30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08

datasheet

***flow*ANPC 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
- Press-fit pin
- Reliable cold welding connection

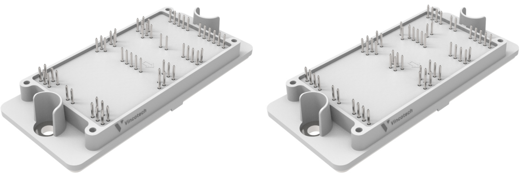
Target applications

- Energy Storage Systems
- Power Supply
- Solar Inverters

Types

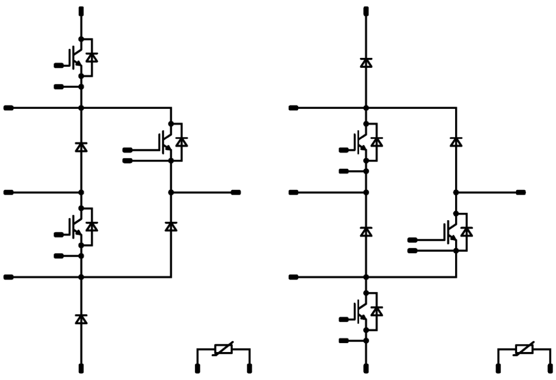
- 30-FT12NAB450SH01-PC10F08
- 30-FT12NAC450SH01-PC20F08

flow 2 12 mm housing



PC10F08 PC20F08

Schematic



PC10F08 PC20F08

Maximum Ratings

T_j = 25 °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 °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 °C	728	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	10	μs
Maximum junction temperature	T_{jmax}			175	°C
AC Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	188	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		910	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	1300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	358	W
Maximum junction temperature	T_{jmax}			175	°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 °C	69	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	340	A
Surge current capability	I^2t			580	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	167	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °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 °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 °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 °C	185	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °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 °C	32	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	170	A
Surge current capability	I^2t			145	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	77	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °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 °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 °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 °C	185	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °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 °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 °C	112	W
Maximum junction temperature	T_{jmax}			175	°C

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
Creepage distance				>12,7	mm
Clearance				>12,7	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
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 Mhz	0	25		25		26400		pF
Reverse transfer capacitance	C_{res}	f = 1 Mhz	0	25		25		1410		pF
Gate charge	Q_g		15		0	25		3420		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,13		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	400	25 125 150		78,79 81,06 81,57		ns
Rise time	t_r	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	400	25 125 150		48,09 49,65 50,06		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	400	25 125 150		169,21 234,04 253,36		ns
Fall time	t_f	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	400	25 125 150		42,4 82,72 95,55		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=3,53 µC Q_{rFWD}=5,46 µC Q_{rFWD}=6,37 µC	±15	600	400	25 125 150		7,98 9,85 10,38		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	400	25 125 150		20,32 35,06 39,32		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	
AC Diode										
Static										
Forward voltage	V_F				200	25 125 150		1,51 1,77 1,91	1,8(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25		350	2000	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,27		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=6407 A/µs d*i*/d*t*=5404 A/µs d*i*/d*t*=6810 A/µs	±15	600	400	25 125 150		100,86 108,63 135,52		A
Reverse recovery time	t_{rr}					25 125 150		71,74 80,02 86,11		ns
Recovered charge	Q_r					25 125 150		3,53 5,46 6,37		µC
Reverse recovered energy	E_{rec}					25 125 150		1,25 1,97 2,32		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3957,62 5908,39 6605,17		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	
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_r = 1200 V				25 150		 5400	120 11000	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{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 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)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,26		K/W

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)	$R_{th(j-s)}$	λ_{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		 2700	60 5500	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,24		K/W

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]	Min	Typ	Max	Unit
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_{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 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)	$R_{th(j-s)}$	λ_{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)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,33		K/W

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_r = 1200 V				25			55	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,85		K/W
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	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	

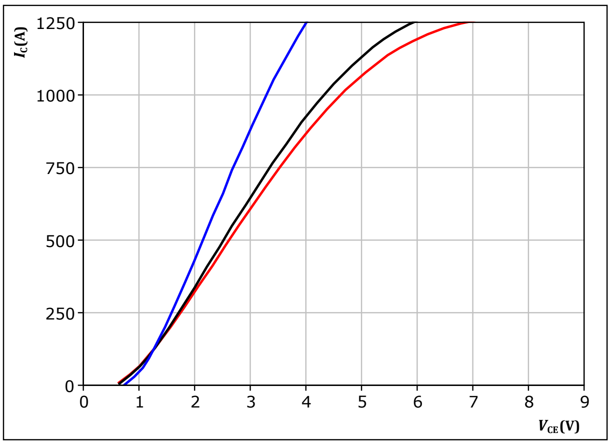
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

AC Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



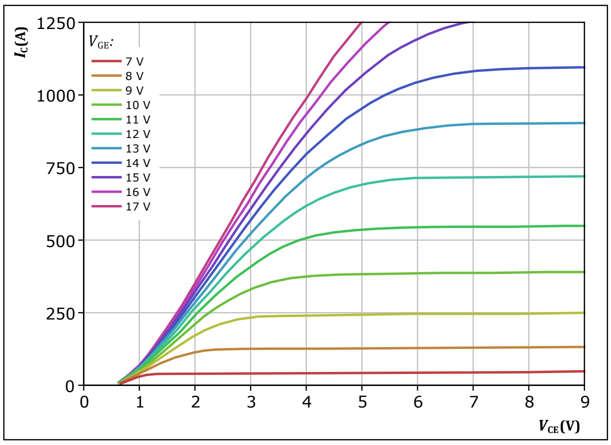
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



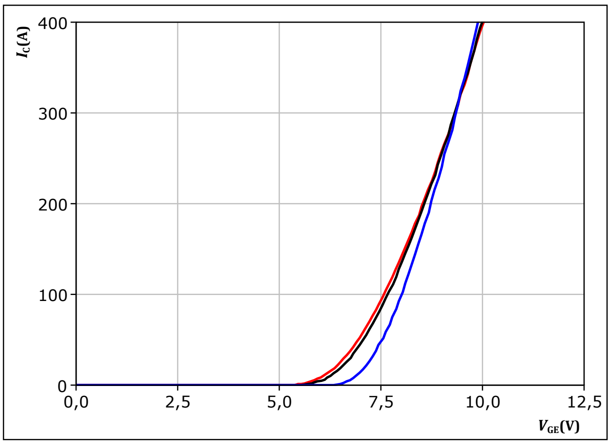
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



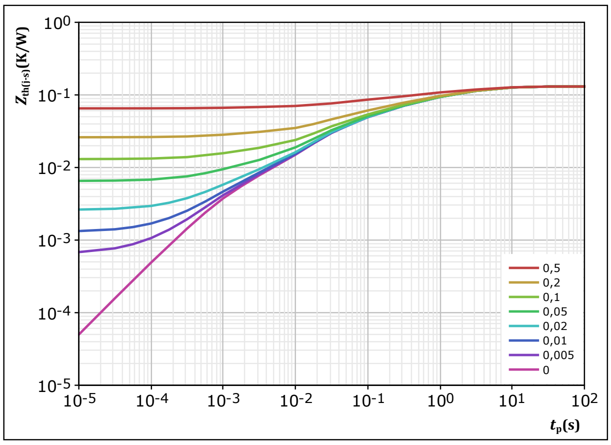
t_p =	250	µs
V_{CE} =	10	V

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	K/W

IGBT thermal model values

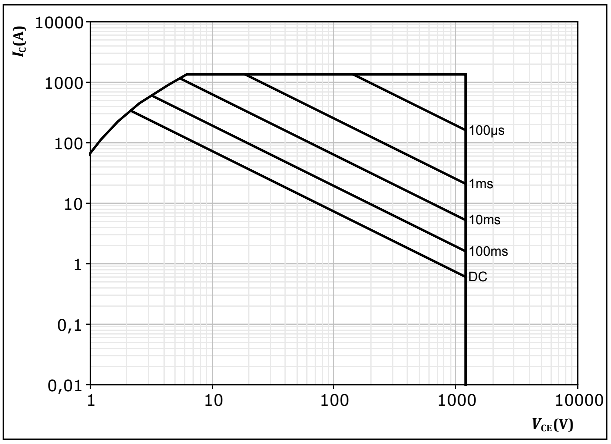
R (K/W)	τ (s)
2,07E-02	5,80E+00
3,48E-02	1,59E+00
4,09E-02	2,46E-01
2,96E-02	2,87E-02
4,41E-03	1,15E-03

