10-FY07LBA100S5-PG08J58T
datasheet

***flow*NPFC 1 SiC** | **650 V / 100 A**

Topology features

- Integrated DC capacitor
- Kelvin Emitter for improved switching performance
- Low inductive commutation loop
- Neutral Boost PFC
- Temperature sensor

Component features

- High speed and smooth switching
- Low gate charge
- Very low collector emitter saturation voltage

Housing features

- Base isolation: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

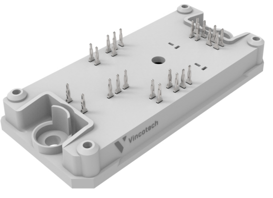
Target applications

- Charging Stations
- Energy Storage Systems
- UPS

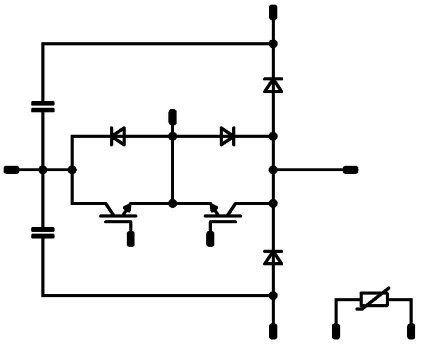
Types

- 10-FY07LBA100S5-PG08J58T

flow 1 12 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	85	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	128	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	73	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		273	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 110 °C	330	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	172	W
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	88	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	600	A
Surge current capability	I^2t			1800	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	103	W
Maximum junction temperature	T_{jmax}			150	°C
Capacitor (DC)					
Maximum DC voltage	V_{MAX}			630	V
Operation Temperature	T_{op}			-55 … 125	°C

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Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Module Properties					
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				8,01	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Values Min	Typ	Max	Unit
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,001	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 125 150		1,41 1,55 1,58	1,75[1]	V
Collector-emitter cut-off current	I_{CES}		0	650		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		6200		pF
Output capacitance	C_{oes}							176		pF
Reverse transfer capacitance	C_{res}							24		pF
Gate charge	Q_g	V_{CC} = 520 V	15		100	25		240		nC
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,74		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	-5/15	350	80	25 125 150		53,59 53,35 53,2		ns
Rise time	t_r					25 125 150		14,83 16,58 17,11		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		151,88 174,11 180,22		ns
Fall time	t_f					25 125 150		13,49 28,66 35		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,368 µC Q_{rFWD}=0,376 µC Q_{rFWD}=0,386 µC				25 125 150		0,598 0,655 0,671		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,819 1,32 1,46		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Diode										
Static										
Forward voltage	V_F				60	25 125 150		1,5 1,86 2,01	1,8[1]	V
Reverse leakage current	I_R	V_r = 1200 V				25		105	600	µA
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,55		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=5216 A/µs d*i*/d*t*=5064 A/µs d*i*/d*t*=4989 A/µs	-5/15	350	80	25 125 150		34,89 34,15 33,82		A
Reverse recovery time	t_{rr}					25 125 150		17,15 18,45 18,94		ns
Recovered charge	Q_r					25 125 150		0,368 0,376 0,386		µC
Reverse recovered energy	E_{rec}					25 125 150		0,06 0,061 0,063		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		5151,07 4561,2 4653,69		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Buck Diode										
Static										
Forward voltage	V_F				50	25 125 150		1,07 1 0,983	1,5(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			100 2	µA mA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,68		K/W
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		100		nF
Tolerance							-10		10	%
Dissipation factor		f = 1 kHz				25		2,5		%

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

(1) Value at chip level

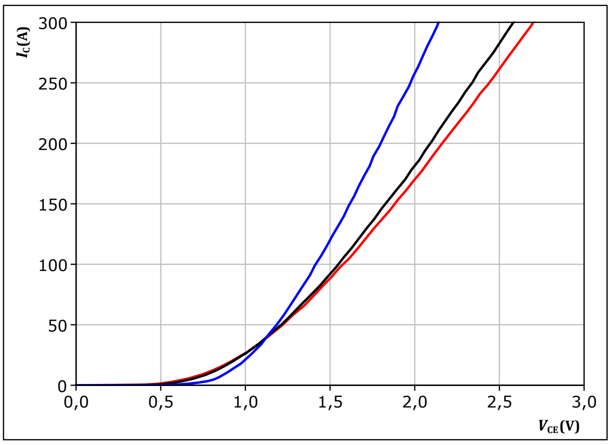
(2) Only valid with pre-applied Vincotech thermal interface material.

