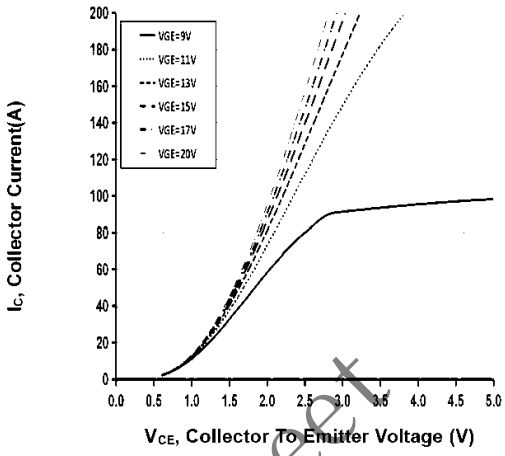


Fig. 2 Typical output characteristic (T_{vj}= 150°C)

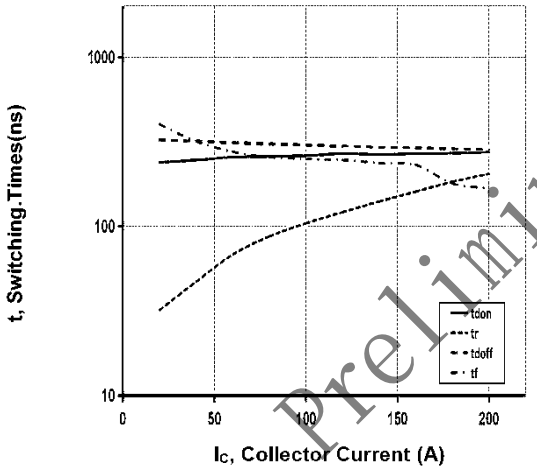


Fig. 3 Typical switching times vs. collector current
(Ind. load, T_{vj}= 150°C, V_{CE}= 600V, V_{GE}= 15/0V, R_G=10Ω)

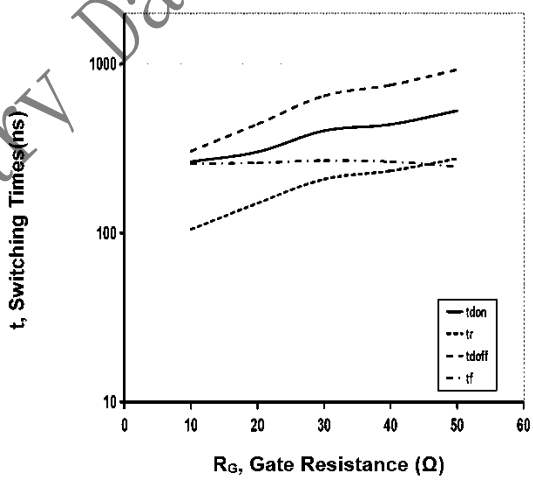


Fig. 4 Typical switching times vs. gate resistor
(Ind. Load, T_{vj}= 150°C, V_{CE}= 600V, V_{GE}= 15/0V, I_C= 100A)

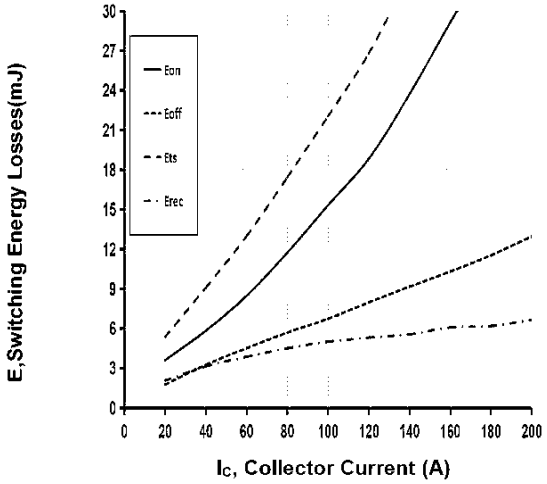


Fig. 5 Typical switching energy losses vs. collector current (Ind. load, T_{vj}= 150°C, V_{CE}= 600V, V_{GE}= 15/0V, R_G=10Ω)

