



flowANPC 2 split

1200 V / 450 A

Topology features

- Temperature sensor
- Advanced Neutral Point Clamped topology
- Split output for improved switching performance
- Split topology

Component features

- Easy paralleling
- High speed switching
- Low switching losses

Housing features

- Base isolation: Al_2O_3
- Convex shaped baseplate for superior thermal contact
- Cu baseplate
- Thermo-mechanical push-and-pull force relief
- Solder pin

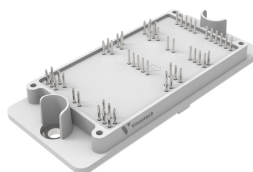
Target applications

- Energy Storage Systems
- Power Supply
- Solar Inverters

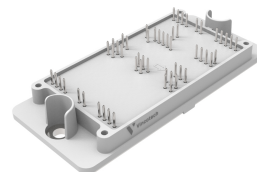
Types

- 30-FT12NAB450SH01-PC10F08
- 30-FT12NAC450SH01-PC20F08

flow 2 12 mm housing

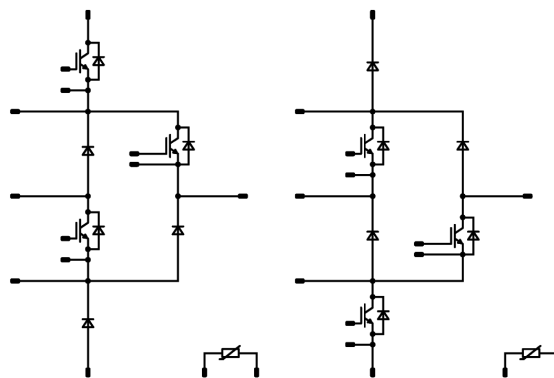


PC10F08



PC20F08

Schematic



PC10F08

PC20F08



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
AC Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	339	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	1350	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	728	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	I_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	10	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

AC Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	218	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	890	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 110\text{ °C}$	1290	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	377	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

AC Switch Prot. Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	69	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	340	A
Surge current capability	I^2t		580	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	167	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
-----------	--------	------------	-------	------

Neutral Point Switch

Collector-emitter voltage	V_{CES}		950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	319	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	370	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C

DC-Link Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	185	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	290	W
Maximum junction temperature	T_{jmax}		175	°C

Neutral Point Switch Prot. Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	32	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	170	A
Surge current capability	I^2t		145	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	77	W
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
DC-Link Switch				
Collector-emitter voltage	V_{CES}		950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	319	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	370	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C

Neutral Point Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	185	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	290	W
Maximum junction temperature	T_{jmax}		175	°C

DC-Link Switch Prot. Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	64	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	112	W
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, 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* $t_p = 2\text{ s}$	6800	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
 datasheet

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	

AC Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0156	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		450	25 125 150	1,78	2,04 2,36 2,45	2,42 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			6	µA
Gate-emitter leakage current	I_{GES}		20	0		25			720	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	$f = 1 \text{ Mhz}$	0	25		25		26400		pF
Reverse transfer capacitance	C_{res}							1410		pF
Gate charge	Q_g		15		0	25		3420		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,13		K/W
--	---------------	---	--	--	--	--	--	------	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	± 15	600	400	25 125 150		83,41 84,26 84,9		ns
Rise time	t_r					25 125 150		33,77 35,92 36,76		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		185,64 255,17 272,52		ns
Fall time	t_f					25 125 150		41,98 91,34 101,74		ns
Turn-on energy (per pulse)	E_{on}					25 125 150		10,26 11,9 13,45		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		18,13 31,5 35,64		mWs



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
 datasheet

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	

AC Diode

Static

Forward voltage	V_F				200	25 125 150		1,38 1,56 1,64	2 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25		50	5000	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,25		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RM}	$di/dt=8311$ A/µs $di/dt=7174$ A/µs $di/dt=9243$ A/µs	± 15	600	400	25 125 150		73,49 73,2 72,62		A
Reverse recovery time	t_{rr}					25 125 150		19,35 19,94 19,75		ns
Recovered charge	Q_r					25 125 150		0,876 0,885 0,869		µC
Reverse recovered energy	E_{rec}					25 125 150		0,2 0,202 0,196		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		10038,91 10159,84 10672,29		A/µs



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
 datasheet

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	

AC Switch Prot. Diode

Static

Forward voltage	V_F				70	25 125 150		2,28 2,41 2,37	2,62 ⁽¹⁾ 2,62 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1200$ V				25 150		5400	120 11000	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,57		K/W
--	---------------	------------------------------------	--	--	--	--	--	------	--	-----

Neutral Point Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0065	25	4,15	4,85	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		400	25 125 150		1,21 1,23 1,24	1,4 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	950		25			8	μA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,75		Ω
Input capacitance	C_{ies}	$f = 100 \text{ kHz}$	0	25		25		49200		pF
Output capacitance	C_{oes}							530		pF
Reverse transfer capacitance	C_{res}							220		pF
Gate charge	Q_g		±15		0	25		4100		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,26		K/W
--	---------------	------------------------------------	--	--	--	--	--	------	--	-----



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
 datasheet

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	

DC-Link Diode

Static

Forward voltage	V_F				300	25 125 150		1,8 1,9 1,9	2,1 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			80	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,33		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

Neutral Point Switch Prot. Diode

Static

Forward voltage	V_F				35	25 125 150		2,28 2,41 2,37	2,62 ⁽¹⁾ 2,62 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25 150			60 5500	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,24		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
 datasheet

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	

DC-Link Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0065	25	4,15	4,85	5,65	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		400	25 125 150		1,21 1,23 1,24	1,4 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	950		25			8	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,75		Ω
Input capacitance	C_{ies}	$f = 100$ kHz	0	25		25		49200		pF
Output capacitance	C_{oes}							530		pF
Reverse transfer capacitance	C_{res}							220		pF
Gate charge	Q_g		±15		0	25		4100		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,26		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

Neutral Point Diode

Static

Forward voltage	V_F				300	25 125 150		1,8 1,9 1,9	2,1 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			80	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,33		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
 datasheet

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	

DC-Link Switch Prot. Diode

Static

Forward voltage	V_F				75	25 125 150		1,74 1,83 1,84	2,15 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1200$ V				25			55	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,85		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

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.



Vincotech

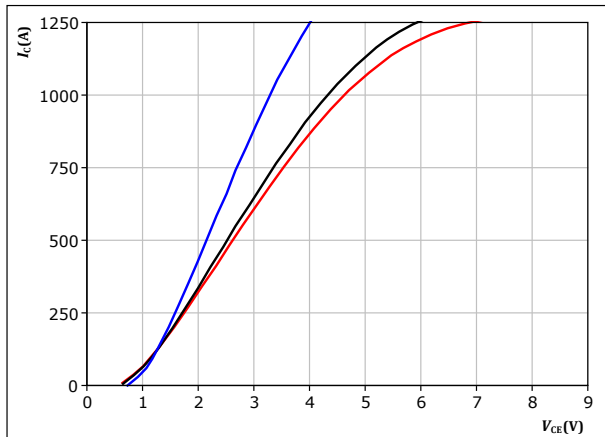
30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

AC Switch Characteristics

figure 1. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

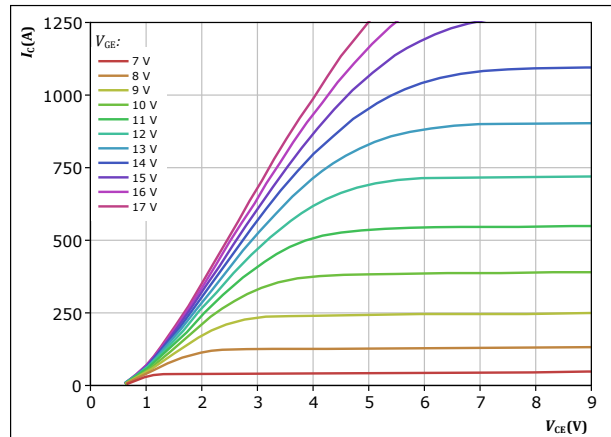


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 2. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

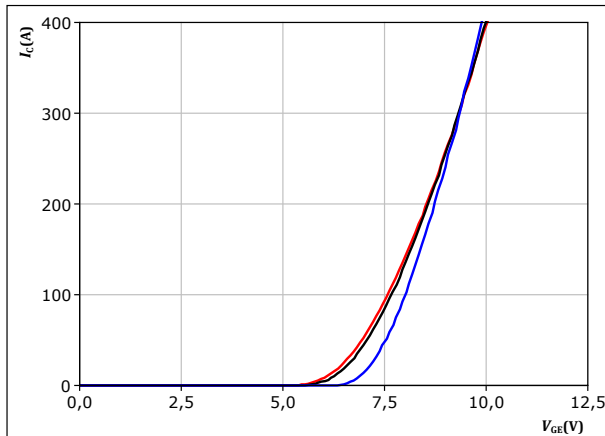


$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ\text{C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