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

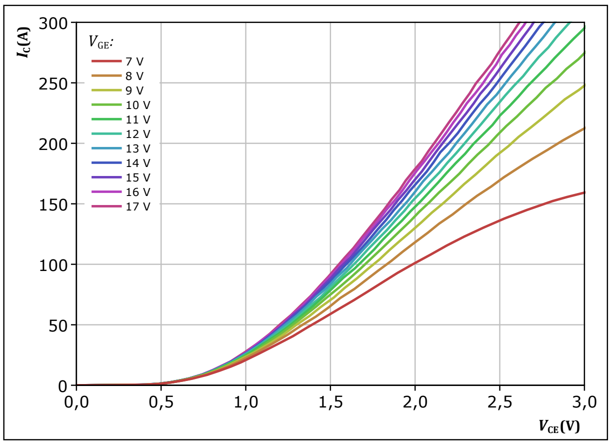


t_p =	250	μs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



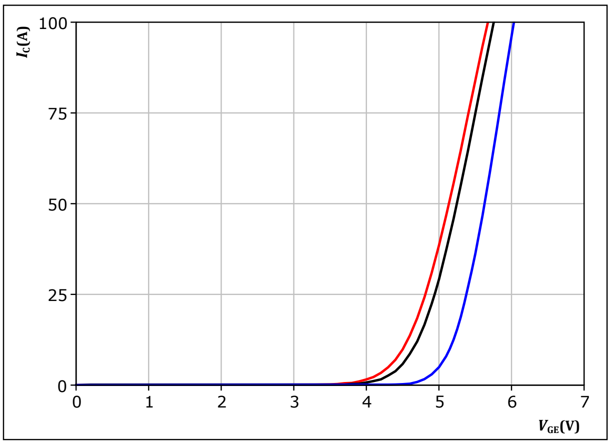
t_p =	250	μs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

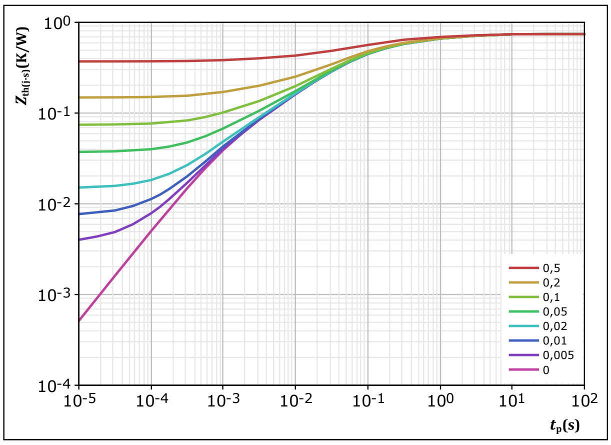


t_p =	250	μs		25 °C
V_{CE} =	38	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D =	t_p / T	
$R_{th(j-s)}$ =	0,742	K/W

IGBT thermal model values

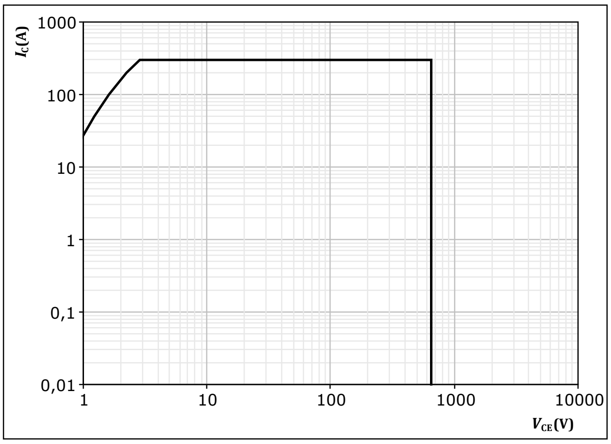
R (K/W)	τ (s)
8,10E-02	3,11E+00
1,65E-01	4,78E-01
3,32E-01	7,07E-02
1,23E-01	1,10E-02
4,07E-02	1,15E-03

Boost Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

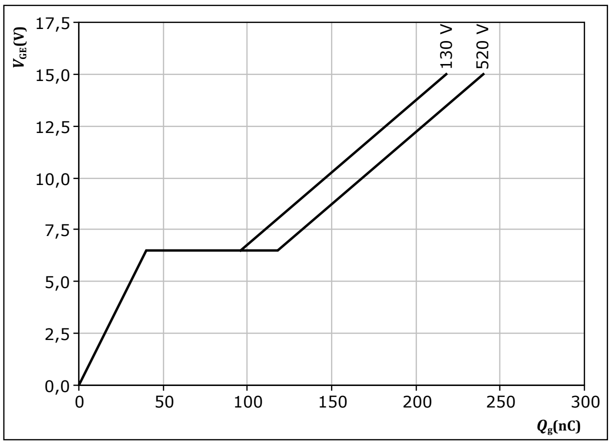


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



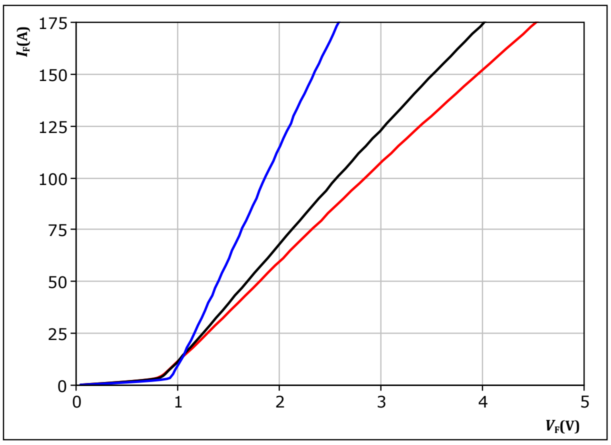
I_C =	50	A
T_j =	25	°C

Boost Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

I_F = f(V_F)