AC Switch Characteristics

figure 5.	IGBT

Safe operating area

I_C = f(V_{CE})



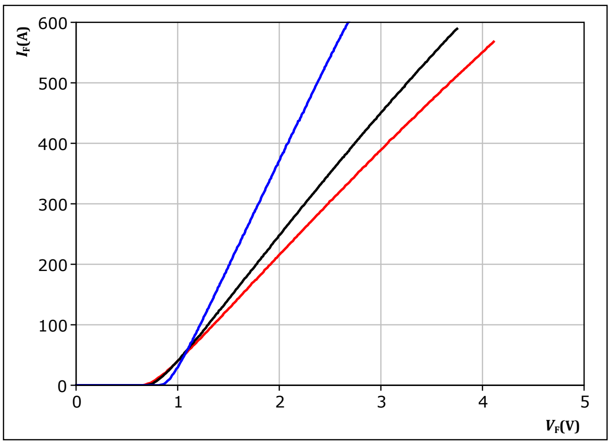
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

AC Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

I_F = f(V_F)

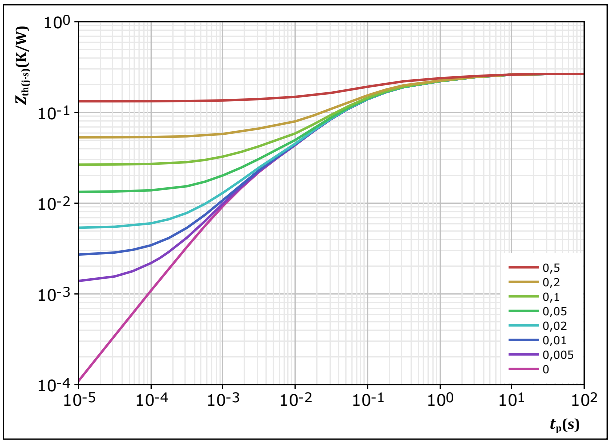


t_p =	250	µs		
			T_j:	25 °C
				125 °C
				150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,266 K/W

FWD thermal model values

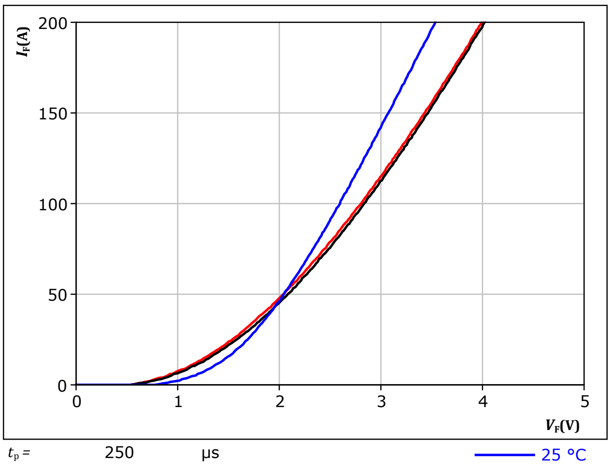
R (K/W)	τ (s)
3,00E-02	5,30E+00
4,56E-02	1,20E+00
1,03E-01	1,48E-01
7,14E-02	2,81E-02
1,53E-02	1,98E-03

AC Switch Prot. Diode Characteristics

figure 8. **FWD**

Typical forward characteristics

I_F = f(V_F)



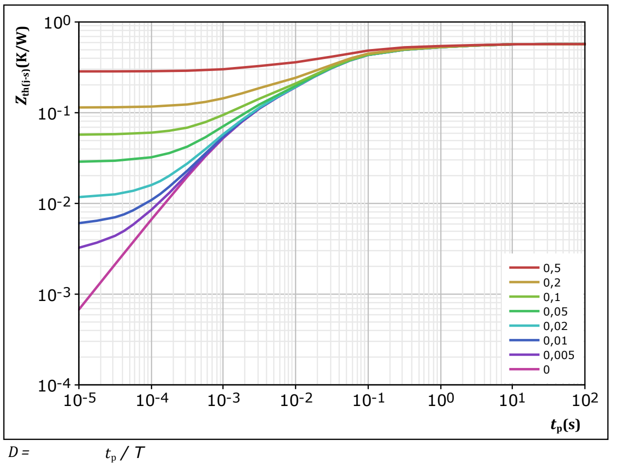
t_p = 250 µs

T_j: 25 °C / 125 °C / 150 °C

figure 9. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,57 K/W

FWD thermal model values

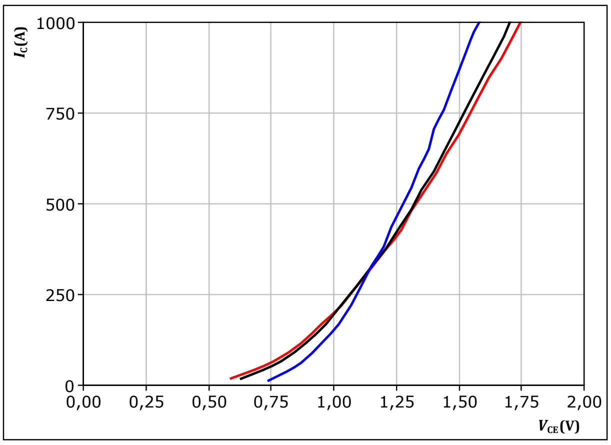
R (K/W)	τ (s)
4,55E-02	3,57E+00
6,49E-02	4,88E-01
2,65E-01	5,28E-02
1,20E-01	1,14E-02
7,47E-02	1,43E-03