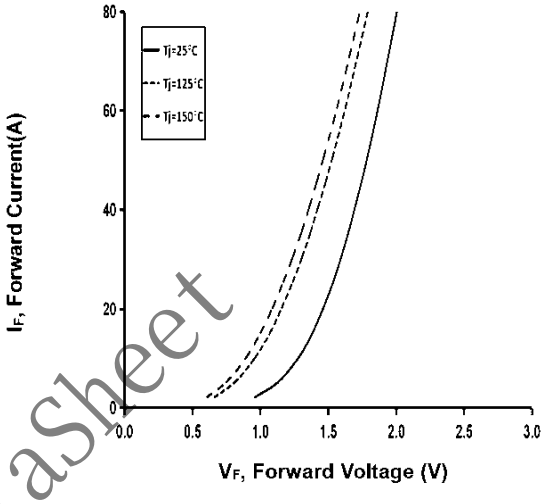
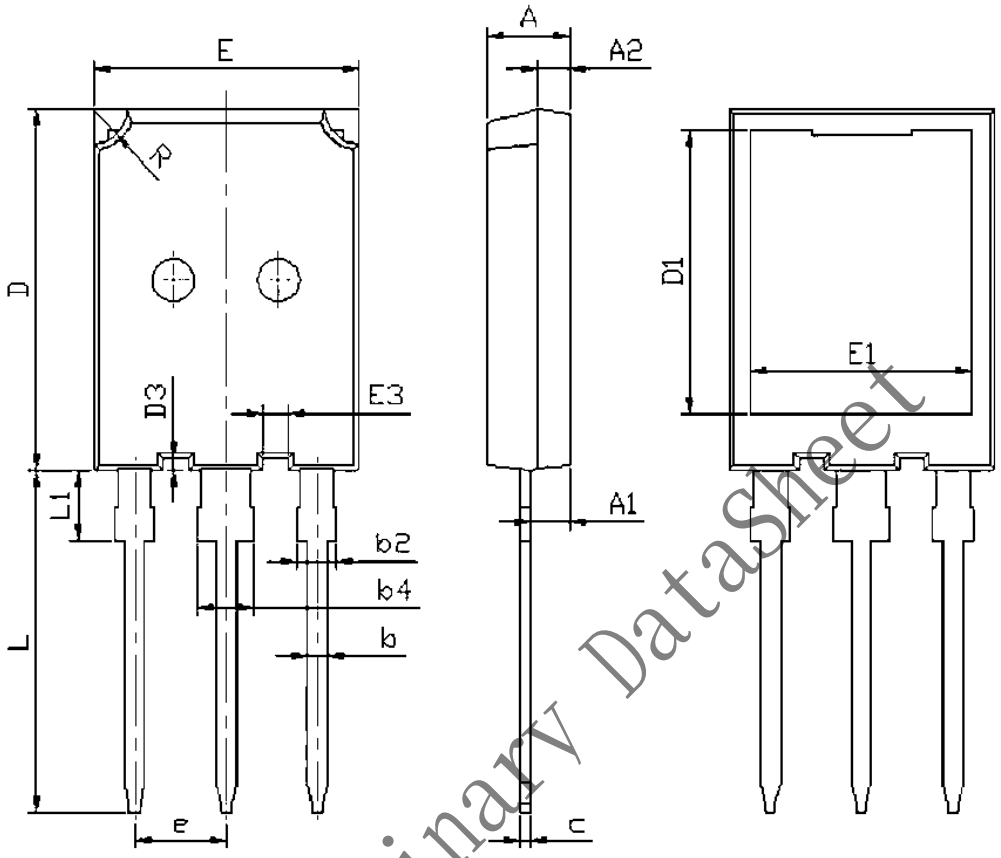