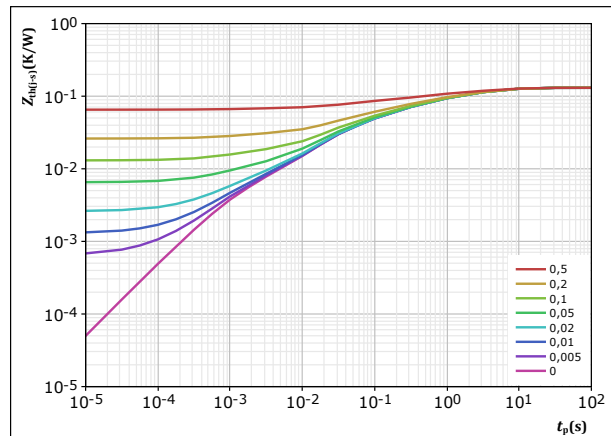


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,13 \text{ K/W}$
IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
2,07E-02	5,80E+00
3,48E-02	1,59E+00
4,09E-02	2,46E-01
2,96E-02	2,87E-02
4,41E-03	1,15E-03



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

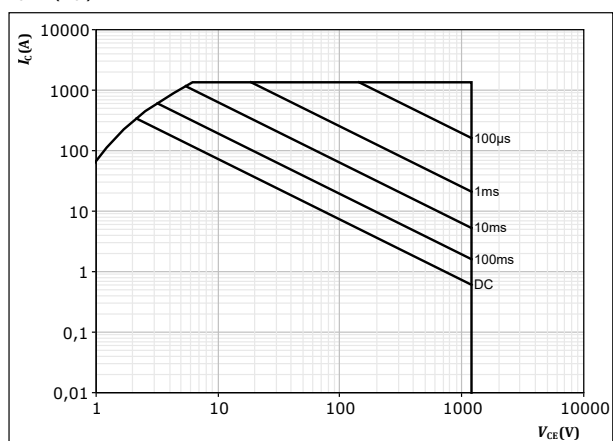
AC Switch Characteristics

figure 5.

IGBT

Safe operating area

$I_C = f(V_{CE})$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GE} = 15 \text{ V}$

$T_j = T_{jmax}$



Vincotech

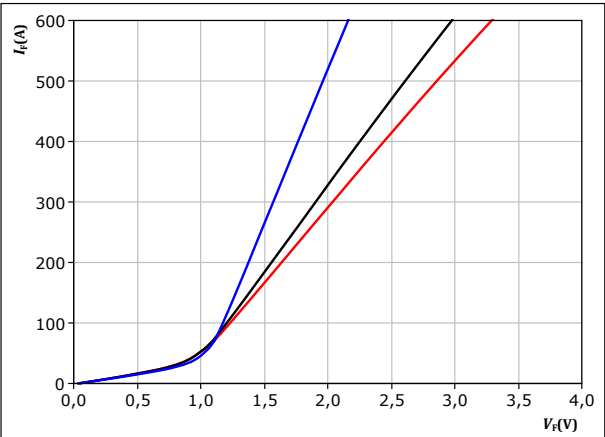
30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

AC Diode Characteristics

figure 6. FWD

Typical forward characteristics

$I_F = f(V_F)$



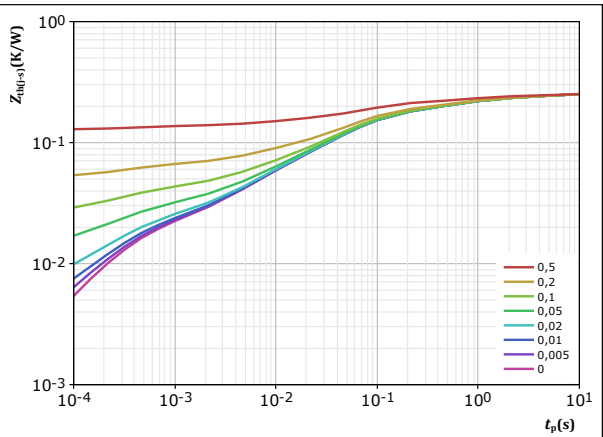
$t_p = 250 \mu s$

T_j : 25 °C, 125 °C, 150 °C

figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)} = 0,252 \text{ K/W}$

FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
3,21E-02	4,54E+00
6,17E-02	5,12E-01
1,18E-01	5,55E-02
2,67E-02	6,14E-03
1,68E-02	3,01E-04



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

AC Switch Prot. Diode Characteristics

figure 8. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

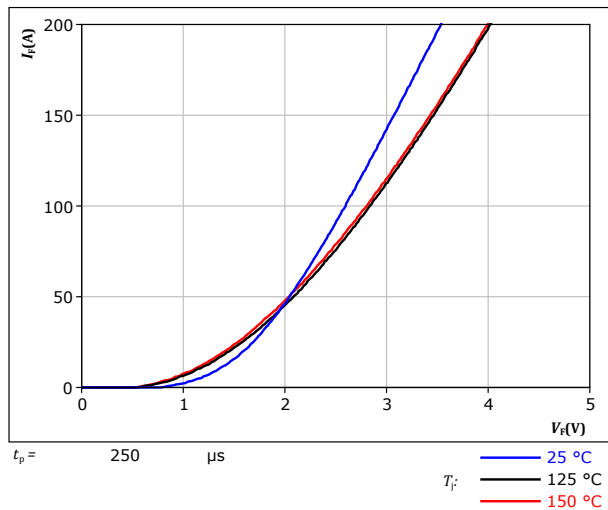
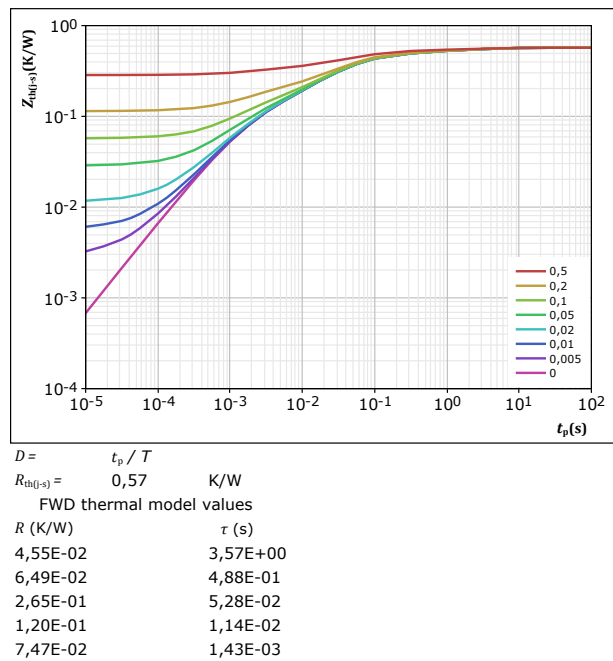


figure 9. FWD

Transient thermal impedance as a function of pulse width

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





Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

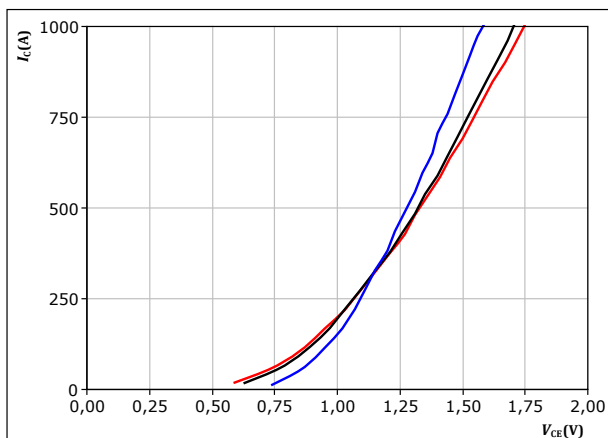
Neutral Point Switch Characteristics

figure 10.

IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$



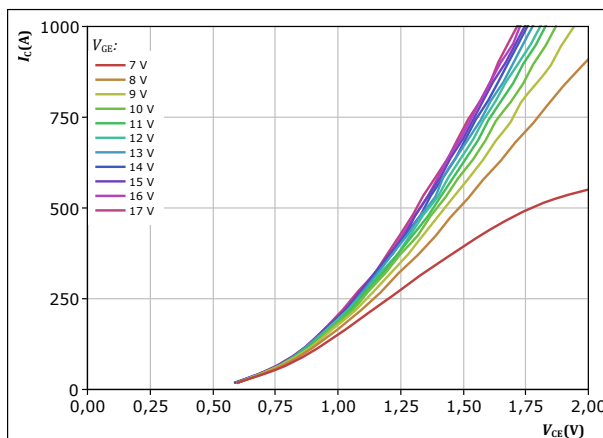
$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 11.

IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$



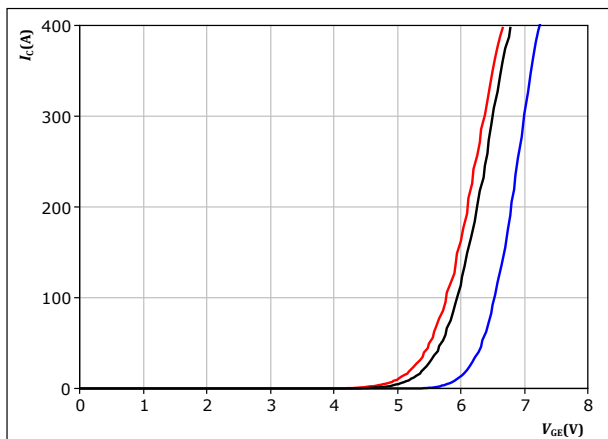
$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 12.

IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$



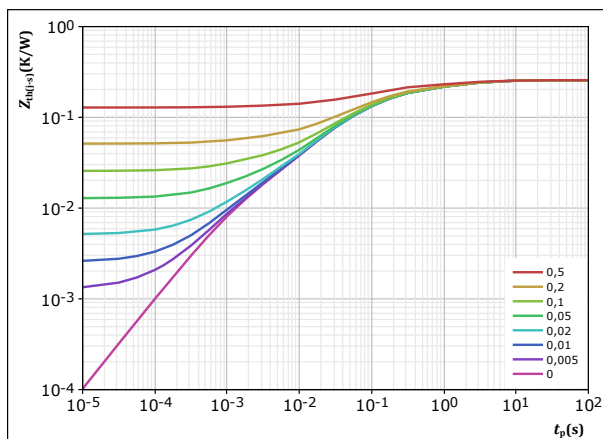
$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 13.

IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,257 K/W$
IGBT thermal model values

$R (K/W)$	$\tau (s)$
2,93E-02	4,18E+00
5,77E-02	7,66E-01
1,16E-01	1,04E-01
4,50E-02	1,97E-02
8,75E-03	1,30E-03



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

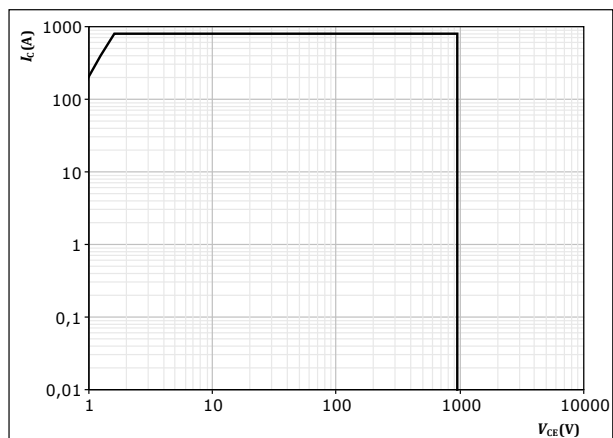
Neutral Point Switch Characteristics

figure 14.

IGBT

Safe operating area

$I_C = f(V_{CE})$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GE} = 15 \text{ V}$

$T_j = T_{jmax}$



DC-Link Diode Characteristics

figure 15. FWD

Typical forward characteristics

$I_F = f(V_F)$

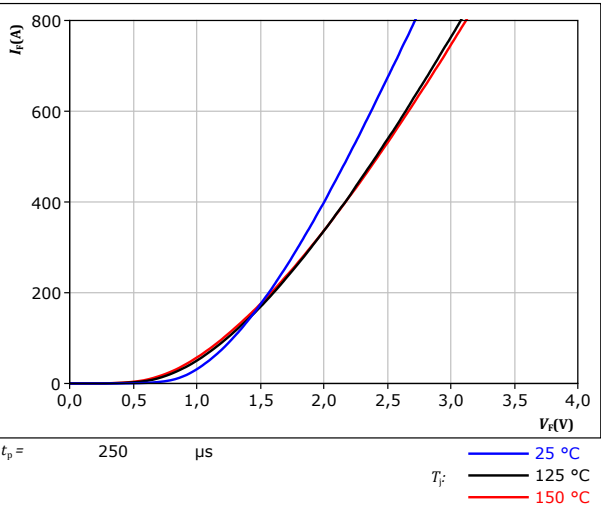
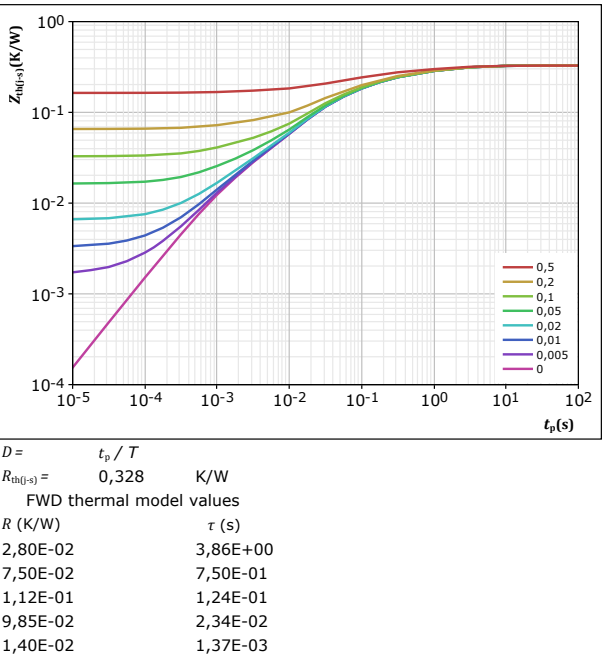


figure 16. FWD

Transient thermal impedance as a function of pulse width

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





Vincotech

Neutral Point Switch Prot. Diode Characteristics

figure 17. FWD

Typical forward characteristics
 $I_F = f(V_F)$

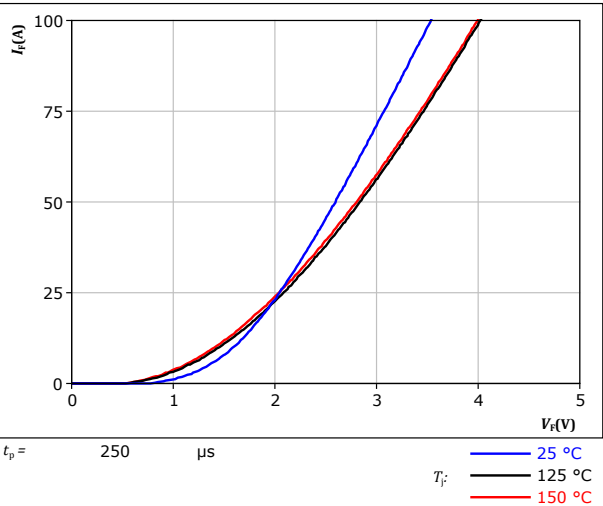
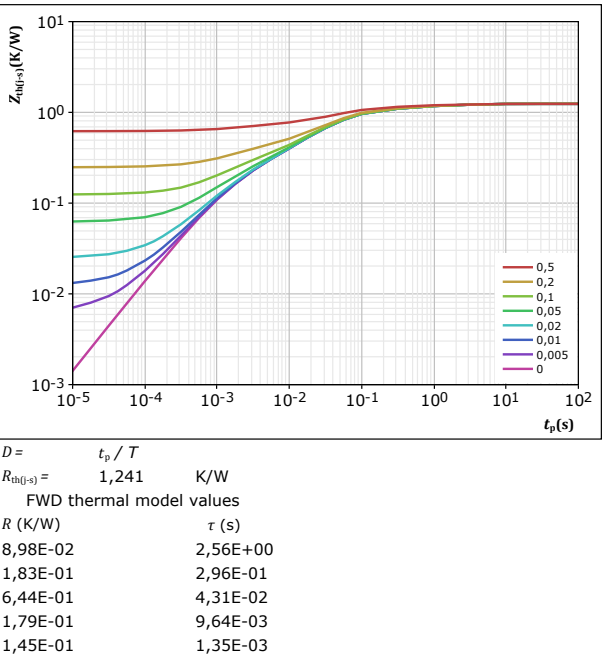