Neutral Point Switch Characteristics

figure 10. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

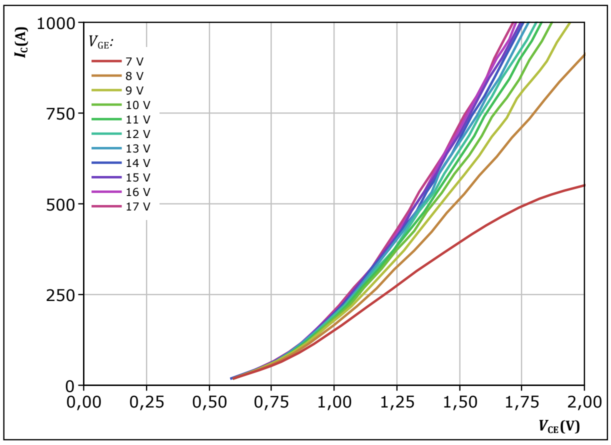


t_p =	250	µs	
V_{GE} =	15	V	
T_j:			25 °C
			125 °C
			150 °C

figure 11. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



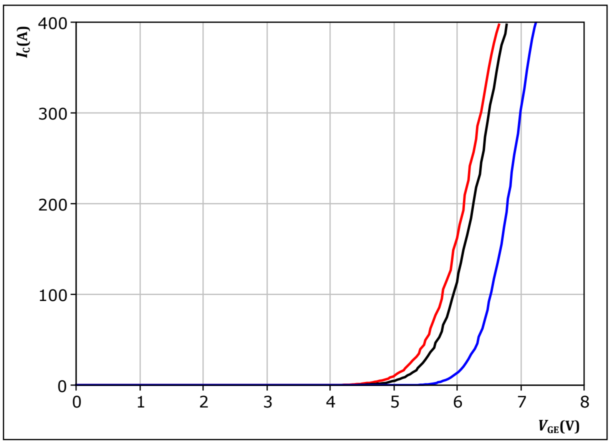
t_p =	250	µs
T_j =	150	°C

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

figure 12. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

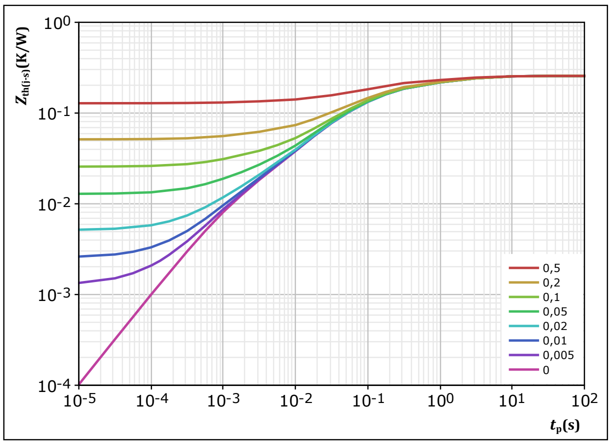


t_p =	250	µs	
V_{CE} =	10	V	
T_j:			25 °C
			125 °C
			150 °C

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

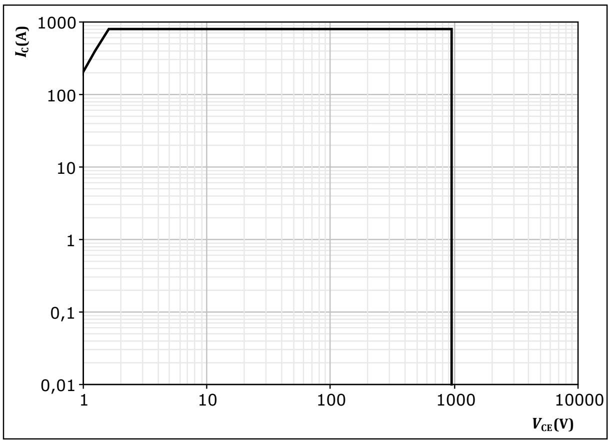
R (K/W)	τ (s)
2,93E-02	4,18E+00
5,77E-02	7,66E-01
1,16E-01	1,04E-01
4,50E-02	1,97E-02
8,75E-03	1,30E-03

Neutral Point Switch Characteristics

figure 14. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



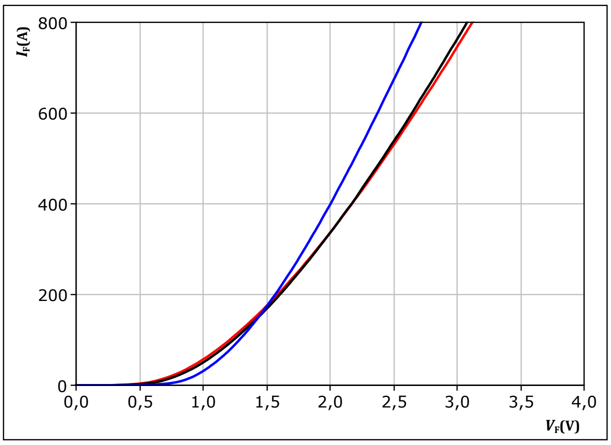
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

DC-Link Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



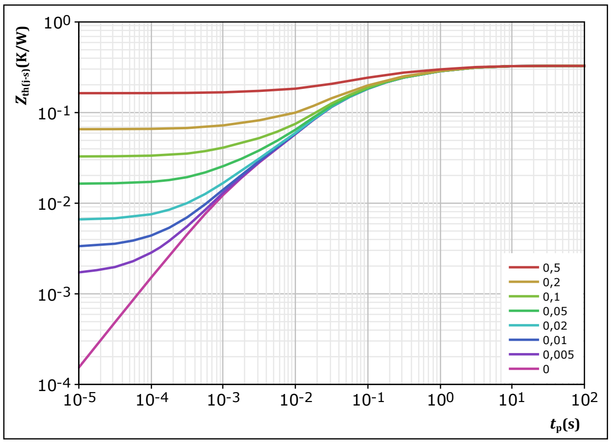
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **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 K/W

FWD thermal model values

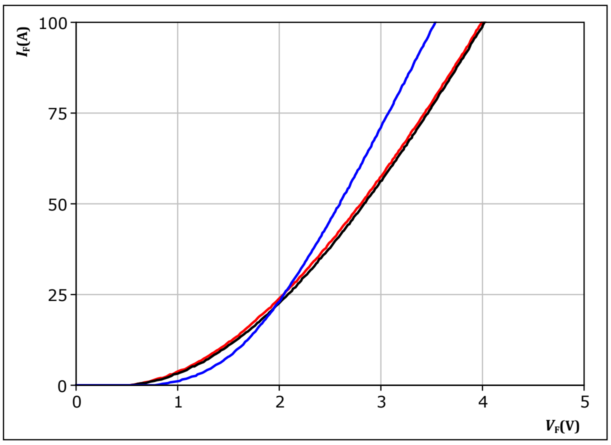
R (K/W)	τ (s)
2,80E-02	3,86E+00
7,50E-02	7,50E-01
1,12E-01	1,24E-01
9,85E-02	2,34E-02
1,40E-02	1,37E-03

Neutral Point Switch Prot. Diode Characteristics

figure 17. FWD

Typical forward characteristics

I_F = f(V_F)



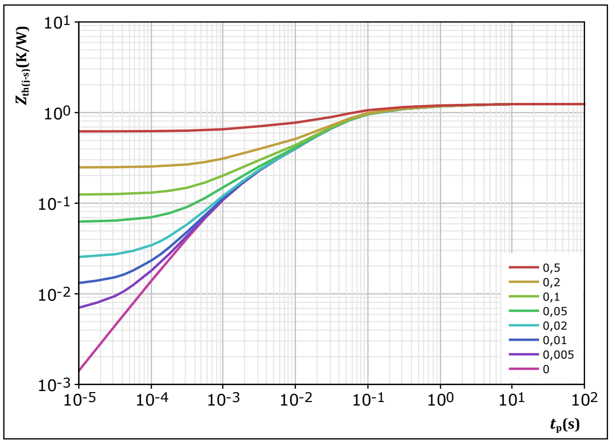
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 18. FWD