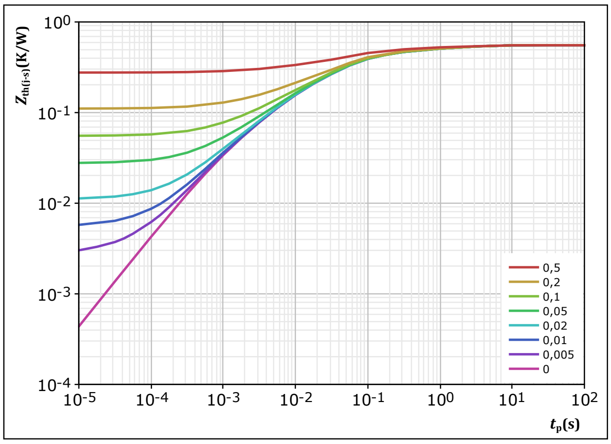
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 0,553 K/W

FWD thermal model values

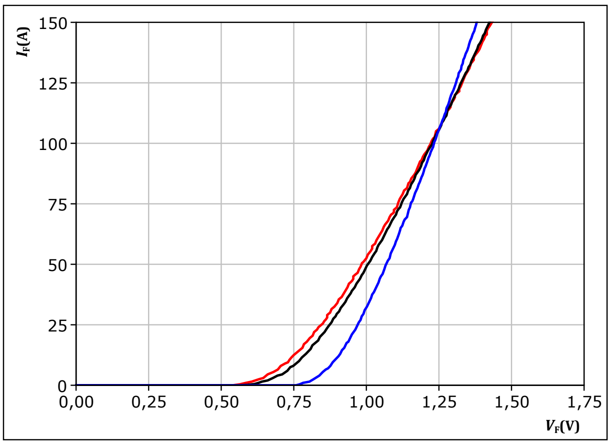
R (K/W)	τ (s)
7,04E-02	2,17E+00
1,22E-01	2,02E-01
2,51E-01	3,93E-02
9,18E-02	5,73E-03
1,84E-02	8,83E-04

Buck Diode Characteristics

figure 9. **Rectifier**

Typical forward characteristics

I_F = f(V_F)



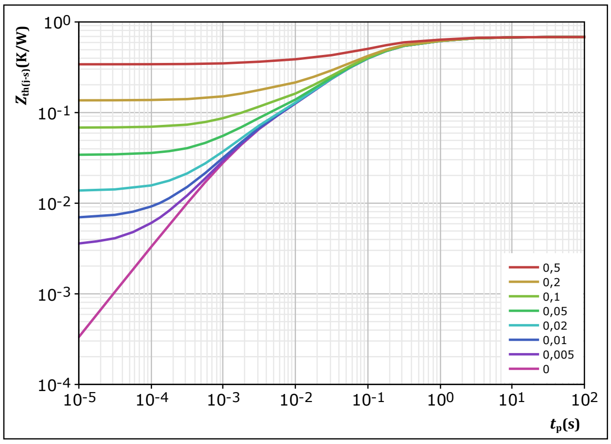
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 10. **Rectifier**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 0,682 K/W

Rectifier thermal model values

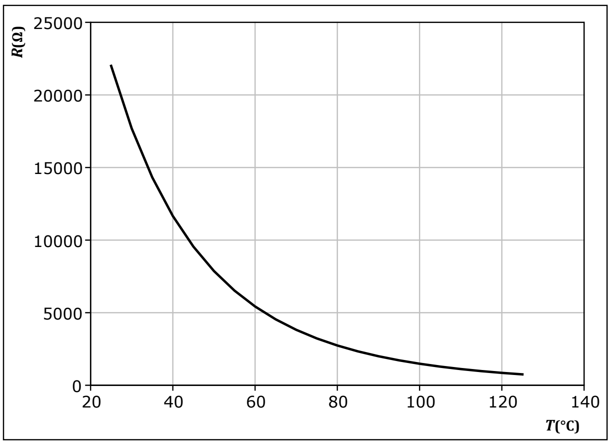
R (K/W)	τ (s)
2,22E-02	8,02E+00
1,33E-01	9,48E-01
3,46E-01	1,13E-01
1,30E-01	2,30E-02
5,02E-02	2,04E-03

