10-F006PPA010M701-LT23B79

datasheet

***flow*PIM 0 + PFC** **650 V / 10 A**

Topology features

- Converter+PFC+Inverter
- Open Emitter configuration
- Temperature sensor

Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current
- Switching optimized for EMC

Housing features

- Base isolation: Al_2O_3
- Clip-in, reliable mechanical connection, qualified for wave soldering
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Solder pin

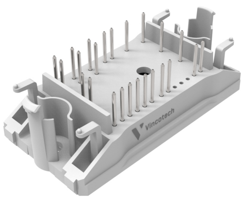
Target applications

- Embedded Drives
- Industrial Drives

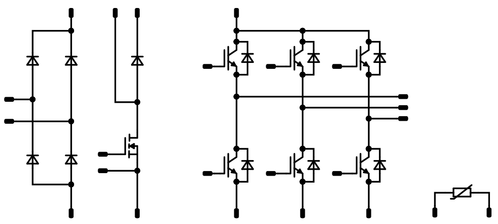
Types

- 10-F006PPA010M701-LT23B79

flow 0 17 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	20	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		20	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	48	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	17	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		20	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	33	W
Maximum junction temperature	T_{jmax}			175	°C
PFC Switch					
Drain-source voltage	V_{DSS}			600	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$	T_s = 80 °C	23	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}		151	A
Avalanche energy, single pulse	E_{AS}	V_{DD} = 50 V	I_D = 0 A	159	mJ
Avalanche energy, repetitive	E_{AR}	V_{DD} = 50 V	I_D = 0 A	0,8	mJ
MOSFET dv/dt ruggedness	dv/dt	V_{DS}= 0..400 V	T_s = 25 °C	80	V/ns
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	67	W
Gate-source voltage	V_{GSS}			±20	V
Reverse diode dv/dt	dv/dt			50	V/ns
Maximum Junction Temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
PFC Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	13	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		37,5	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	71	A
Surge current capability	I^2t			25	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	35	W
Maximum junction temperature	T_{jmax}			175	°C
Rectifier Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	31	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	200	A
Surge current capability	I^2t			200	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	37	W
Maximum junction temperature	T_{jmax}			150	°C
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				>12,7	mm
Comparative Tracking Index	CTI			≥ 200	

*100 % tested in production

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	
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,001	25	5,6	6,2	6,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		10	25 125 150		1,4 1,49 1,52	1,81(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			15	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}		0	10		25		1300		pF
Reverse transfer capacitance	C_{res}		0	10		25		24		pF
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,99		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	350	10	25 125 150		52,64 49,92 49,76		ns
Rise time	t_r	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	350	10	25 125 150		23,52 24,48 24,48		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	350	10	25 125 150		92,64 109,76 112,96		ns
Fall time	t_f	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	350	10	25 125 150		97,15 115,26 120,43		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,367 µC Q_{rFWD}=0,746 µC Q_{rFWD}=0,861 µC	±15	350	10	25 125 150		0,156 0,227 0,249		mWs
Turn-off energy (per pulse)	E_{off}		±15	350	10	25 125 150		0,362 0,501 0,536		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	
Inverter Diode										
Static										
Forward voltage	V_F				10	25 125	1,23	1,67 1,56	1,87(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			0,14	μA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,87		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=360 A/μs di/dt=349 A/μs di/dt=362 A/μs	±15	350	10	25 125 150		5,37 7,77 8,26		A
Reverse recovery time	t_{rr}					25 125 150		175,53 241,84 258,22		ns
Recovered charge	Q_r					25 125 150		0,367 0,746 0,861		μC
Reverse recovered energy	E_{rec}					25 125 150		0,1 0,2 0,23		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		116,48 87,46 80,04		A/μs

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
PFC Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		10		15,9	25 125		63,3 115	60(1)	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,0008	25	3	3,5	4	V
Gate to Source Leakage Current	I_{GSS}		20	0		25			100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	600		25			1	µA
Internal gate resistance	r_g							2,8		Ω
Gate charge	Q_g		0/10	400	15,9	25		67		nC
Short-circuit input capacitance	C_{iss}	f = 250 kHz	0	400	0	25		2895		pF
Short-circuit output capacitance	C_{oss}							48		
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,05		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	0/10	400	20	25 125		22,88 21,92		ns
Rise time	t_r					25 125		5,28 5,6		ns
Turn-off delay time	$t_{d(off)}$					25 125		72 79,68		ns
Fall time	t_f					25 125		11,88 10,83		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,024 µC Q_{rFWD}=0,026 µC				25 125		0,011 0,015		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,049 0,054		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	
PFC Diode										
Static										
Forward voltage	V_F				8	25 125 150		1,49 1,74 1,84	1,8[(1)]	V
Reverse leakage current	I_R	V_r = 650 V				25		10	51	µA
Thermal										
Thermal resistance junction to sink [(2)]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,74		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=4860 A/µs d*i*/d*t*=4365 A/µs	0/10	400	20	25 125		13,3 12,44		A
Reverse recovery time	t_{rr}					25 125		6,7 6,91		ns
Recovered charge	Q_r					25 125		0,024 0,026		µC
Reverse recovered energy	E_{rec}					25 125		0,019 0,018		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		4730 4486		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	
Rectifier Diode										
Static										
Forward voltage	V_F				18	25 125 150		1,12 1,03 1,02	1,5[1]	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			100 1000	µA
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,87		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	

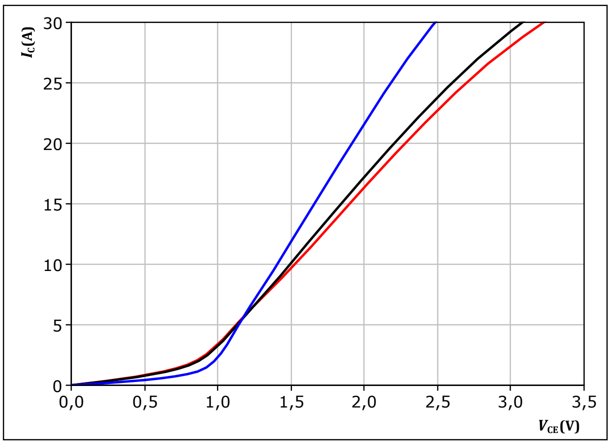
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