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,241 K/W

FWD thermal model values

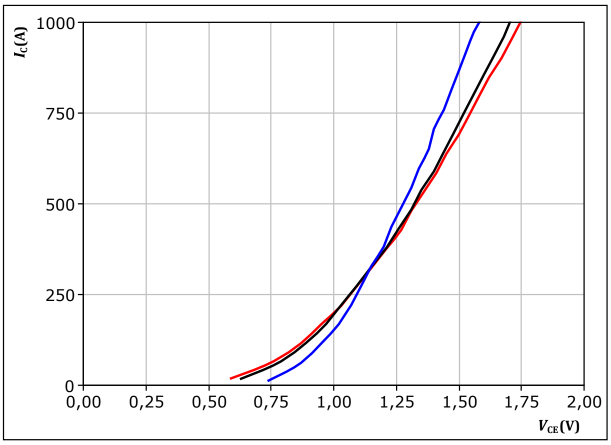
R (K/W)	τ (s)
8,98E-02	2,56E+00
1,83E-01	2,96E-01
6,44E-01	4,31E-02
1,79E-01	9,64E-03
1,45E-01	1,35E-03

DC-Link Switch Characteristics

figure 19. IGBT

Typical output characteristics

I_C = f(V_{CE})



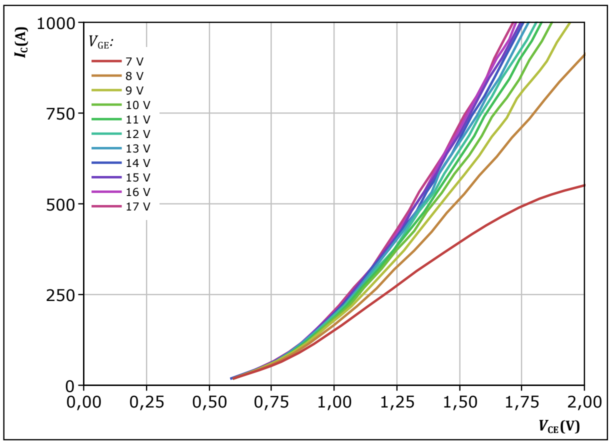
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 20. IGBT

Typical output characteristics

I_C = f(V_{CE})



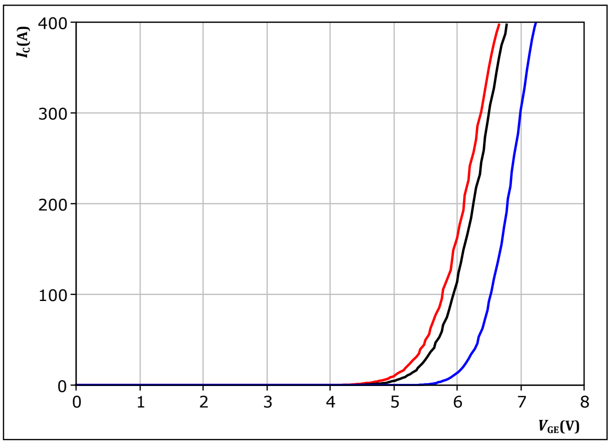
t_p =	250	µs
T_j =	150	°C

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

figure 21. IGBT

Typical transfer characteristics

I_C = f(V_{GE})



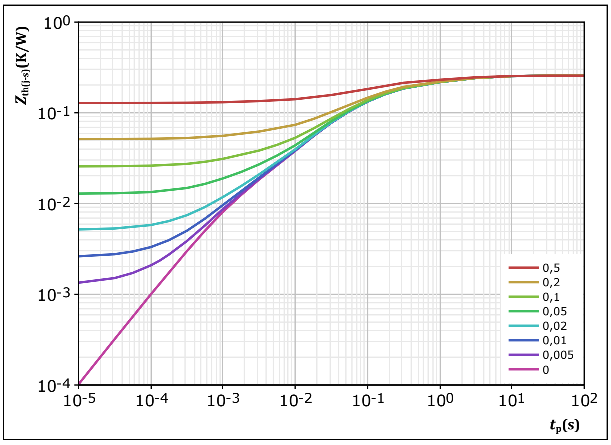
t_p =	250	µs
V_{CE} =	10	V

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

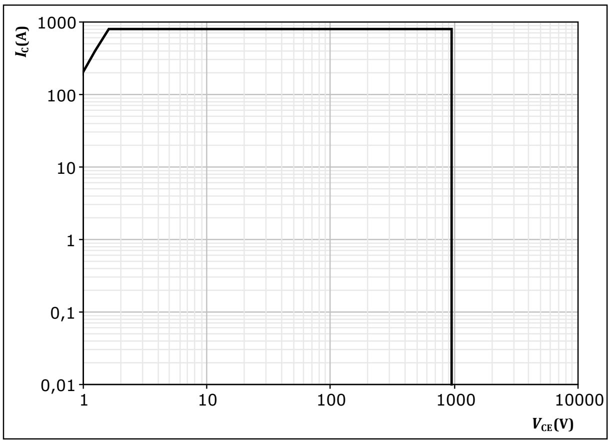
R (K/W)	τ (s)
2,93E-02	4,18E+00
5,77E-02	7,66E-01
1,16E-01	1,04E-01
4,50E-02	1,97E-02
8,75E-03	1,30E-03

DC-Link Switch Characteristics

figure 23.	IGBT

Safe operating area

I_C = f(V_{CE})



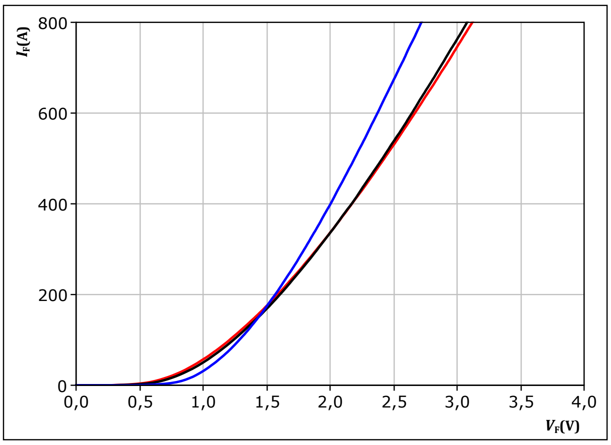
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Neutral Point Diode Characteristics

figure 24. FWD

Typical forward characteristics

$I_F = f(V_F)$



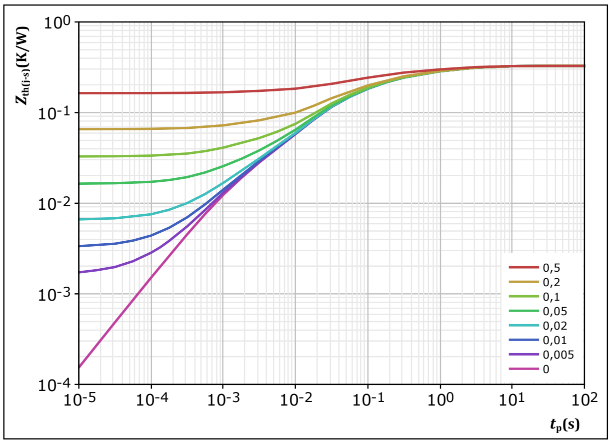
t_p = 250 µs

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 K/W

FWD thermal model values

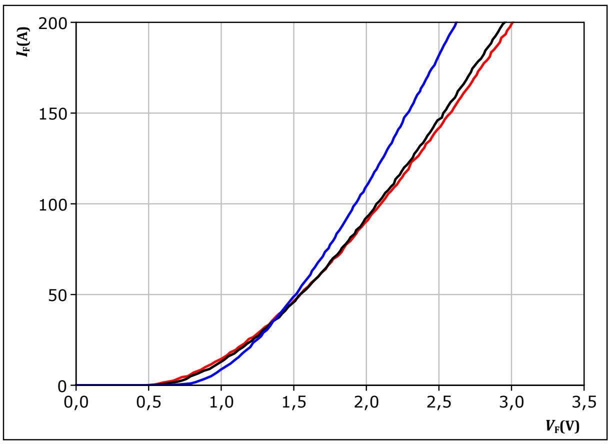
R (K/W)	τ (s)
2,80E-02	3,86E+00
7,50E-02	7,50E-01
1,12E-01	1,24E-01
9,85E-02	2,34E-02
1,40E-02	1,37E-03