Thermistor Characteristics

figure 11.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

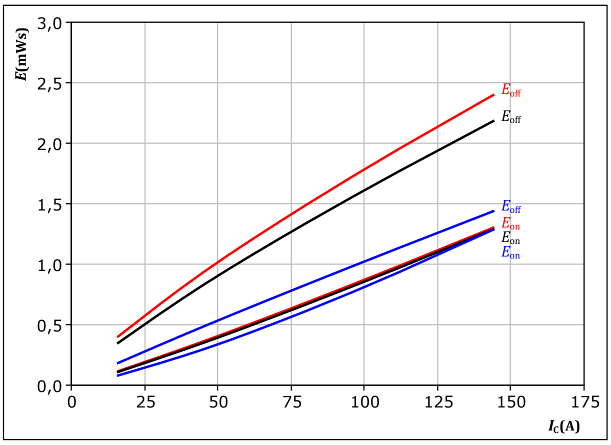


Boost Switching Characteristics

figure 12. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



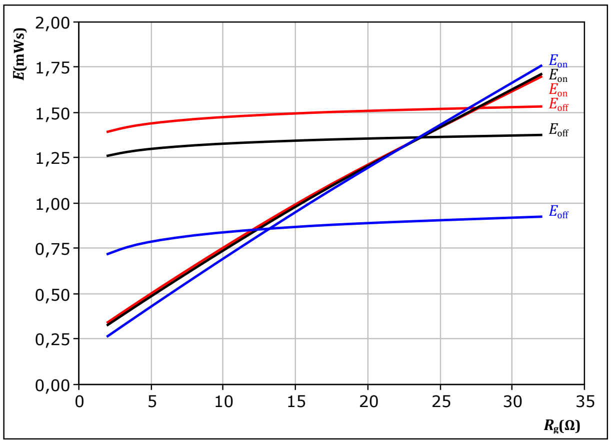
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
R_{gon} =	8	Ω		
R_{goff} =	8	Ω		

figure 13. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

$E = f(R_g)$



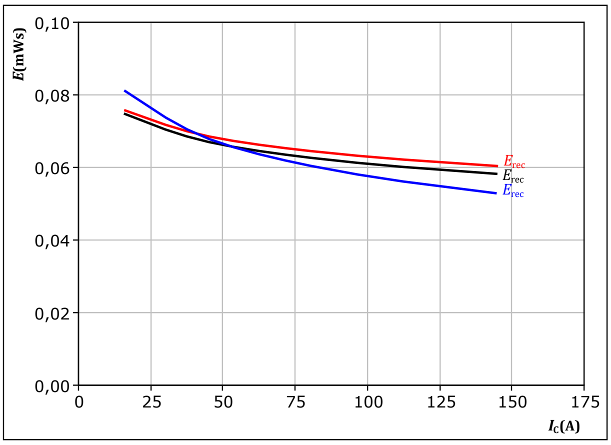
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
I_C =	80	A		

figure 14. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



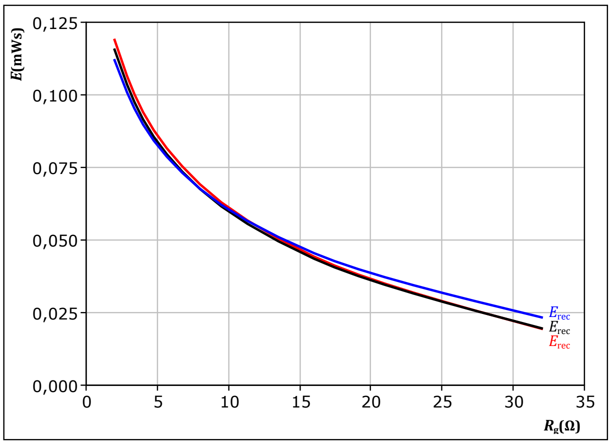
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
R_{gon} =	8	Ω		

figure 15. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

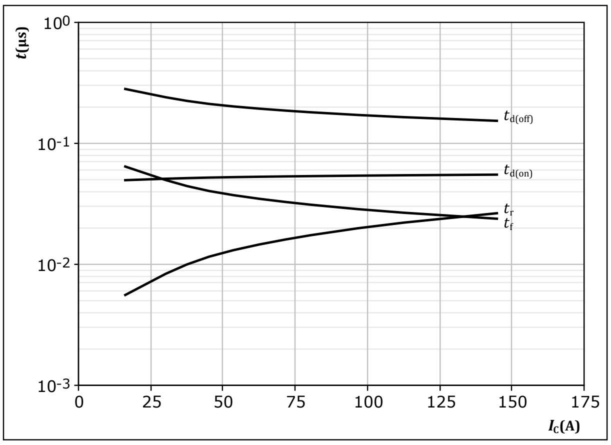
V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
I_C =	80	A		

Boost Switching Characteristics

figure 16. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



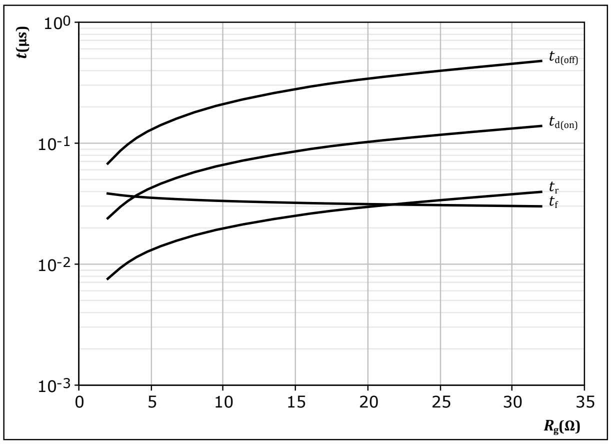
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 17. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

t = f(R_g)