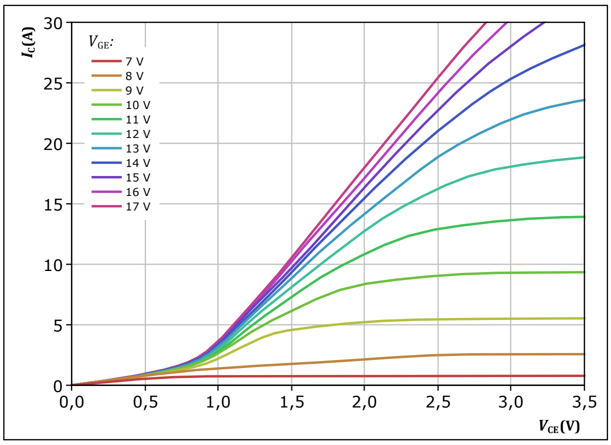


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



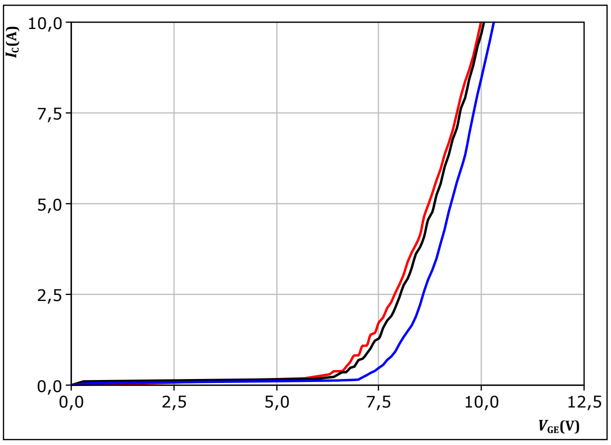
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

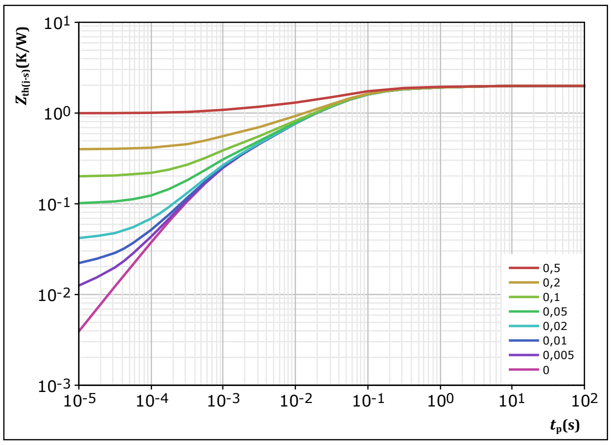


t_p =	250	µs		25 °C
V_{CE} =	15	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,993	K/W

IGBT thermal model values

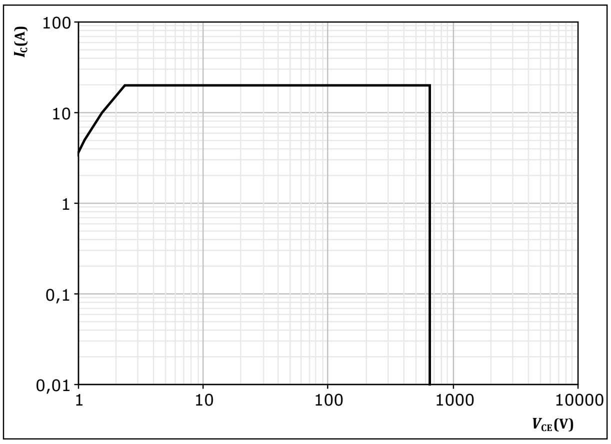
R (K/W)	τ (s)
1,17E-01	2,39E+00
4,31E-01	1,57E-01
8,29E-01	3,56E-02
3,94E-01	6,16E-03
2,23E-01	7,29E-04

Inverter Switch Characteristics

figure 5.	IGBT

Safe operating area

$I_C = f(V_{CE})$



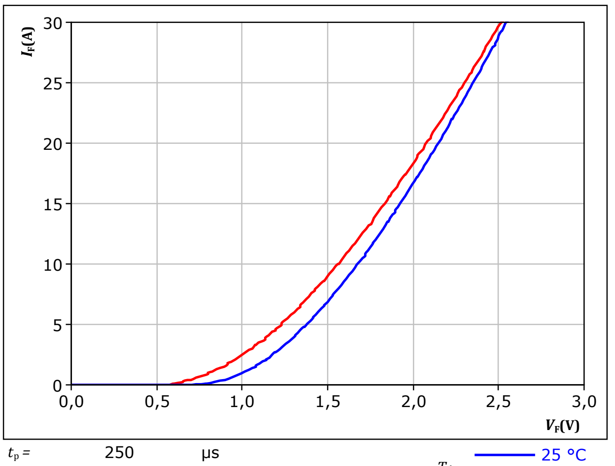
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Inverter Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

I_F = f(V_F)