DC-Link Switch Prot. Diode Characteristics

figure 26. FWD

Typical forward characteristics

$I_F = f(V_F)$



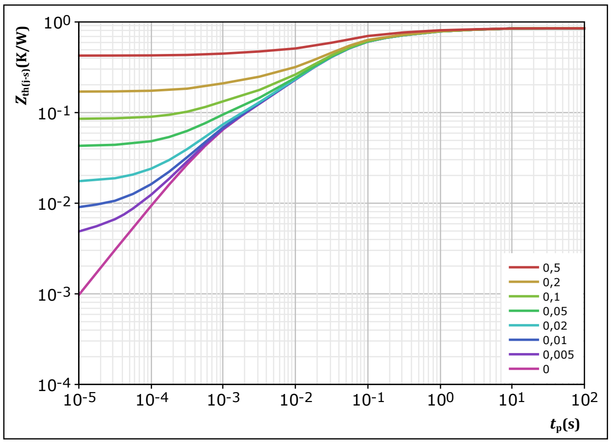
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 27. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,85 K/W

FWD thermal model values

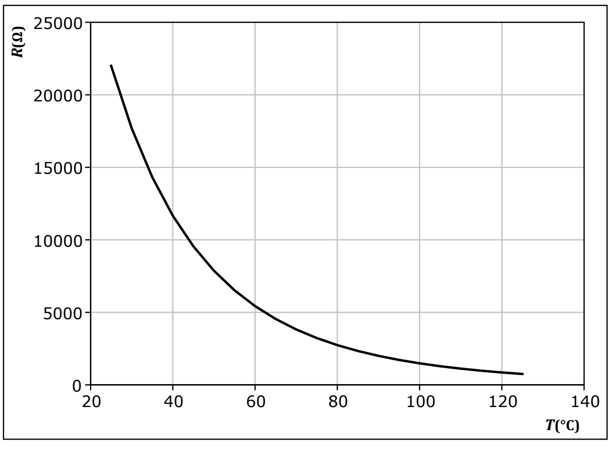
R (K/W)	τ (s)
7,37E-02	3,12E+00
1,62E-01	3,66E-01
4,12E-01	4,70E-02
1,41E-01	1,06E-02
6,17E-02	8,20E-04

Thermistor Characteristics

figure 28. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

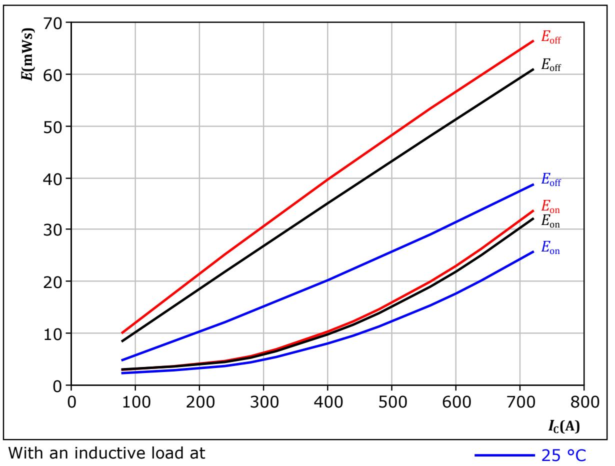


AC Switching Characteristics

figure 29. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



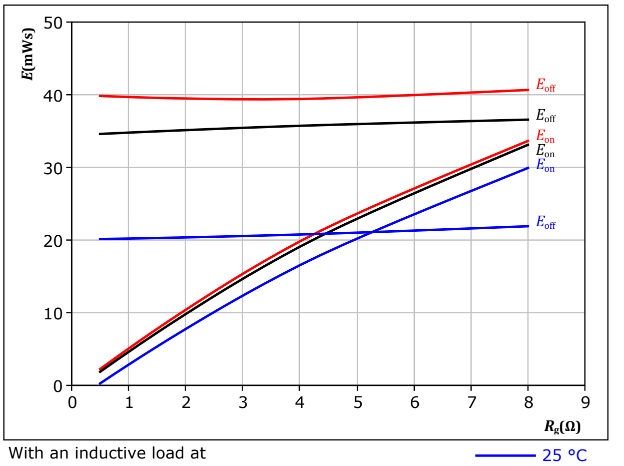
With an inductive load at

			T_j:
V_{CE} =	600	V	25 °C
V_{GE} =	±15	V	125 °C
R_{gon} =	2	Ω	150 °C
R_{goff} =	2	Ω	

figure 30. **IGBT**

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

$E = f(R_g)$



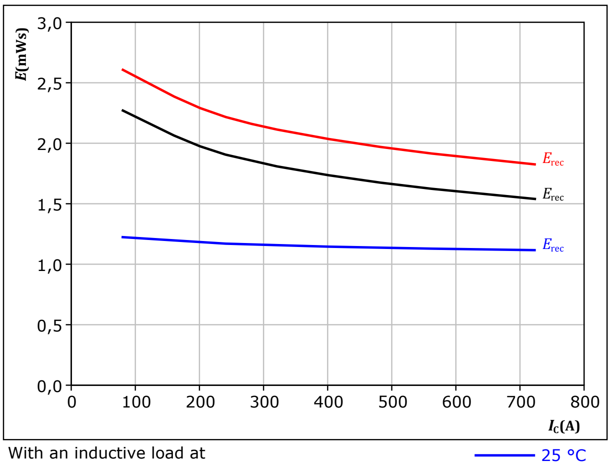
With an inductive load at

			T_j:
V_{CE} =	600	V	25 °C
V_{GE} =	±15	V	125 °C
I_C =	400	A	150 °C

figure 31. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



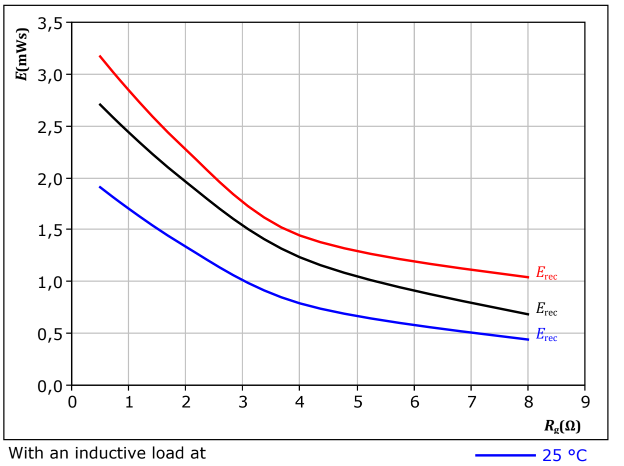
With an inductive load at

			T_j:
V_{CE} =	600	V	25 °C
V_{GE} =	±15	V	125 °C
R_{gon} =	2	Ω	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