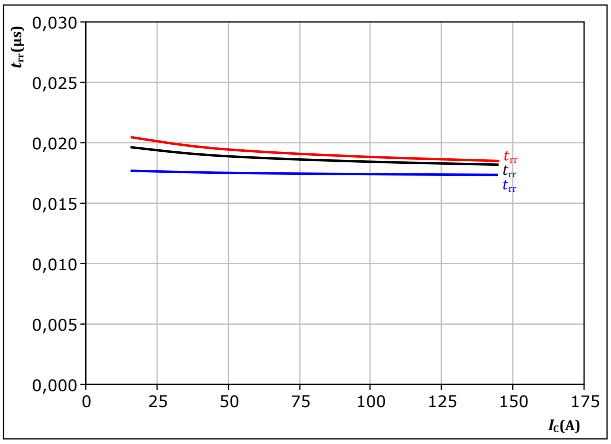
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
I_C =	80	A

figure 18. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

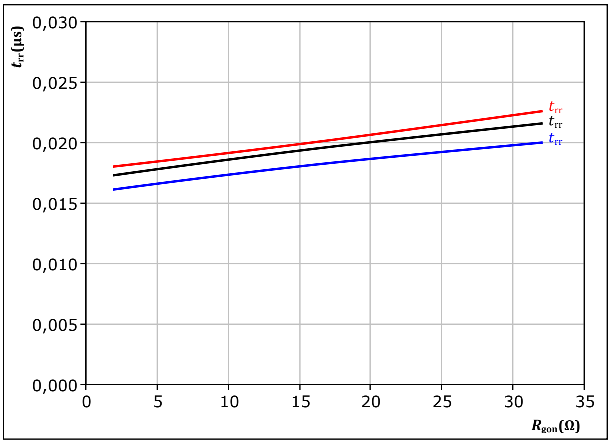
V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 19. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

t_{rr} = f(R_{gon})



With an inductive load at

V_{CE} =	350	V
V_{GE} =	-5/15	V
I_C =	80	A

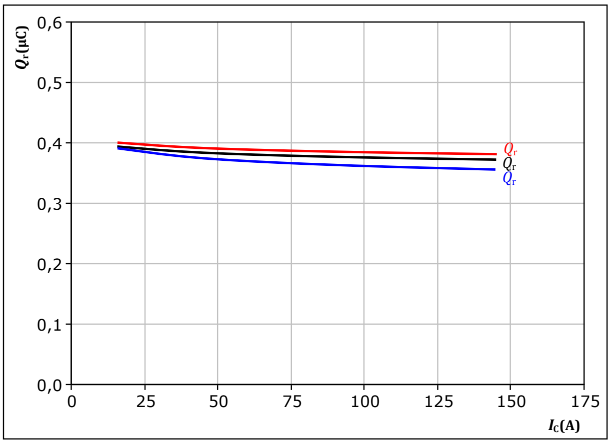
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 20. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



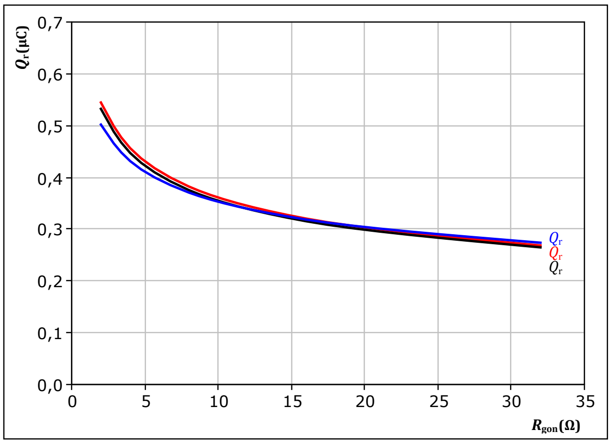
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
R_{gon} =	8	Ω		

figure 21. **FWD**

Typical recovered charge as a function of IGBT turn on gate resistor

Q_r = f(R_{gon})



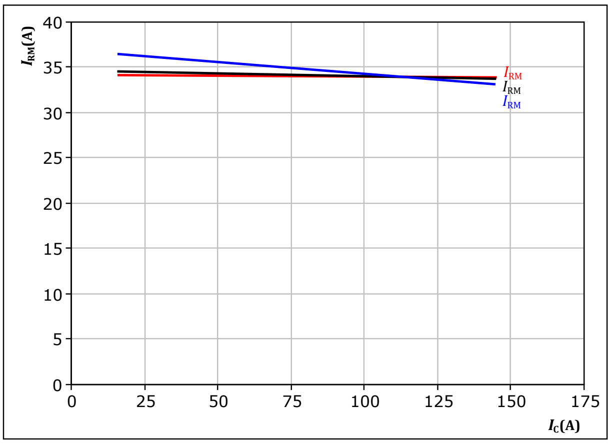
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
I_C =	80	A		