figure 18. FWD

Transient thermal impedance as a function of pulse width
 $Z_{th(j-s)} = f(t_p)$



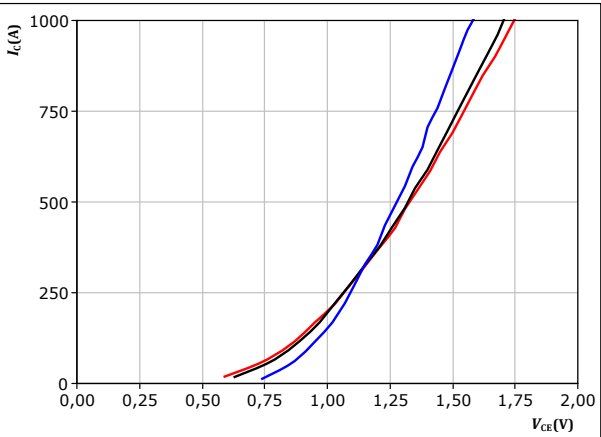


DC-Link Switch Characteristics

figure 19. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

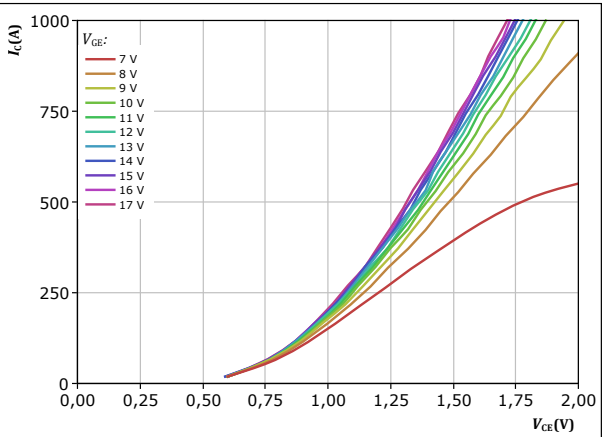


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 20. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

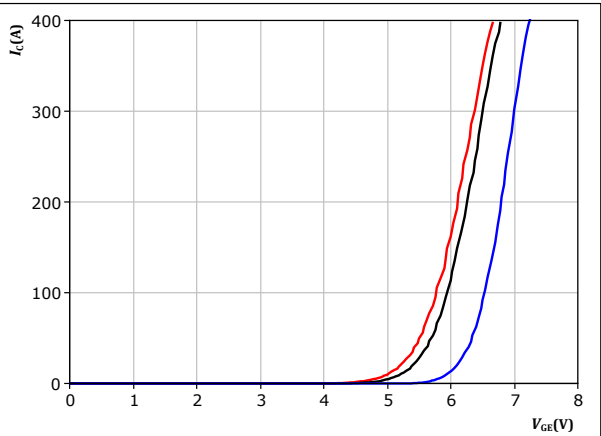


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 21. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

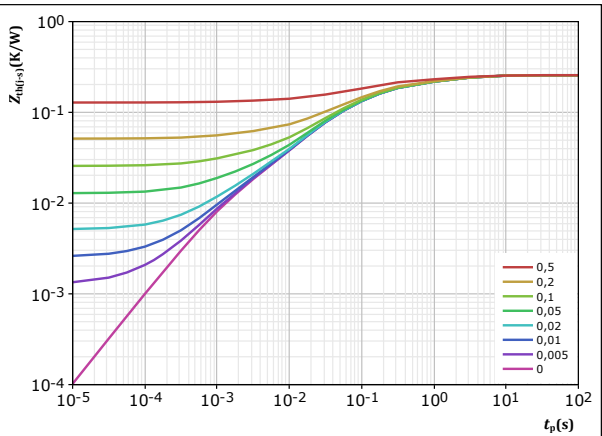


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 22. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,257 K/W$
IGBT thermal model values

$R (K/W)$	$\tau (s)$
2,93E-02	4,18E+00
5,77E-02	7,66E-01
1,16E-01	1,04E-01
4,50E-02	1,97E-02
8,75E-03	1,30E-03



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

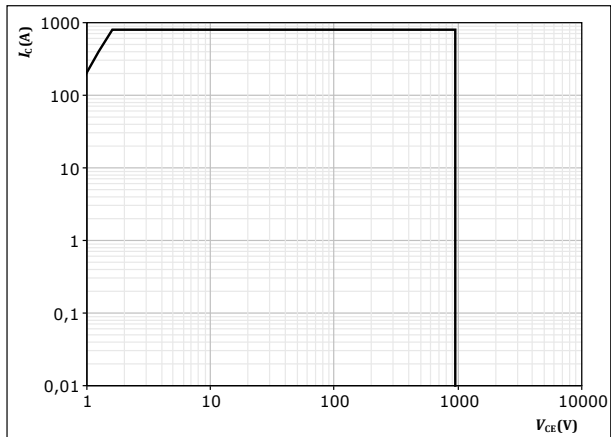
DC-Link Switch Characteristics

figure 23.

IGBT

Safe operating area

$I_C = f(V_{CE})$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GE} = 15 \text{ V}$

$T_j = T_{jmax}$

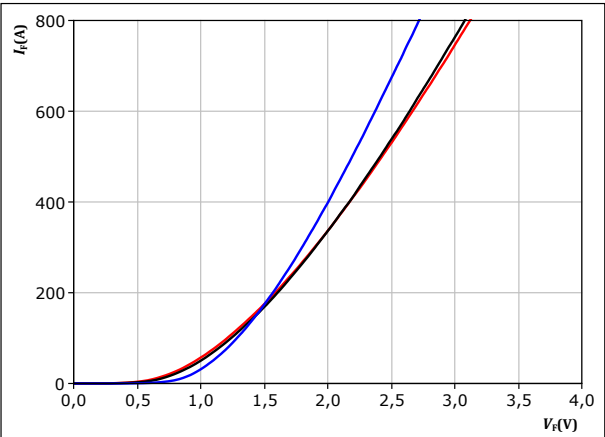


Neutral Point Diode Characteristics

figure 24. FWD

Typical forward characteristics

$I_F = f(V_F)$



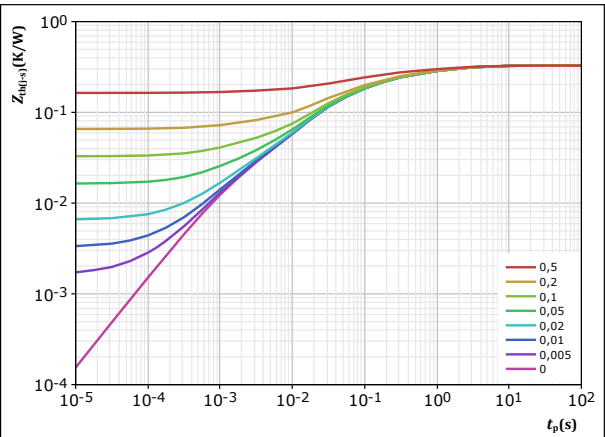
$t_p = 250 \mu s$

T_j : 25 °C, 125 °C, 150 °C

figure 25. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)} = 0,328 \text{ K/W}$

FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
2,80E-02	3,86E+00
7,50E-02	7,50E-01
1,12E-01	1,24E-01
9,85E-02	2,34E-02
1,40E-02	1,37E-03



DC-Link Switch Prot. Diode Characteristics

figure 26. FWD

Typical forward characteristics
 $I_F = f(V_F)$

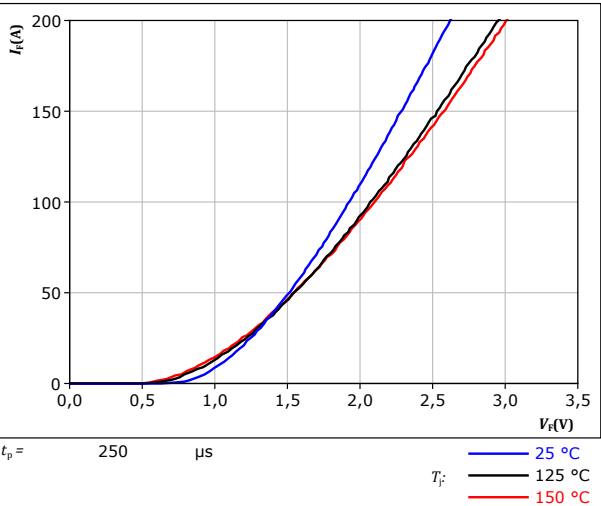
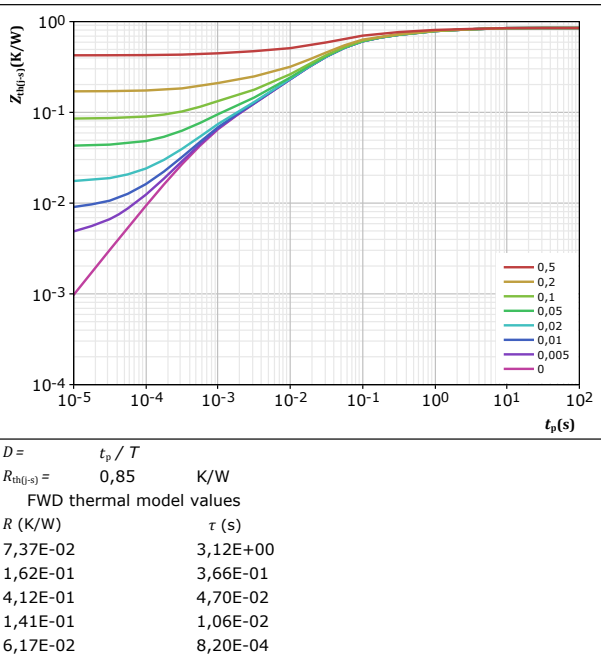