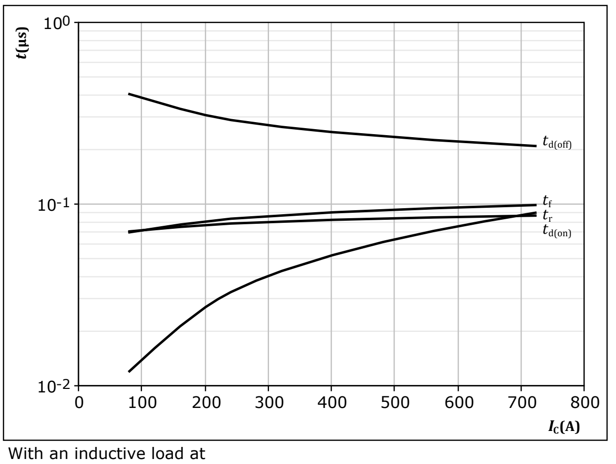
			T_j:
V_{CE} =	600	V	25 °C
V_{GE} =	±15	V	125 °C
I_C =	400	A	150 °C

AC Switching Characteristics

figure 33. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



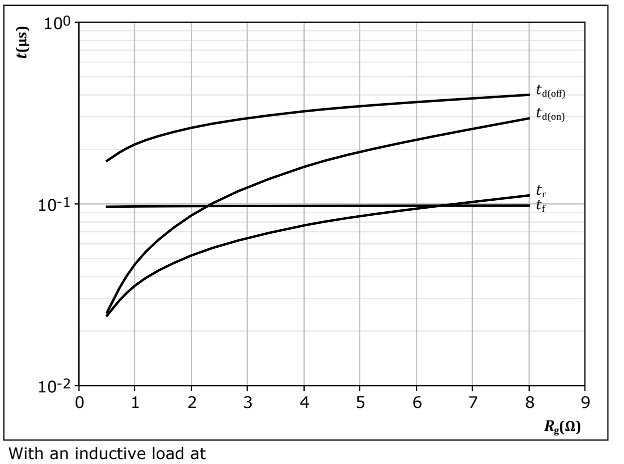
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±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)



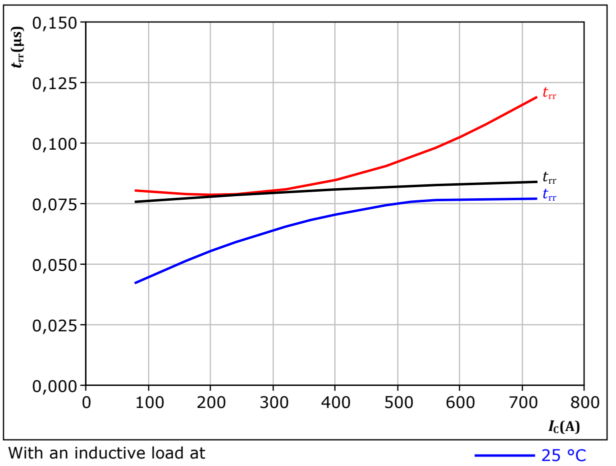
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±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

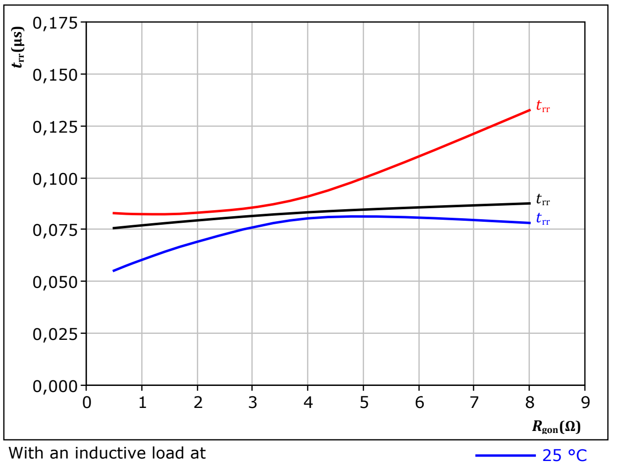
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

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} =	±15	V
I_C =	400	A

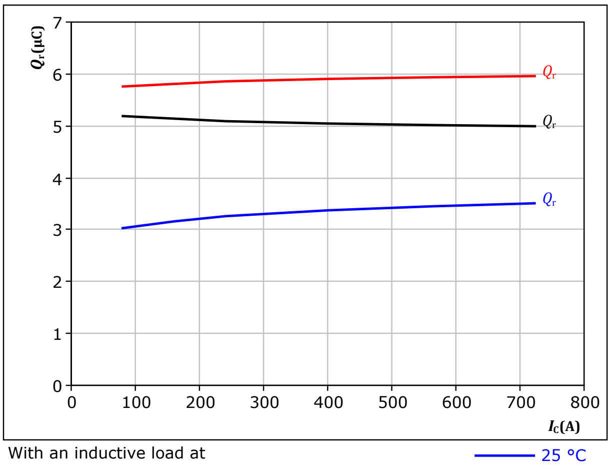
T_j: 25 °C, 125 °C, 150 °C

AC Switching Characteristics

figure 37. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



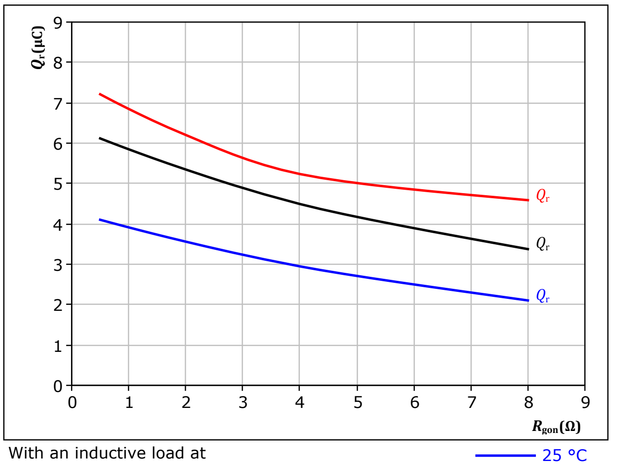
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 38. **FWD**

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

$Q_r = f(R_{gon})$



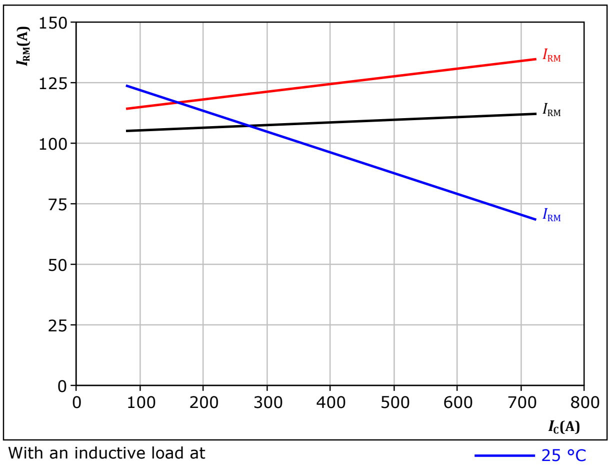
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

figure 39. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



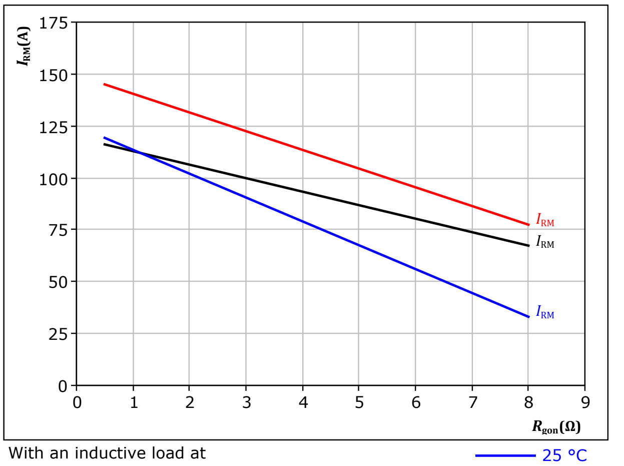
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		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