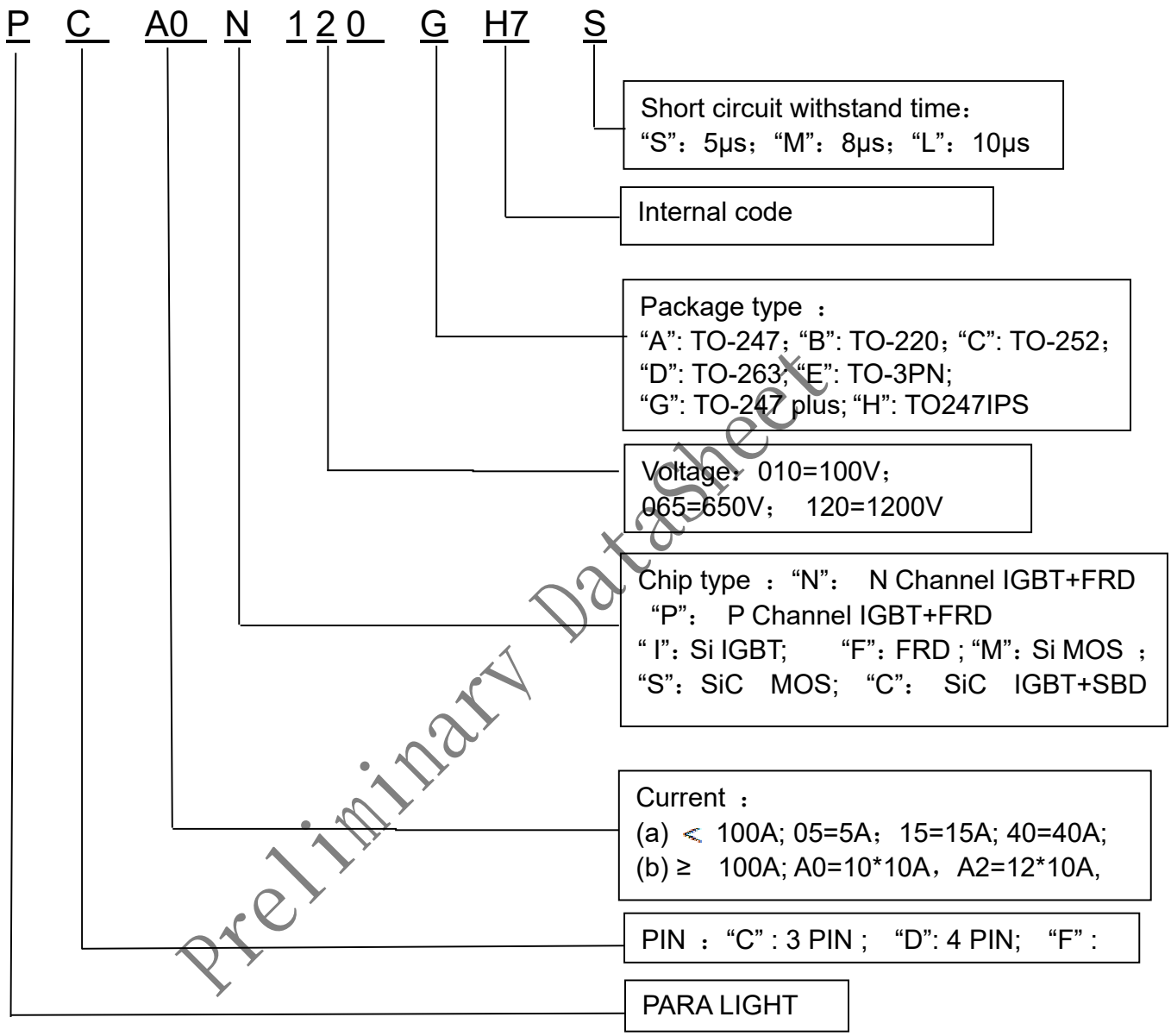
Fig. 6 Typical diode forward current vs. forward voltage

Package Dimensions



Common dimensions(mm)							
Symbol	**Min**	**Typ**	**Max**	**Symbol**	**Min**	**Typ**	**Max**
A	4.80	-	5.20	E	15.50		16.10
A1	2.21	-	2.61	E1	13.10		13.5
A2	1.85	-	2.15	E3	1.30		1.60
b	1.07	-	1.33	e		5.44	
b2	1.90	-	2.16	L	19.62		20.22
b4	2.90	-	3.20	L1			4.30
c	0.52	-	0.68	R	1.85		2.15
D	20.70	-	21.30				
D1	16.25	-	16.85				
D3	0.53	-	0.83				

PART NO. SYSTEM :



Revision history

Document revision history

Date	Version	Changes
2024.05.24	A / 0	First release.