figure 27. FWD

Transient thermal impedance as a function of pulse width
 $Z_{th(j-s)} = f(t_p)$





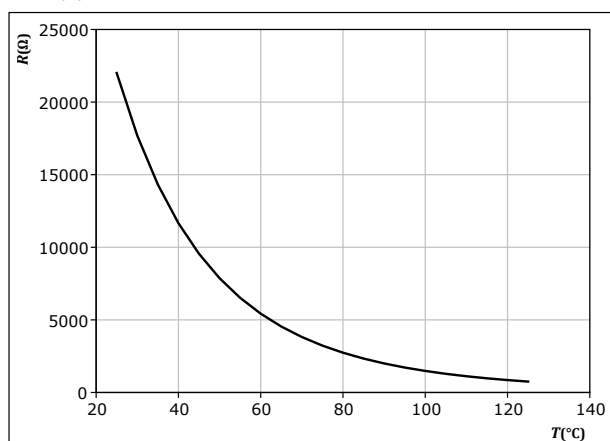
Thermistor Characteristics

figure 28.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

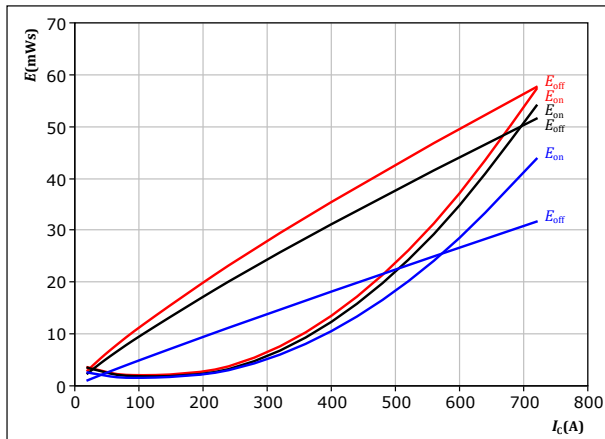
AC Switching Characteristics

figure 29.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$
 $R_{goff} = 2 \text{ } \Omega$

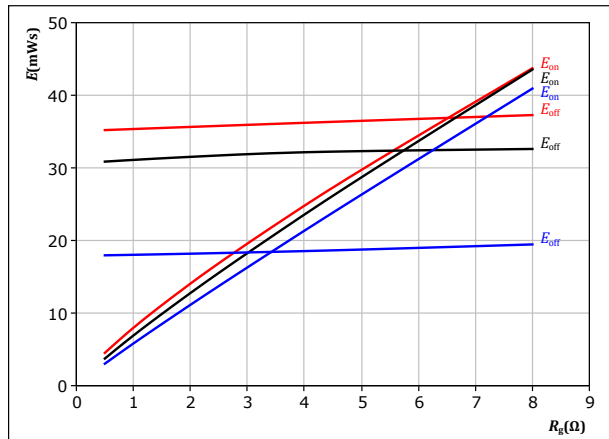
T_j : 25 °C
125 °C
150 °C

figure 30.

IGBT

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

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 400 \text{ A}$

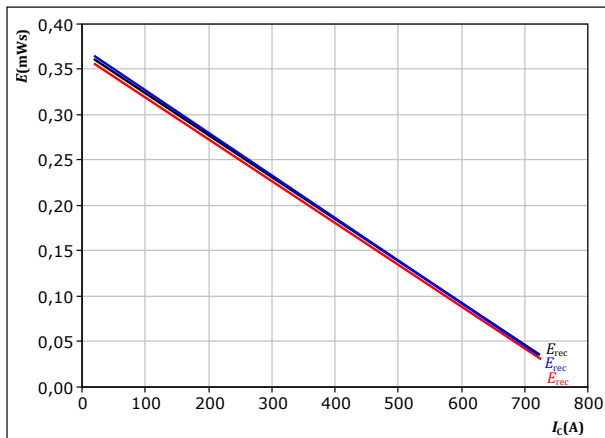
T_j : 25 °C
125 °C
150 °C

figure 31.

FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$

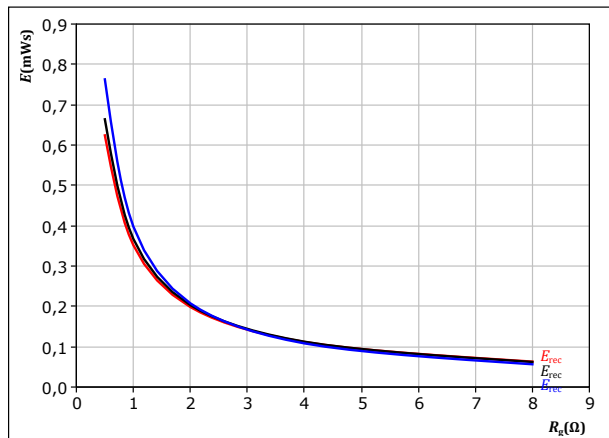
T_j : 25 °C
125 °C
150 °C

figure 32.

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

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 400 \text{ A}$

T_j : 25 °C
125 °C
150 °C



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

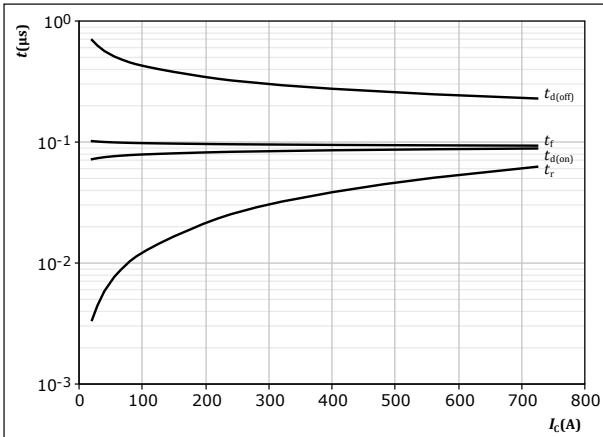
AC Switching Characteristics

figure 33.

IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



With an inductive load at

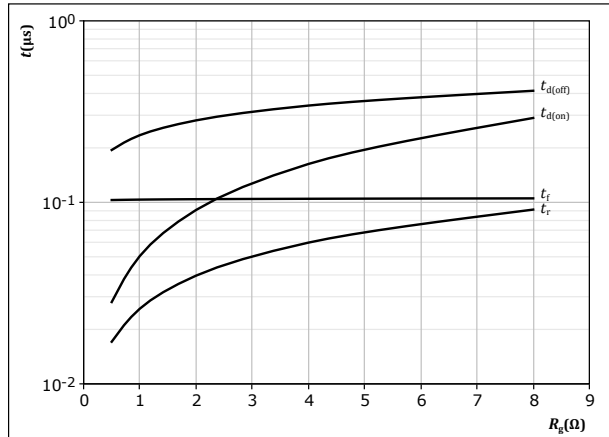
$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

figure 34.

IGBT

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

$$t = f(R_g)$$



With an inductive load at

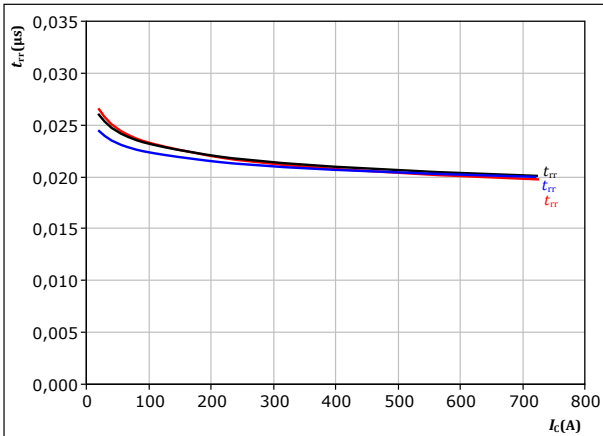
$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 400$ A

figure 35.

FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$



With an inductive load at

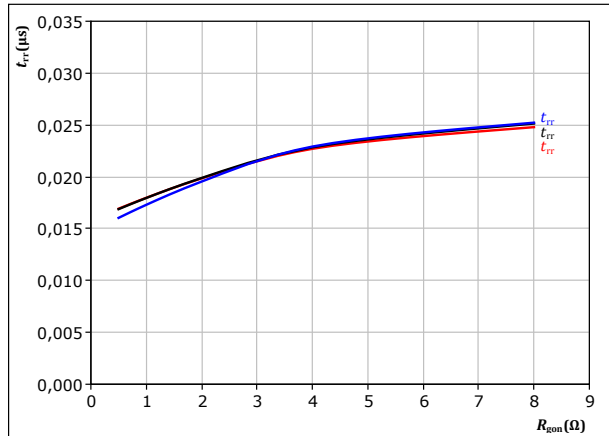
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $T_j: 25$ °C (blue), 125 °C (black), 150 °C (red)

figure 36.

FWD

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

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 400$ A
 $T_j: 25$ °C (blue), 125 °C (black), 150 °C (red)



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

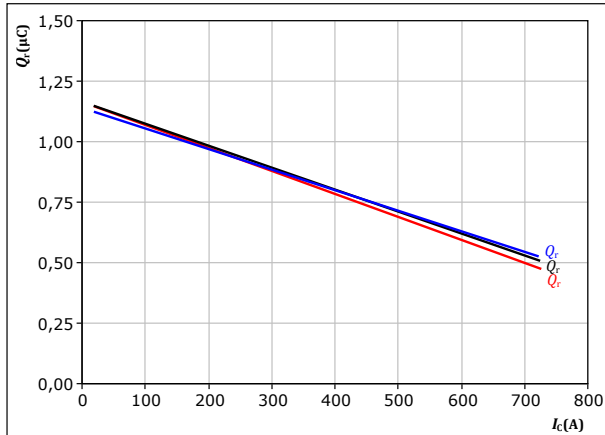
AC Switching Characteristics

figure 37.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

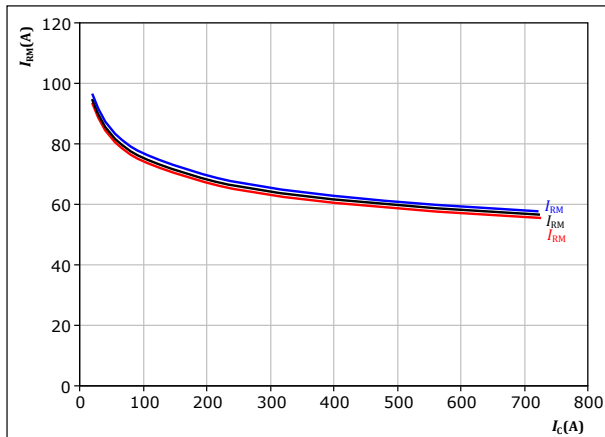
T_j : 25 °C
125 °C
150 °C

figure 39.

FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

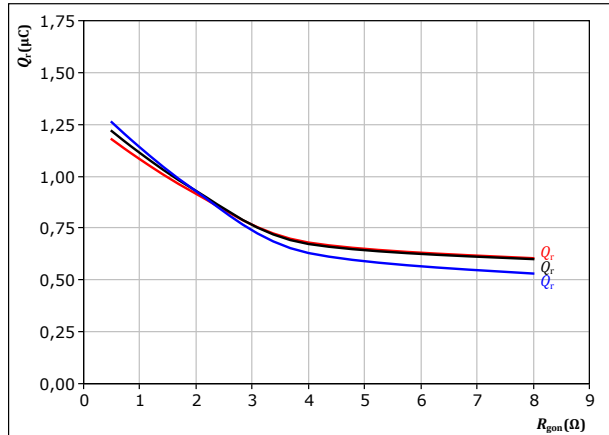
T_j : 25 °C
125 °C
150 °C

figure 38.

FWD

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

$$Q_r = f(R_{gon})$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 400$ A

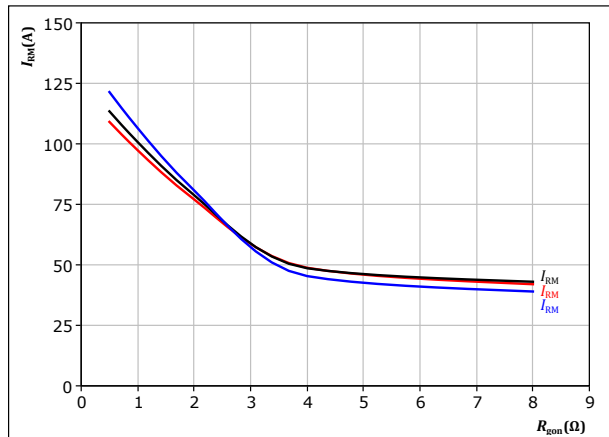
T_j : 25 °C
125 °C
150 °C

figure 40.

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 400$ A

T_j : 25 °C
125 °C
150 °C



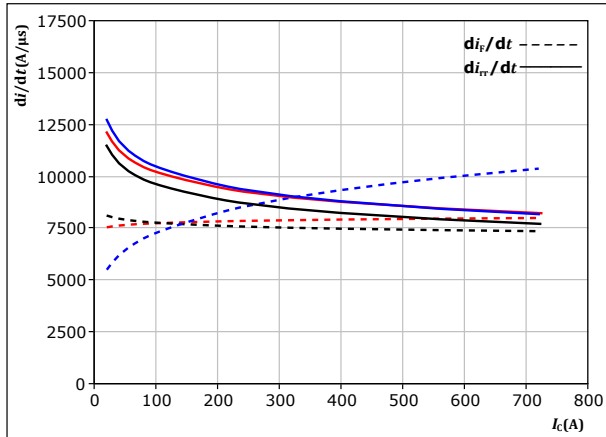
Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
 datasheet

AC Switching Characteristics

figure 41. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_r/dt = f(I_C)$



With an inductive load at

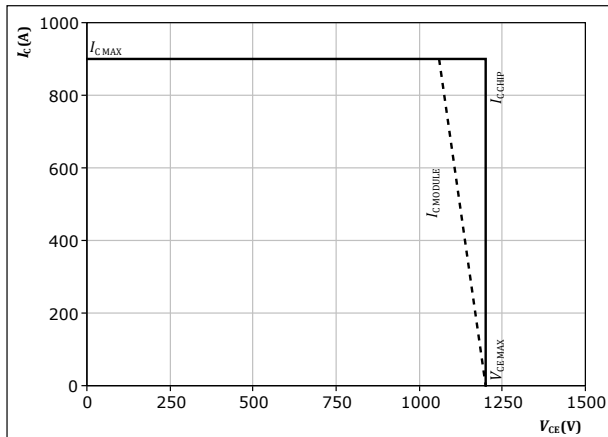
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$

$T_j = 25 \text{ } ^\circ\text{C}$
 $125 \text{ } ^\circ\text{C}$
 $150 \text{ } ^\circ\text{C}$

figure 43. IGBT

Reverse bias safe operating area

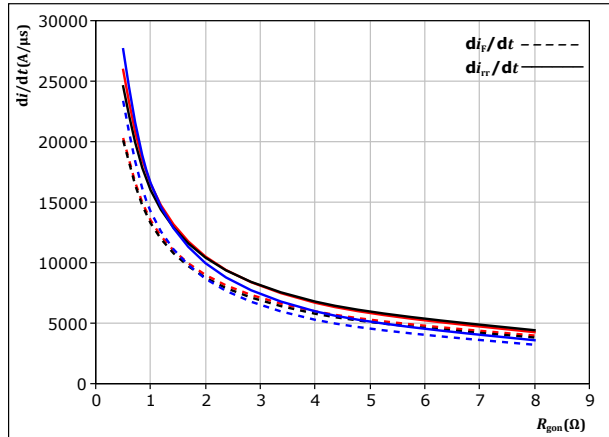
$I_C = f(V_{CE})$



At $T_j = 150 \text{ } ^\circ\text{C}$
 $R_{gon} = 2 \text{ } \Omega$
 $R_{goff} = 2 \text{ } \Omega$

figure 42. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 400 \text{ A}$

$T_j = 25 \text{ } ^\circ\text{C}$
 $125 \text{ } ^\circ\text{C}$
 $150 \text{ } ^\circ\text{C}$