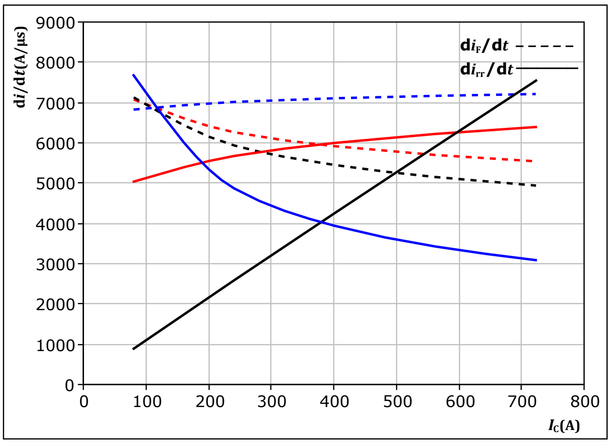
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

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_{rr}/dt = f(I_C)



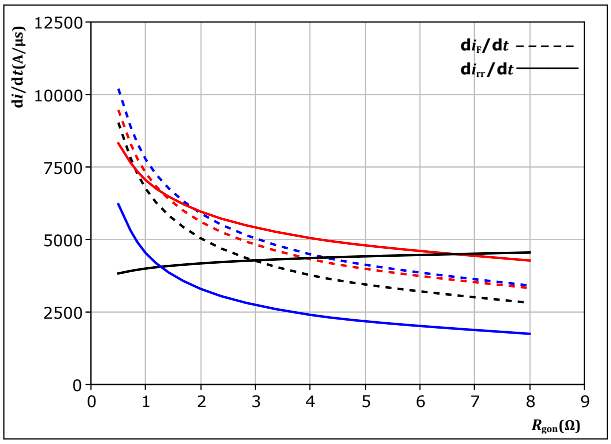
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

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_{rr}/dt = f(R_{gon})



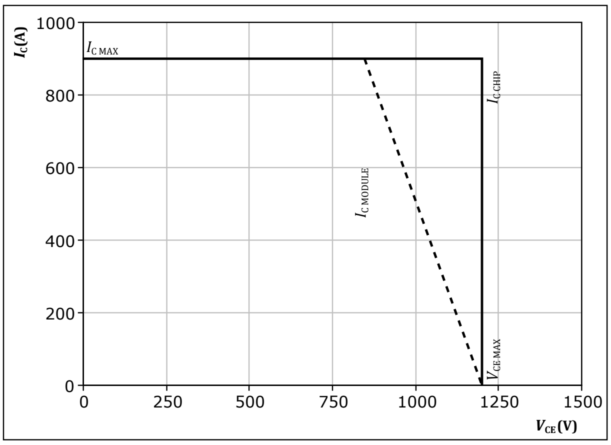
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

figure 43. IGBT

Reverse bias safe operating area

I_C = f(V_{CE})



At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

Switching Definitions

figure 44. **IGBT**

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

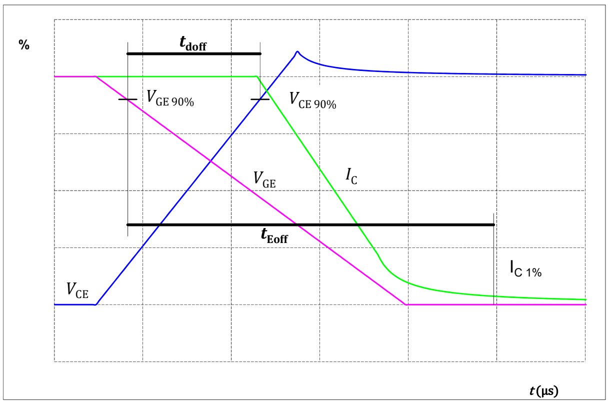


figure 45. **IGBT**

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

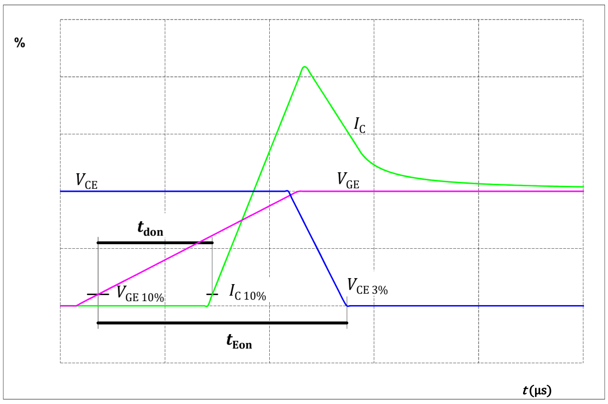


figure 46. **IGBT**

Turn-off Switching Waveforms & definition of t_f

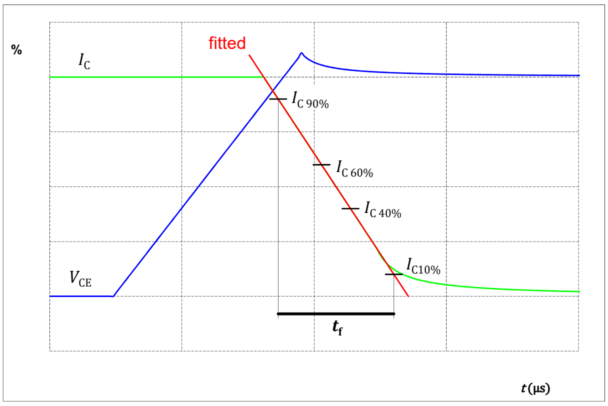
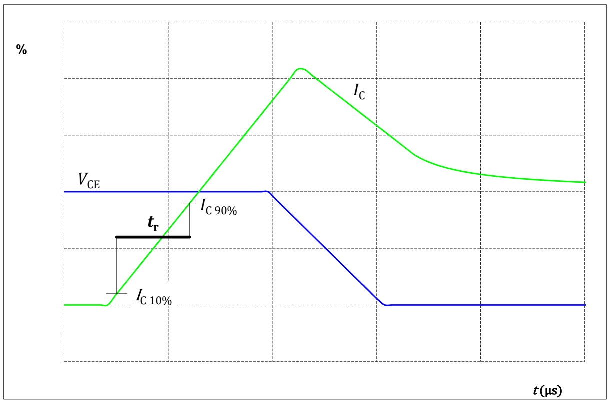


figure 47. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 48. **FWD**

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

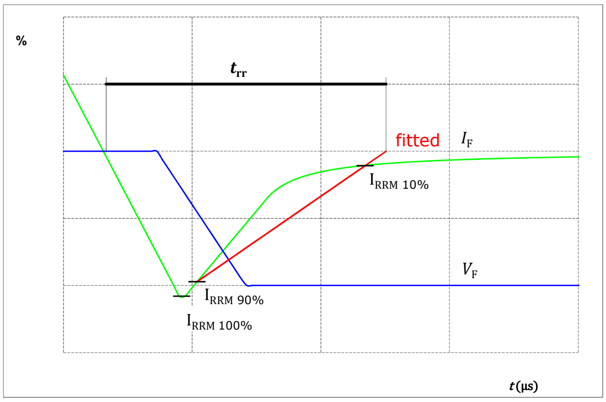
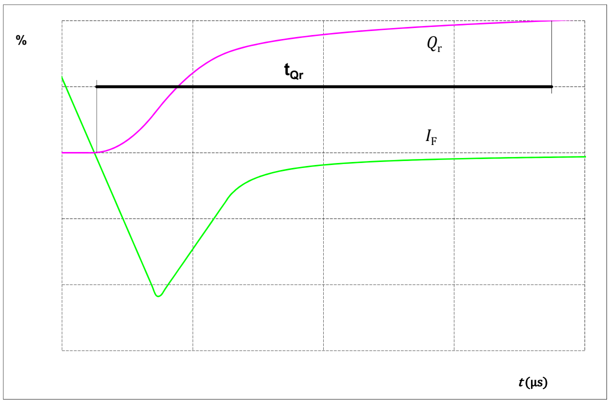