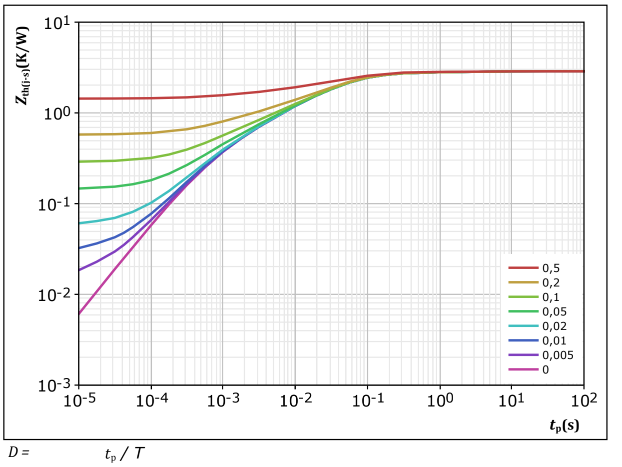
t_p = 250 µs

T_j: 25 °C, 125 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,873 K/W

FWD thermal model values

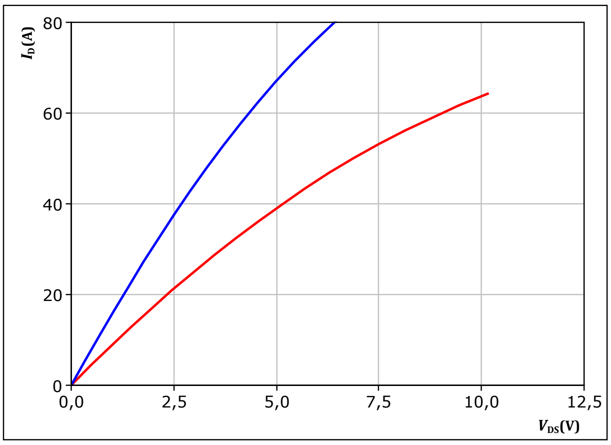
R (K/W)	τ (s)
6,53E-02	3,94E+00
1,48E-01	4,48E-01
1,31E+00	5,96E-02
7,32E-01	1,36E-02
4,04E-01	2,79E-03
2,11E-01	5,37E-04

PFC Switch Characteristics

figure 8. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



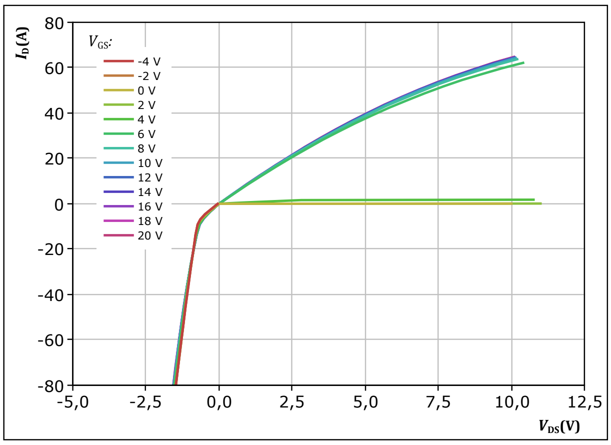
t_p =	250	μs
V_{GS} =	10	V

T_j: 25 °C, 125 °C

figure 9. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



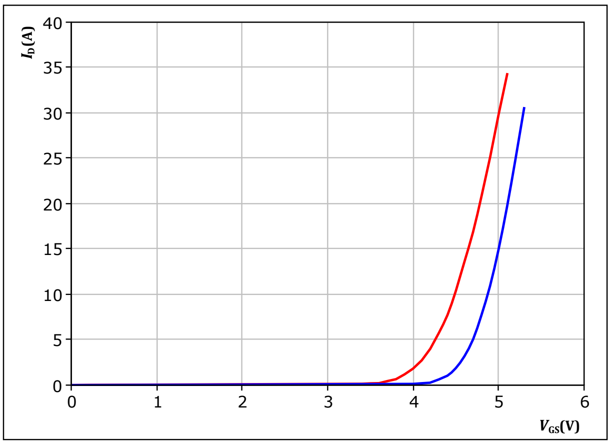
t_p =	250	μs
T_j =	125	°C

V_{GS} from -4 V to 20 V in steps of 2 V

figure 10. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$



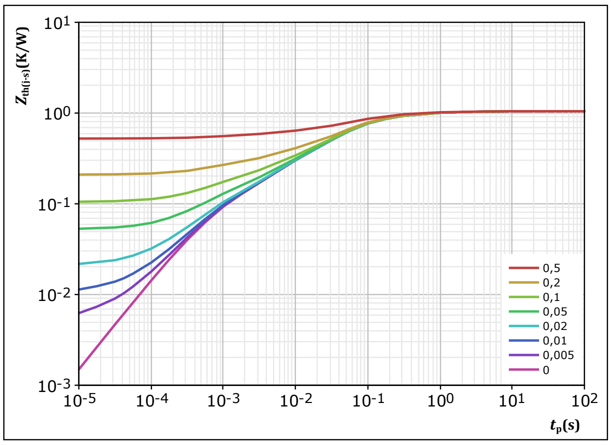
t_p =	250	μs
V_{DS} =	10	V

T_j: 25 °C, 125 °C

figure 11. **MOSFET**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,047	K/W

MOSFET thermal model values

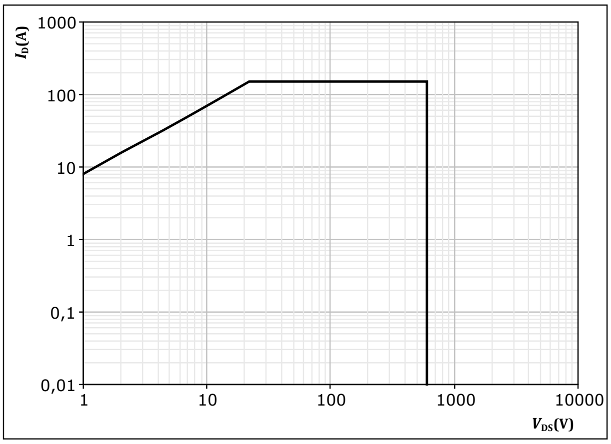
R (K/W)	τ (s)
6,31E-02	1,89E+00
2,11E-01	2,50E-01
5,41E-01	5,16E-02
1,55E-01	6,52E-03
7,68E-02	6,66E-04

PFC Switch Characteristics

figure 12.	MOSFET

Safe operating area

I_D = f(V_{DS})



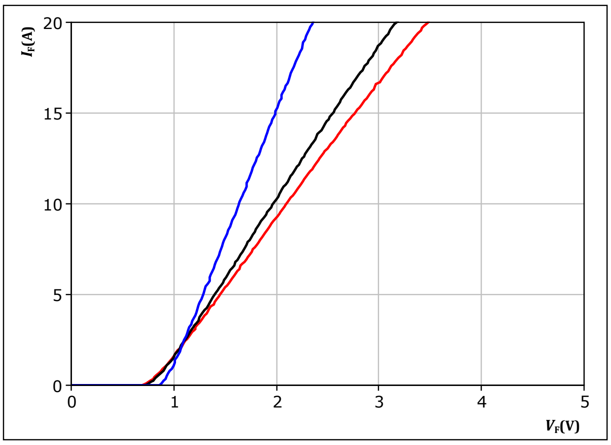
D =	single pulse	
T_s =	80	°C
V_{GS} =	10	V
T_j =	T_{jmax}	