figure 22. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



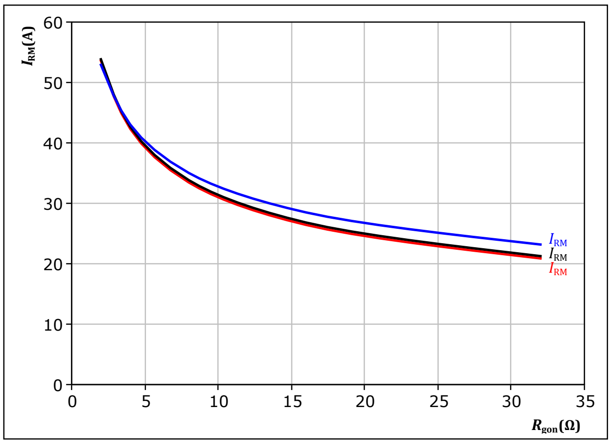
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
R_{gon} =	8	Ω		

figure 23. **FWD**

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

I_{RM} = f(R_{gon})



With an inductive load at

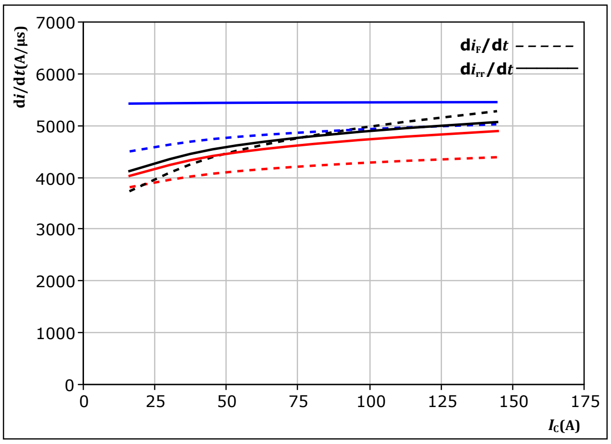
V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	-5/15	V		
I_C =	80	A		

Boost Switching Characteristics

figure 24. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

di_F/dt, di_{rr}/dt = f(I_C)



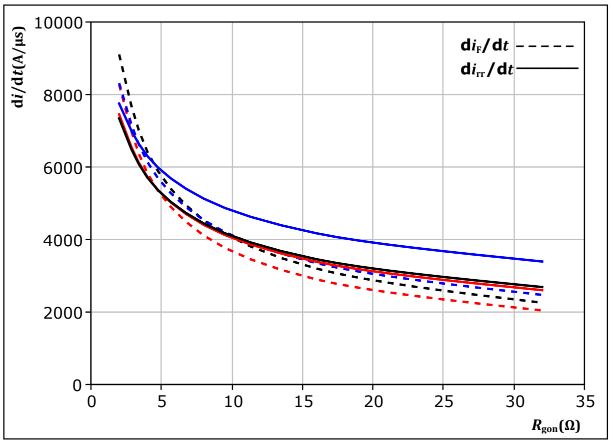
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 25. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

di_F/dt, di_{rr}/dt = f(R_{gon})



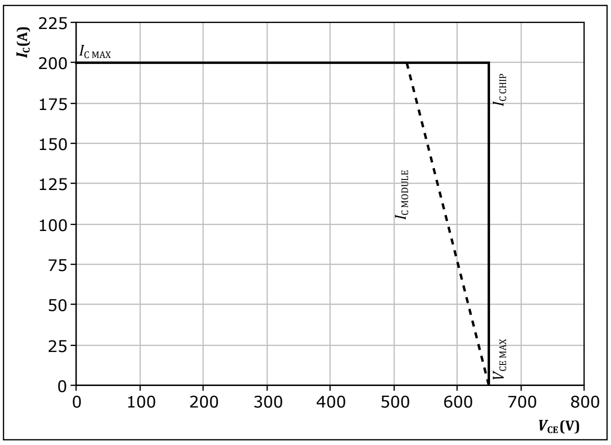
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	80	A		150 °C

figure 26. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At	T_j =	150	°C
	R_{gon} =	8	Ω
	R_{goff} =	8	Ω

Boost Switching Definitions

figure 27. **IGBT**

Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{tEoff} = **integrating time for** E_{off})

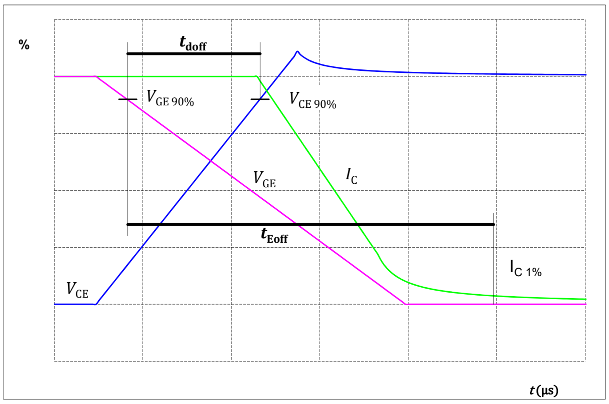


figure 28. **IGBT**

Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = **integrating time for** E_{on})