figure 49. **FWD**

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



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

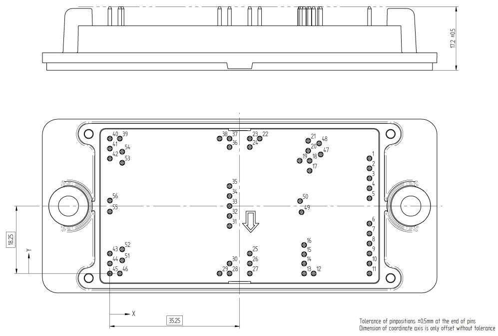
Marking							
	**Text**	**Name**		**Date code**	**UL & VIN**	**Lot**	**Serial**
		NN-NNNNNNNNNNNNNN-TTTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

High Side Module 30-FT12NAB450SH01-PC10F08

Outline

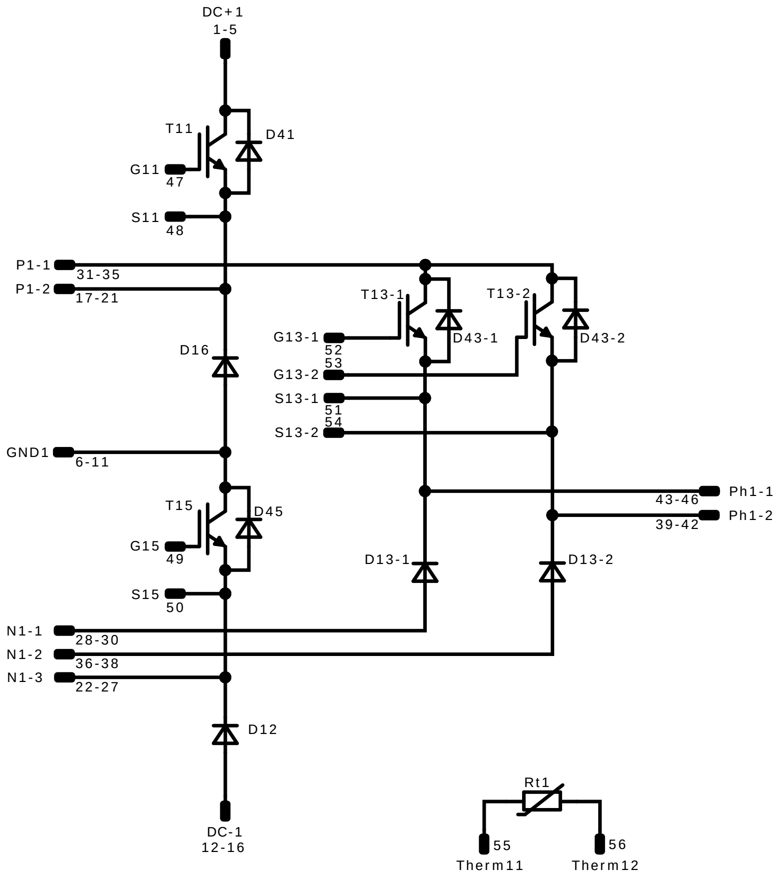
Pin table [mm]

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				



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	

Vincotech

30-FT12NAB450SH01-PC10F08
30-FT12NAC450SH01-PC20F08
datasheet

Ordering Code	
Version	**Ordering Code**
Without thermal paste	30-FT12NAC450SH01-PC20F08
With thermal paste (3,4 W/mK, PSX-P7)	30-FT12NAC450SH01-PC20F08-/3/

Low Side Module 30-FT12NAC450SH01-PC20F08

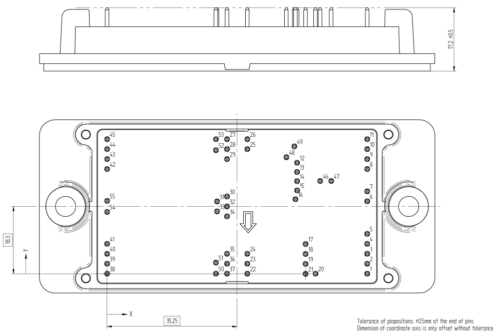
Marking

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

Outline

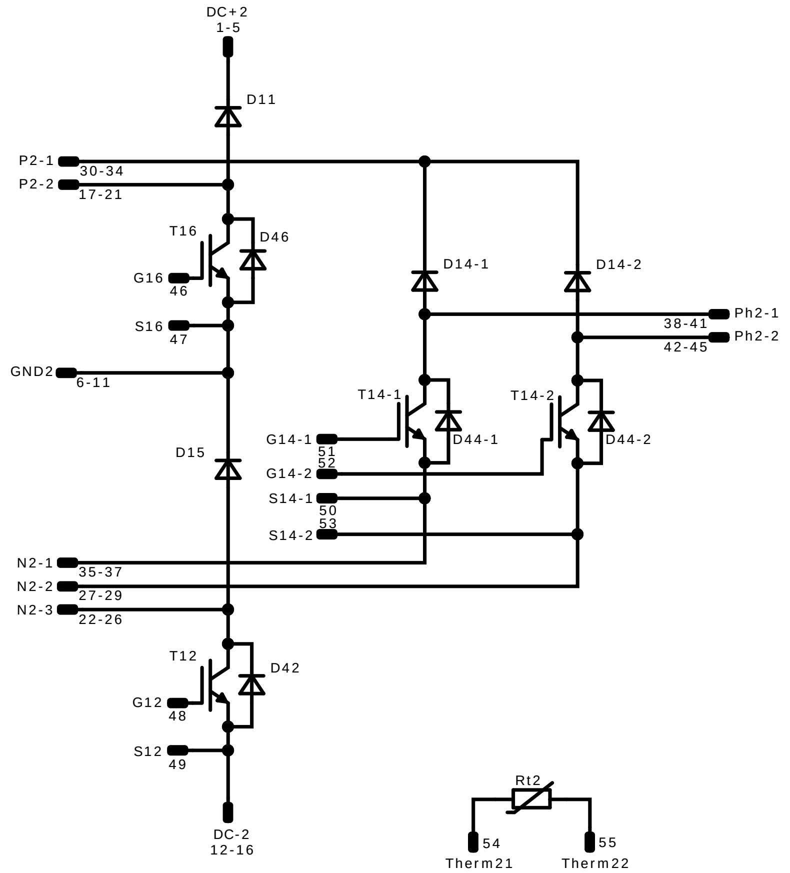
Pin table [mm]

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				



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	

Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 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
30-FT12NAx450SH01-PCx0F08-D3-14	21 Oct. 2022	Pinout and chipset modification	
30-FT12NAx450SH01-PCx0F08-D4-14	7 Mar. 2023	Pin length correction	1