PFC Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

I_F = f(V_F)



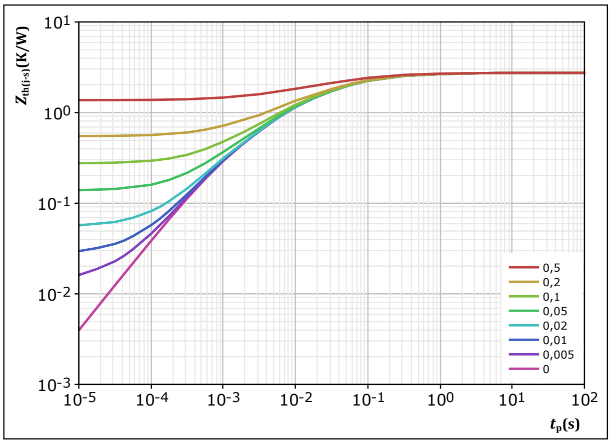
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 14. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 2,742 K/W

FWD thermal model values

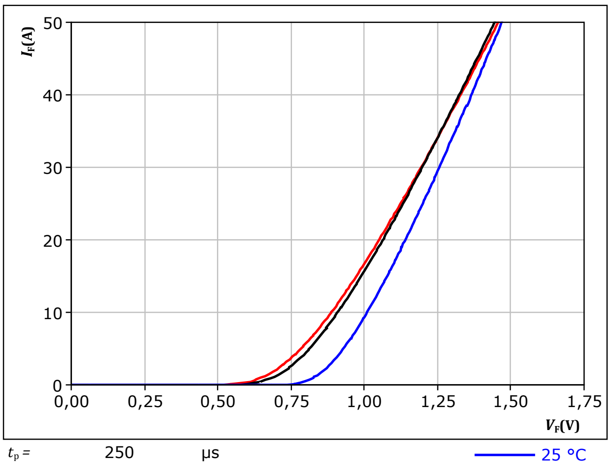
R (K/W)	τ (s)
1,36E-01	1,88E+00
5,61E-01	1,67E-01
9,94E-01	3,59E-02
8,51E-01	6,29E-03
1,99E-01	8,62E-04

Rectifier Diode Characteristics

figure 15. **Rectifier**

Typical forward characteristics

I_F = f(V_F)

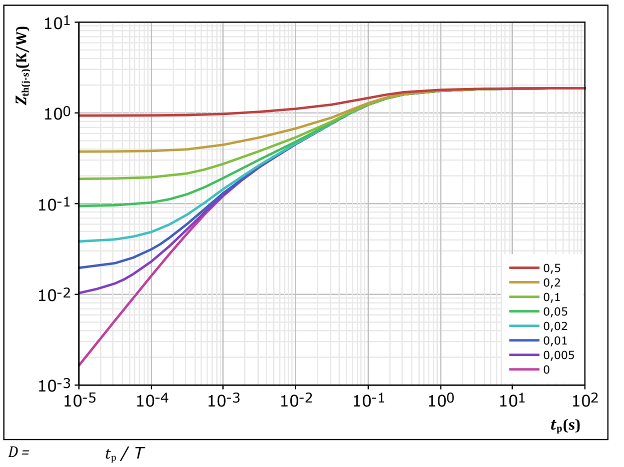


t_p =	250	µs		25 °C
			T_j:	125 °C
				150 °C

figure 16. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,869 K/W

Rectifier thermal model values

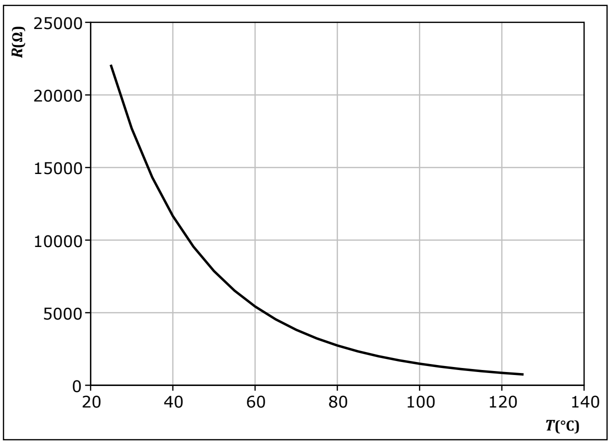
R (K/W)	τ (s)
5,65E-02	8,90E+00
1,70E-01	1,08E+00
6,15E-01	1,58E-01
6,94E-01	5,21E-02
2,16E-01	6,16E-03
1,19E-01	1,06E-03

Thermistor Characteristics

figure 17.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

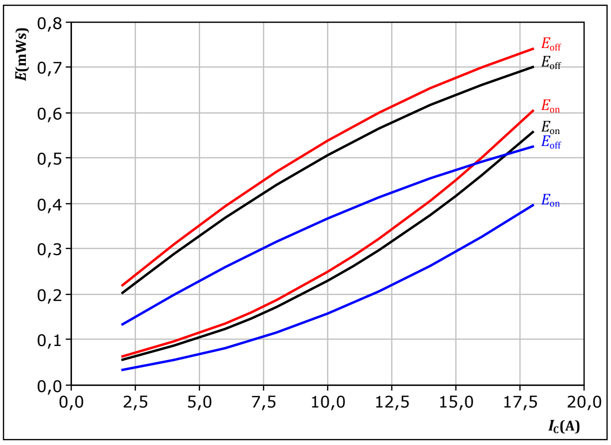


Inverter Switching Characteristics

figure 18. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



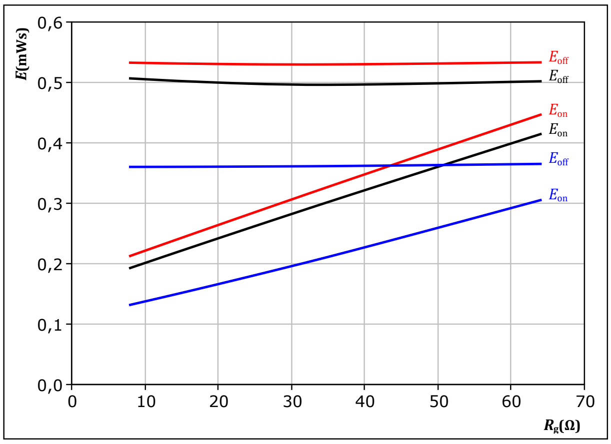
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C
R_{goff} =	16	Ω		