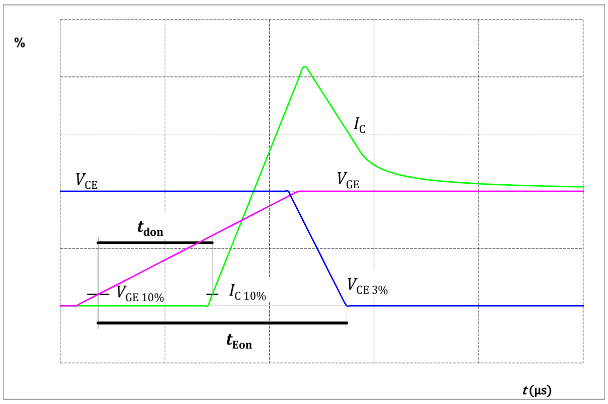


figure 29. **IGBT**

Turn-off Switching Waveforms & definition of t_f

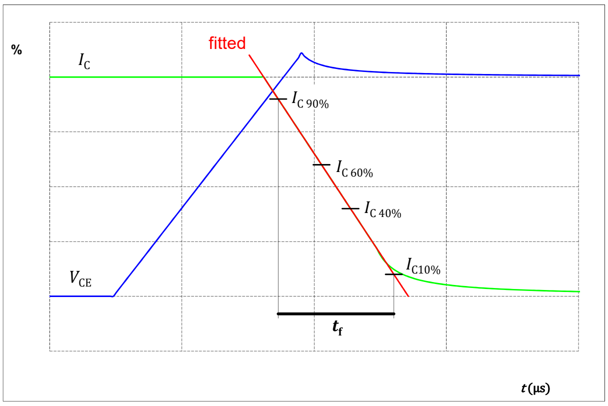
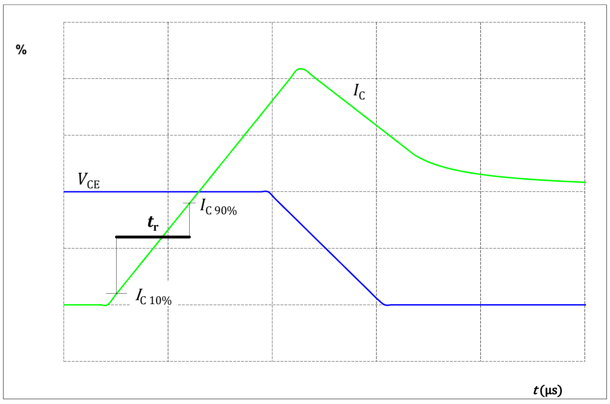


figure 30. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Boost Switching Definitions

figure 31.	FWD

Turn-off Switching Waveforms & definition of t_{rr}

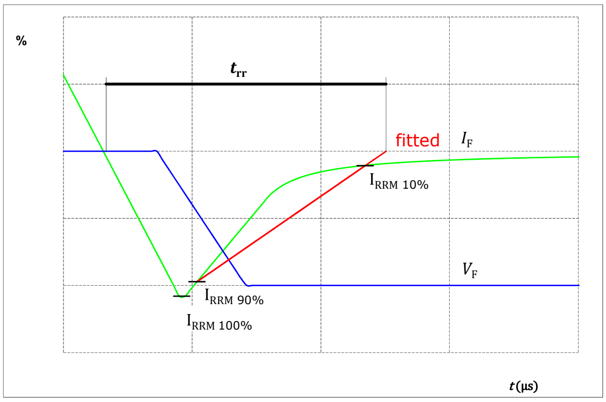
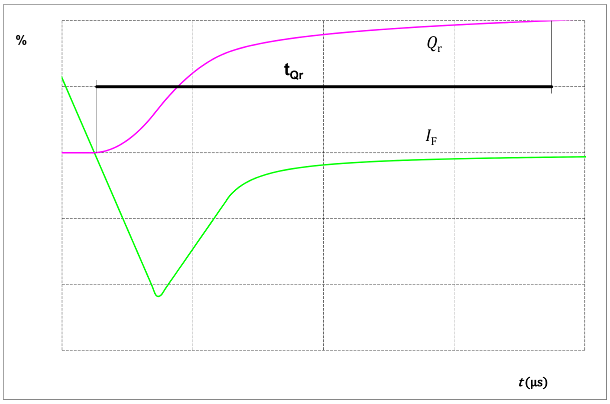


figure 32.	FWD

Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



Vincotech

10-FY07LBA100S5-PG08J58T
datasheet

Ordering Code

Version	Ordering Code
Without thermal paste	10-FY07LBA100S5-PG08J58T
With thermal paste (5,2 W/mK, PTM6000HV)	10-FY07LBA100S5-PG08J58T-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-FY07LBA100S5-PG08J58T-/3/