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Switching Definitions

figure 44. IGBT

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

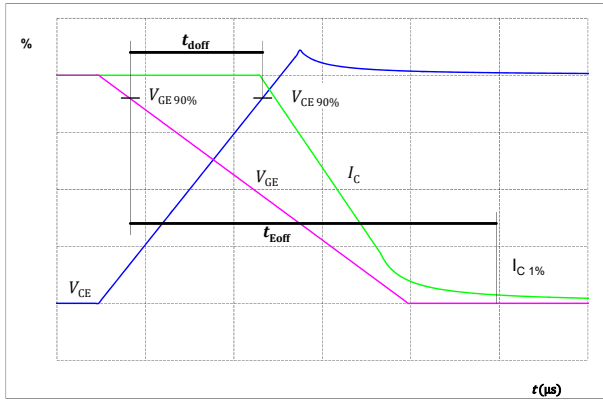


figure 45. IGBT

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

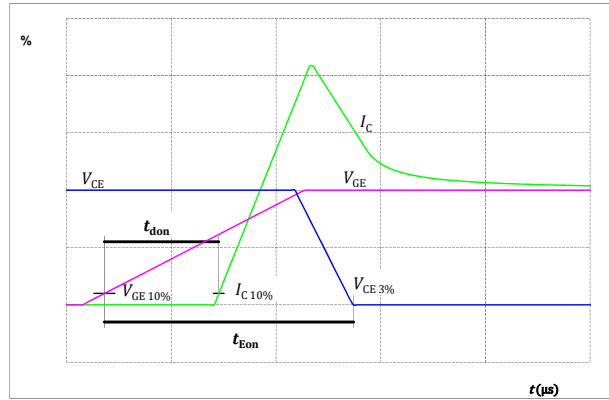


figure 46. IGBT

Turn-off Switching Waveforms & definition of t_f

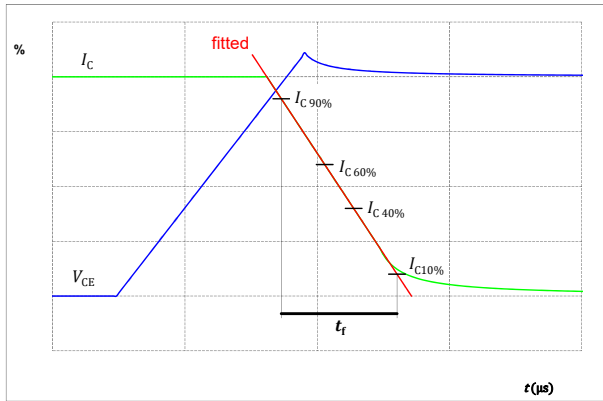
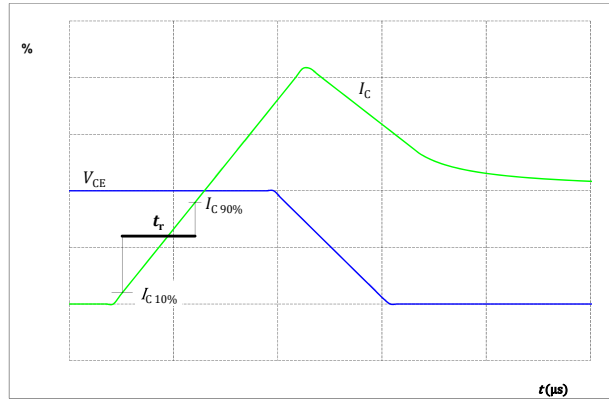


figure 47. IGBT

Turn-on Switching Waveforms & definition of t_r





Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Switching Definitions

figure 48.

FWD

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

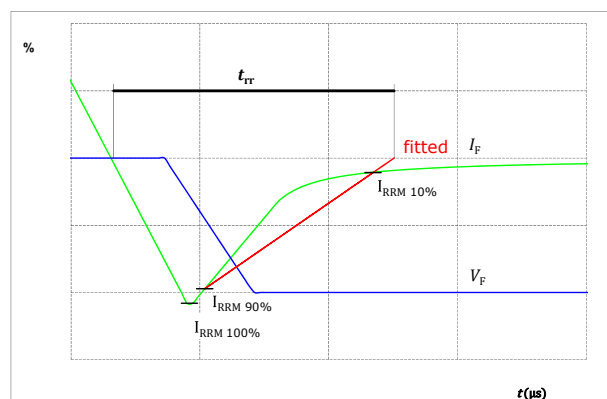
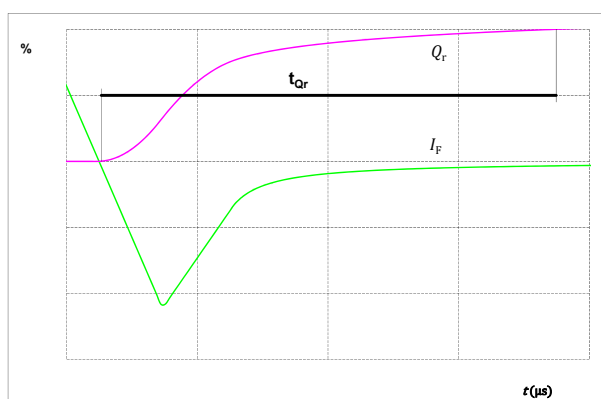


figure 49.

FWD

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





Vincotech

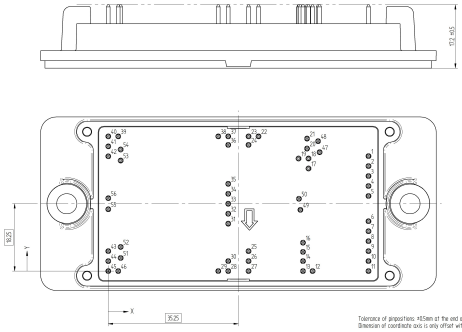
30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	30-FT12NAB450SH01-PC10F08
With thermal paste (3,4 W/mK, PSX-P7)	30-FT12NAB450SH01-PC10F08-/3/

Marking						
	Text	Name NN-NNNNNNNNNNNNNNNN- TTTT TTVV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTTTTV	Lot number LLLLL	Serial SSSS	Date code WWYY	

High Side Module 30-FT12NAB450SH01-PC10F08

Outline							
Pin table [mm]							
Pin	X	Y	Function	29	29,8	0	N1-1
1	70,5	31,15	DC+1	30	32,5	2,7	N1-1
2	70,5	28,45	DC+1	31	32,5	12,85	P1-1
3	70,5	25,75	DC+1	32	32,5	15,55	P1-1
4	70,5	23,05	DC+1	33	32,5	18,25	P1-1
5	70,5	20,35	DC+1	34	32,5	20,95	P1-1
6	70,5	13,5	GND1	35	32,5	23,65	P1-1
7	70,5	10,8	GND1	36	32,5	34,2	N1-2
8	70,5	8,1	GND1	37	32,5	36,5	N1-2
9	70,5	5,4	GND1	38	29,8	36,5	N1-2
10	70,5	2,7	GND1	39	2,7	36,5	Ph1-2
11	70,5	0	GND1	40	0	36,5	Ph1-2
12	55,35	0	DC-1	41	0	33,8	Ph1-2
13	52,75	0	DC-1	42	0	31,1	Ph1-2
14	52,75	2,7	DC-1	43	0	5,4	Ph1-1
15	52,75	5,2	DC-1	44	0	2,7	Ph1-1
16	52,75	7,7	DC-1	45	0	0	Ph1-1
17	54,25	27,8	P1-2	46	2,7	0	Ph1-1
18	54,25	30,5	P1-2	47	57,25	32,2	G11
19	51,55	30,5	P1-2	48	56,85	35,2	S11
20	53,85	33,2	P1-2	49	52,05	16,6	G15
21	53,85	35,9	P1-2	50	51,65	19,6	S15
22	40,7	36,5	N1-3	51	3,35	3,55	S13-1
23	38	36,5	N1-3	52	3,35	6,55	G13-1
24	38	34,2	N1-3	53	3,35	29,95	G13-2
25	38	5,4	N1-3	54	3,35	32,95	S13-2
26	38	2,7	N1-3	55	0	16,75	Therm11
27	38	0	N1-3	56	0	19,75	Therm12
28	32,5	0	N1-1				



Tolerance of proportions: relative to the end of pins.
Dimension of coordinate axis is only offset without tolerance.