figure 19. **IGBT**

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

$E = f(R_g)$



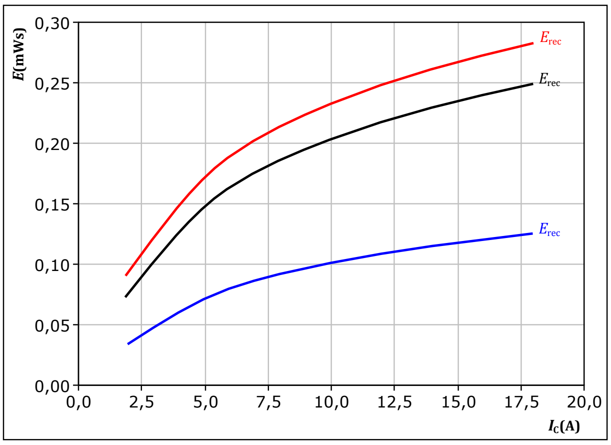
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	10	A		150 °C

figure 20. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



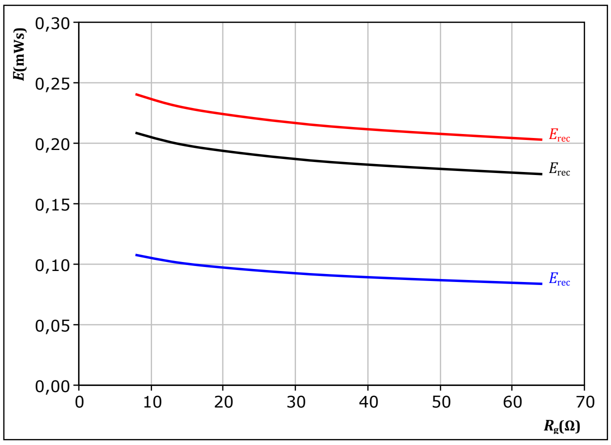
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 21. **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

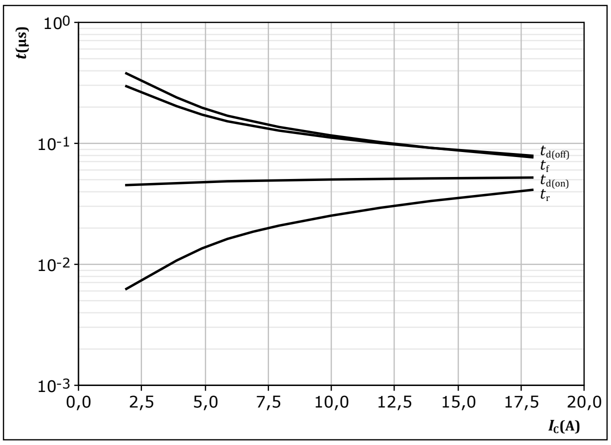
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	10	A		150 °C

Inverter Switching Characteristics

figure 22. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



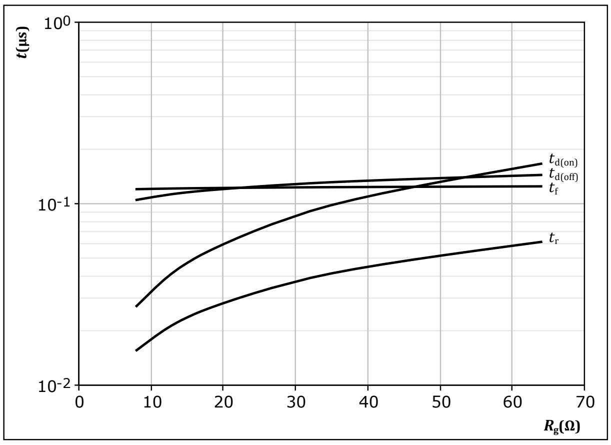
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 23. **IGBT**

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

$t = f(R_g)$



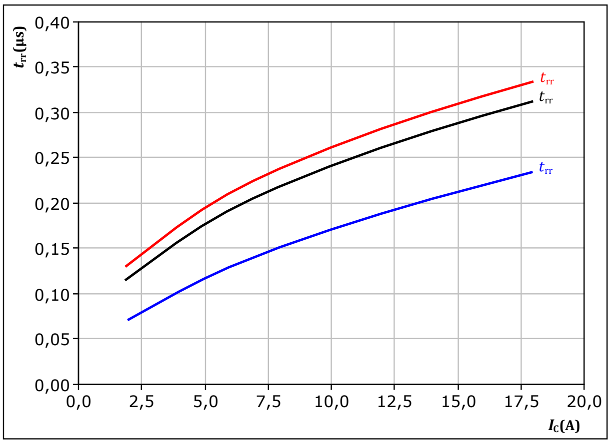
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	10	A

figure 24. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

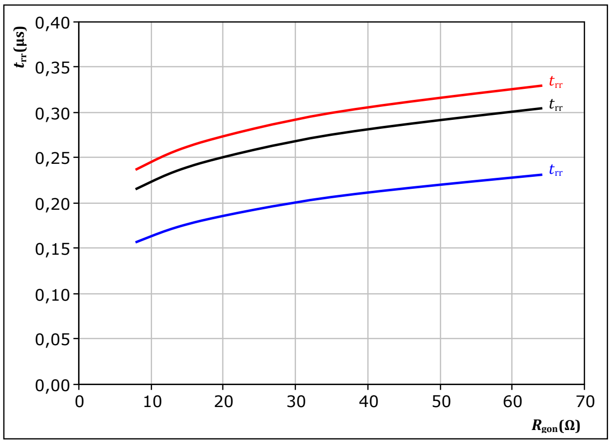
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 25. **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} =	±15	V
I_C =	10	A