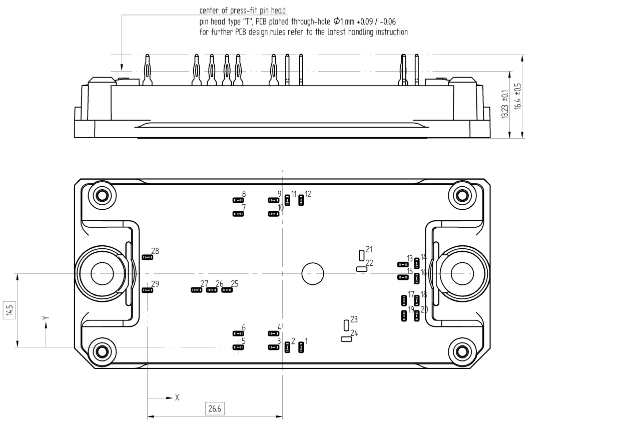
Marking

	**Text**	**Name**		**Date code**	**UL & VIN**	**Lot**	**Serial**
		NN-NNNNNNNNNNNNNNN-TTTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

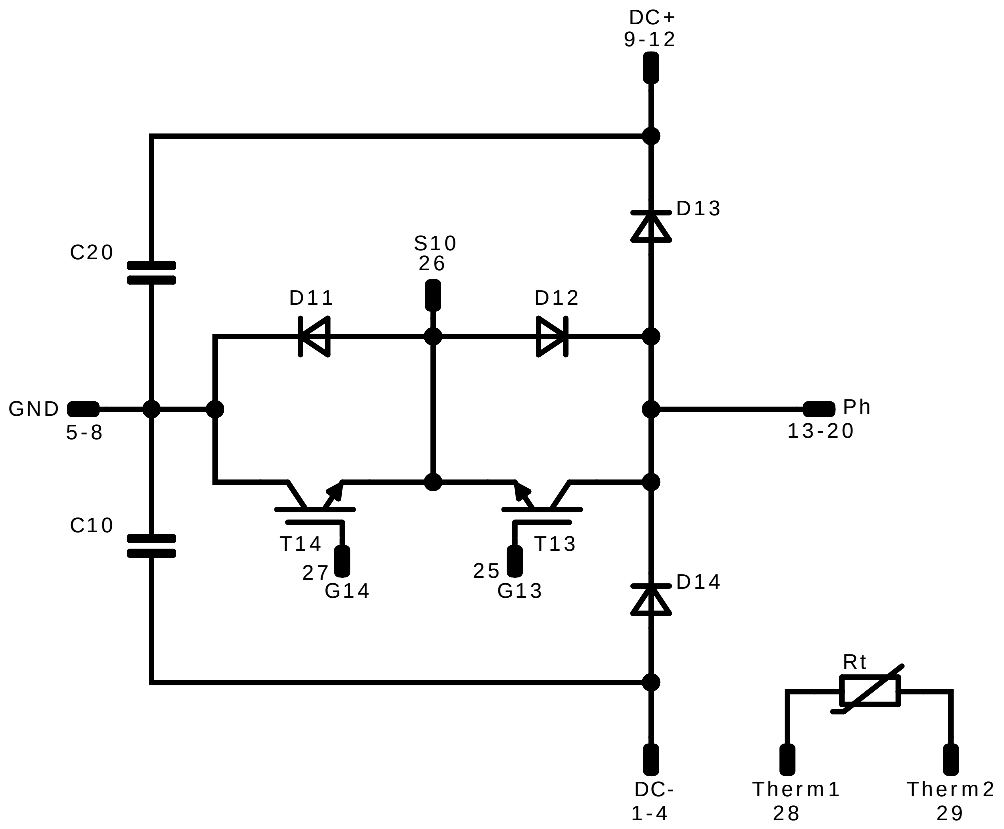
Outline

Pin	X	Y	Function
1	30,3	0	DC-
2	27,6	0	DC-
3	24,9	0	DC-
4	24,9	2,7	DC-
5	17,9	0	GND
6	17,9	2,7	GND
7	17,9	26,3	GND
8	17,9	29	GND
9	24,9	29	DC+
10	24,9	26,3	DC+
11	27,6	29	DC+
12	30,3	29	DC+
13	50,4	16,3	Ph
14	53,1	16,55	Ph
15	50,4	13,8	Ph
16	53,1	13,55	Ph
17	50,6	9,2	Ph
18	53,1	9,2	Ph
19	50,6	6,2	Ph
20	53,1	6,2	Ph
21	not assembled		
22	not assembled		
23	not assembled		
24	not assembled		
25	15,7	11,3	G13
26	12,7	11,3	S134
27	9,7	11,3	G14
28	0	17,75	Therm2
29	0	11,25	Therm2

Pin table [mm]



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
D11, D12	Rectifier	1600 V	50 A	Buck Diode	
T13, T14	IGBT	650 V	100 A	Boost Switch	
D13, D14	FWD	1200 V	60 A	Boost Diode	
C10, C20	Capacitor	630 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-FY07LBA100S5-PG08J58T-D1-14	8 Oct. 2023		

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.