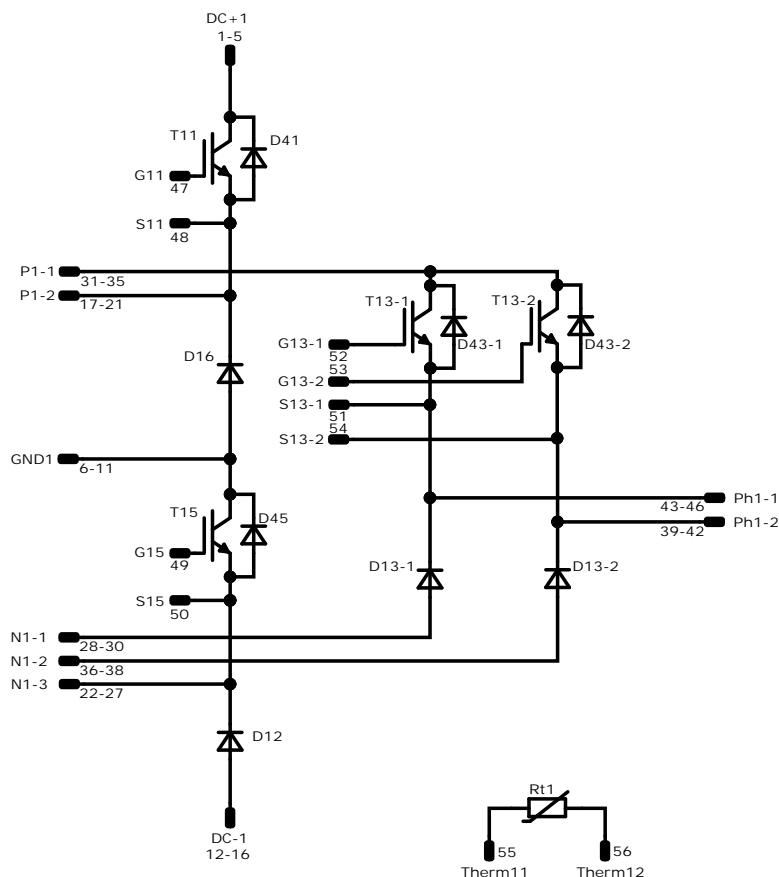


Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

High Side Module 30-FT12NAB450SH01-PC10F08

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T13-1, T13-2	IGBT	1200 V	450 A	AC Switch	Parallel devices with separate control. Values apply to complete device.
D13-1, D13-2	FWD	1200 V	200 A	AC Diode	
D43-1, D43-2	FWD	1200 V	70 A	AC Switch Prot. Diode	
T15	IGBT	950 V	400 A	Neutral Point Switch	
D12	FWD	1200 V	300 A	DC-Link Diode	
D45	FWD	1200 V	35 A	Neutral Point Switch Prot. Diode	
T11	IGBT	950 V	400 A	DC-Link Switch	
D16	FWD	1200 V	300 A	Neutral Point Diode	
D41	FWD	1200 V	75 A	DC-Link Switch Prot. Diode	
Rt1	Thermistor			Thermistor	



datasheet

Low Side Module 30-FT12NAC450SH01-PC20F08

Outline

Pin table [mm]							
Pin	X	Y	Function	29	32,5	31,15	N2-2
1	70,5	0,05	DC+2	30	32,5	21	P2-1
2	70,5	2,75	DC+2	31	29,8	19,65	P2-1
3	70,5	5,45	DC+2	32	32,5	18,3	P2-1
4	70,5	8,15	DC+2	33	29,8	16,95	P2-1
5	70,5	10,85	DC+2	34	32,5	15,6	P2-1
6	70,5	19,7	GND2	35	32,5	5,45	N2-1
7	70,5	22,4	GND2	36	32,5	2,75	N2-1
8	70,5	28,45	GND2	37	32,5	0,05	N2-1
9	70,5	31,15	GND2	38	0	0,05	Ph2-1
10	70,5	33,85	GND2	39	0	2,75	Ph2-1
11	70,5	36,55	GND2	40	0	5,45	Ph2-1
12	51,5	30,15	DC-2	41	0	8,15	Ph2-1
13	51,5	27,65	DC-2	42	0	28,45	Ph2-2
14	51,5	25,15	DC-2	43	0	31,15	Ph2-2
15	51,5	22,65	DC-2	44	0	33,85	Ph2-2
16	51,05	20,25	DC-2	45	0	36,55	Ph2-2
17	53,8	8,1	P2-2	46	57,75	25,2	G16
18	53,8	5,4	P2-2	47	60,75	25,2	S16
19	53,8	2,7	P2-2	48	48,6	31,65	G12
20	56,5	0,05	P2-2	49	50,75	34,6	S12
21	53,8	0	P2-2	50	29,5	0,05	S14-1
22	38	0,05	N2-3	51	29,5	3,05	G14-1
23	38	2,75	N2-3	52	29,5	33,55	G14-2
24	38	5,45	N2-3	53	29,5	36,55	S14-2
25	38	33,85	N2-3	54	0	16,8	Therm21
26	38	36,55	N2-3	55	0	19,8	Therm22
27	32,5	36,55	N2-2				
28	32,5	33,85	N2-2				

Tolerance of graphics: $\pm 0,15$ mm on the part of pins.
Dimension of coordinate axis is only offset without tolerance

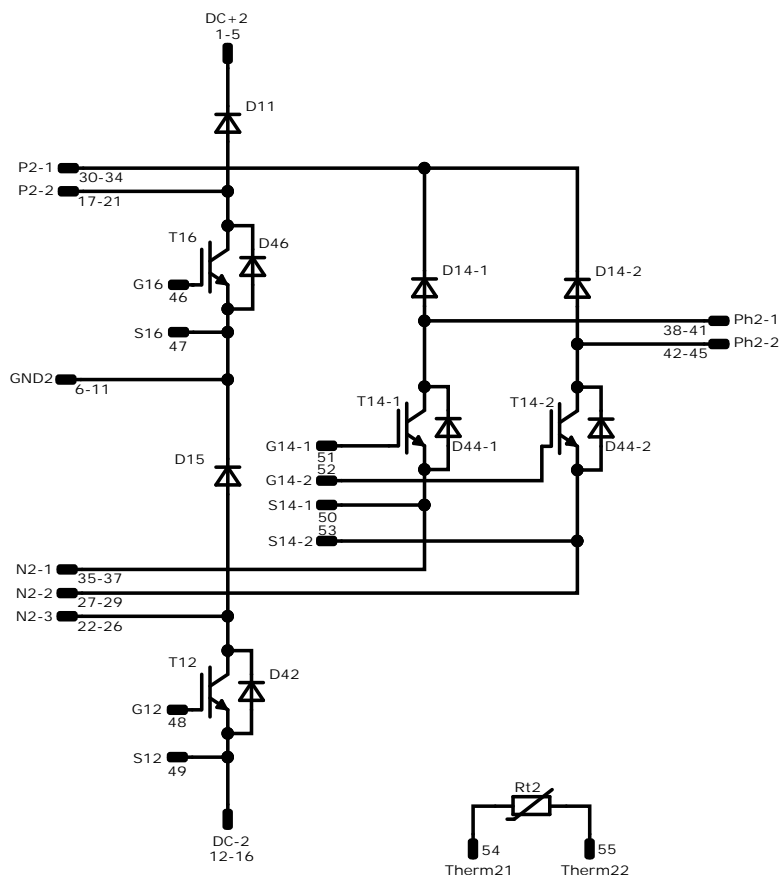


Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Low Side Module 30-FT12NAC450SH01-PC20F08

Pinout




Identification

ID	Component	Voltage	Current	Function	Comment
T14-1, T14-2	IGBT	1200 V	450 A	AC Switch	Parallel devices with separate control. Values apply to complete device.
D14-1, D14-2	FWD	1200 V	200 A	AC Diode	
D44-1, D44-2	FWD	1200 V	70 A	AC Switch Prot. Diode	
T16	IGBT	950 V	400 A	Neutral Point Switch	
D11	FWD	1200 V	300 A	DC-Link Diode	
D46	FWD	1200 V	35 A	Neutral Point Switch Prot. Diode	
T12	IGBT	950 V	400 A	DC-Link Switch	
D15	FWD	1200 V	300 A	Neutral Point Diode	
D42	FWD	1200 V	75 A	DC-Link Switch Prot. Diode	
Rt2	Thermistor			Thermistor	



Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for <i>flow 2</i> packages see vincotech.com website.				
Package data				
Package data for <i>flow 2</i> 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 UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,sp}=175^{\circ}\text{C}$ and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
30-FT12NAX450SH01-PCx0F08-D5-14	28 Nov. 2025	Change AC Diode according to PCN-2025-004	

DISCLAIMER

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

LIFE SUPPORT POLICY

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.