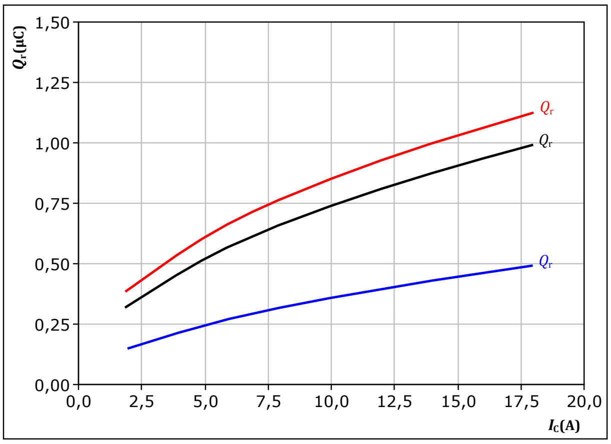
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 26. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



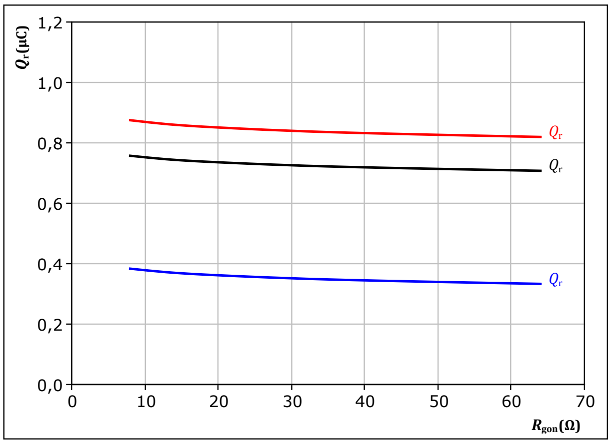
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 27. **FWD**

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

Q_r = f(R_{gon})



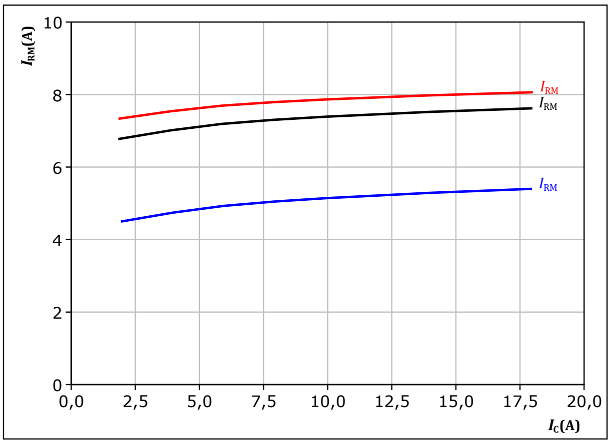
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	10	A		150 °C

figure 28. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



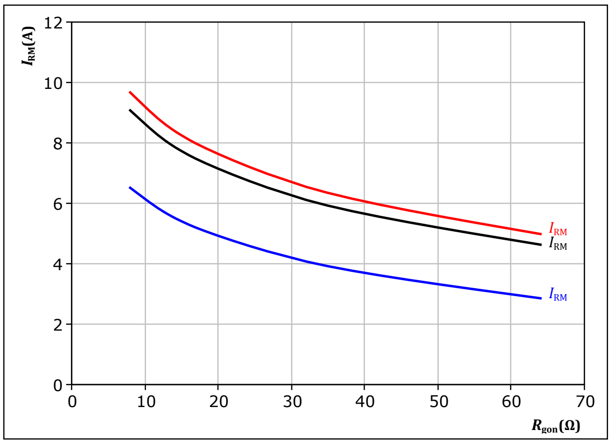
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 29. **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

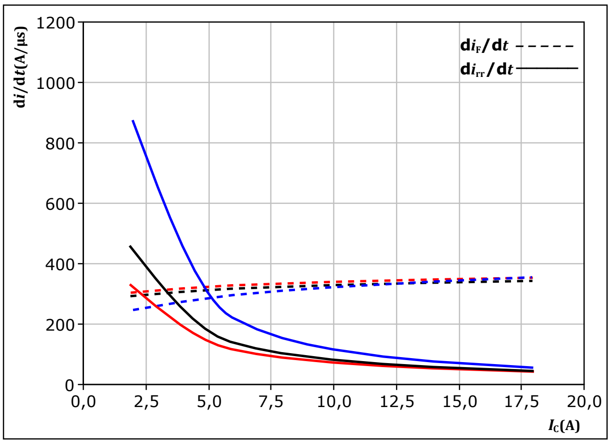
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	10	A		150 °C

Inverter Switching Characteristics

figure 30. **FWD**

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

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



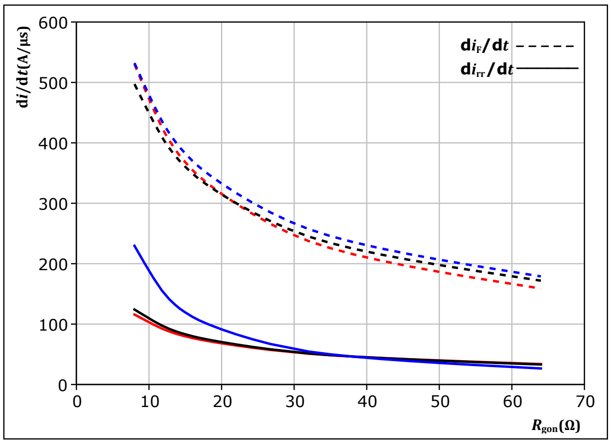
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 31. **FWD**

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

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



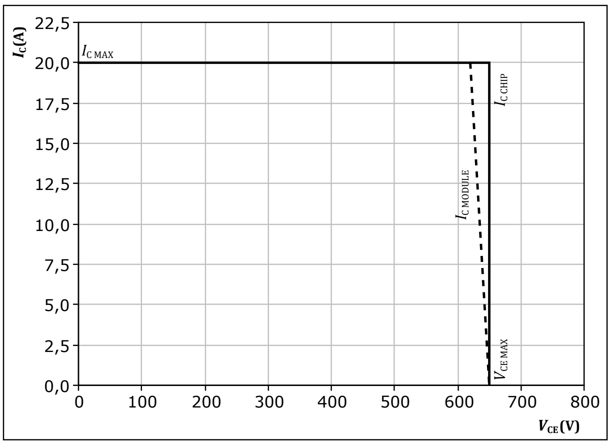
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	10	A		150 °C

figure 32. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



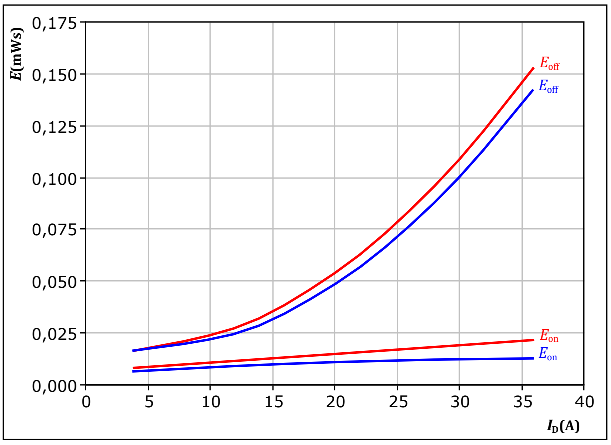
At	T_j =	150	°C
	R_{gon} =	16	Ω
	R_{goff} =	16	Ω

PFC Switching Characteristics

figure 33. **MOSFET**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



With an inductive load at

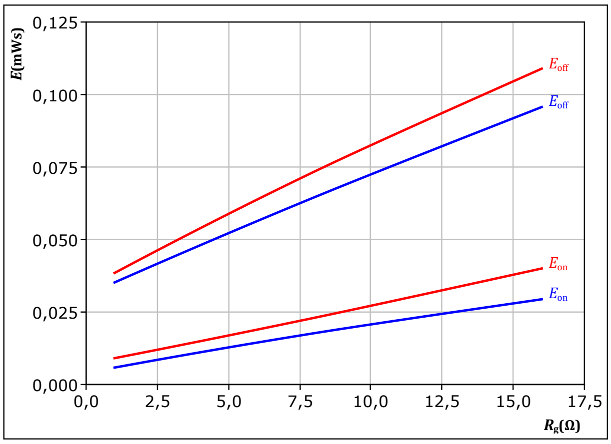
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

T_j: 25 °C (blue), 125 °C (red)

figure 34. **MOSFET**

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

$E = f(R_g)$



With an inductive load at

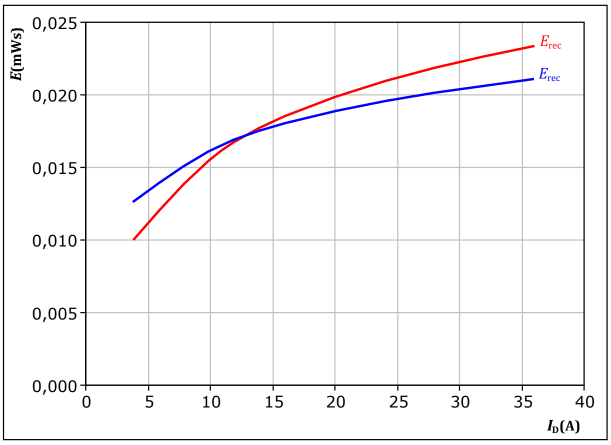
V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	20	A

T_j: 25 °C (blue), 125 °C (red)

figure 35. **FWD**

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



With an inductive load at

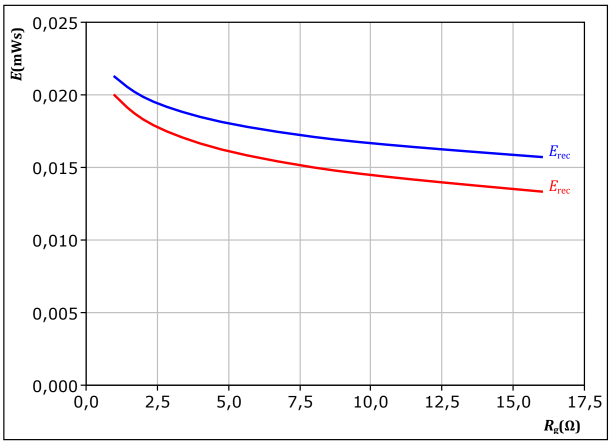
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	4	Ω

T_j: 25 °C (blue), 125 °C (red)

figure 36. **FWD**

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

$E_{rec} = f(R_g)$



With an inductive load at

V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	20	A

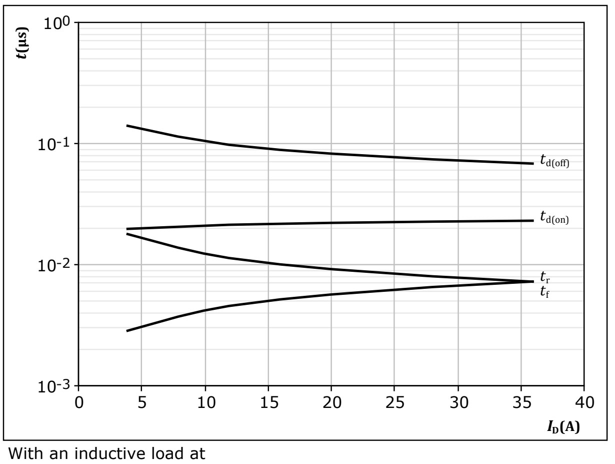
T_j: 25 °C (blue), 125 °C (red)

PFC Switching Characteristics

figure 37. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



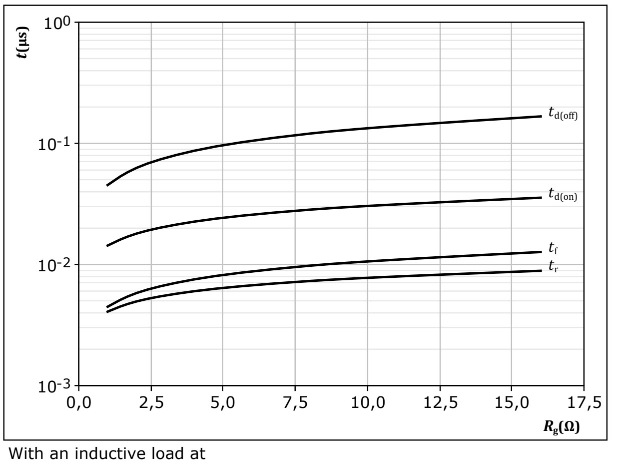
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 38. **MOSFET**

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

$t = f(R_g)$



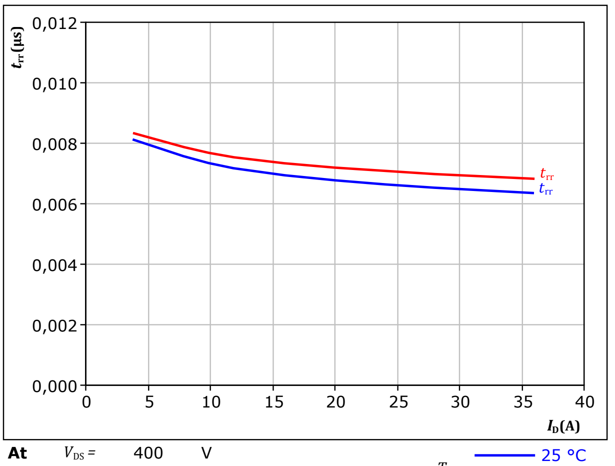
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	20	A

figure 39. **FWD**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



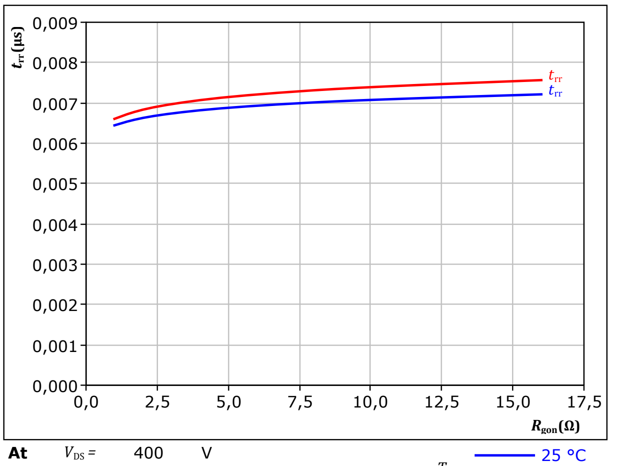
At			
	V_{DS} =	400	V
	V_{GS} =	0/10	V
	R_{gon} =	4	Ω

T_j: 25 °C, 125 °C

figure 40. **FWD**

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

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



At			
	V_{DS} =	400	V
	V_{GS} =	0/10	V
	I_D =	20	A

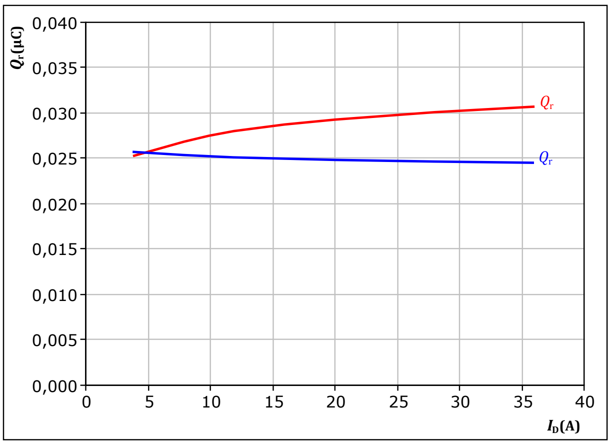
T_j: 25 °C, 125 °C

PFC Switching Characteristics

figure 41. **FWD**

Typical recovered charge as a function of drain current

Q_r = f(I_D)

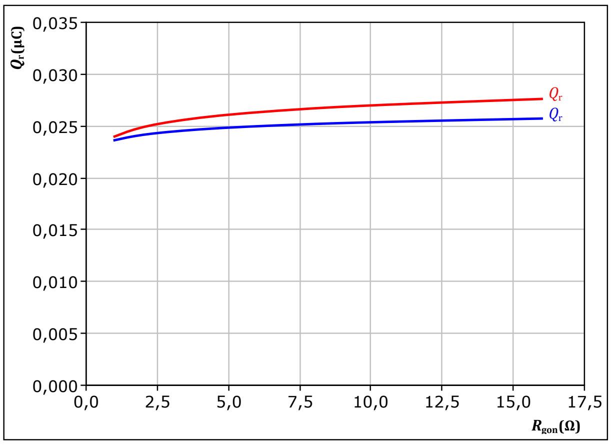


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
R_{gon} =	4	Ω		

figure 42. **FWD**

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

Q_r = f(R_{gon})

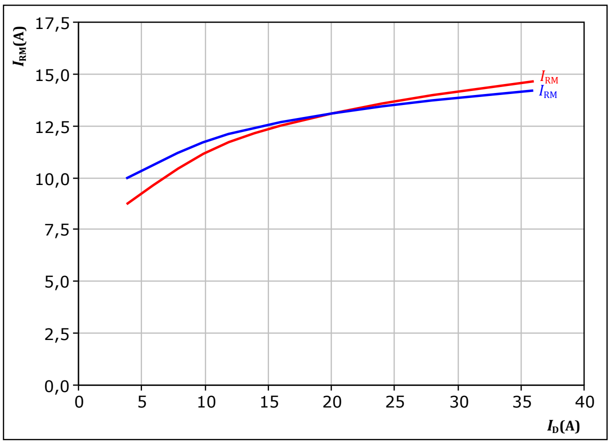


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
I_D =	20	A		

figure 43. **FWD**

Typical peak reverse recovery current as a function of drain current

I_{RM} = f(I_D)

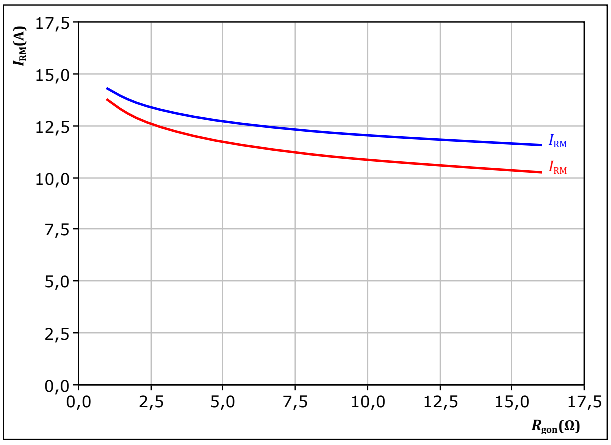


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
R_{gon} =	4	Ω		

figure 44. **FWD**

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

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



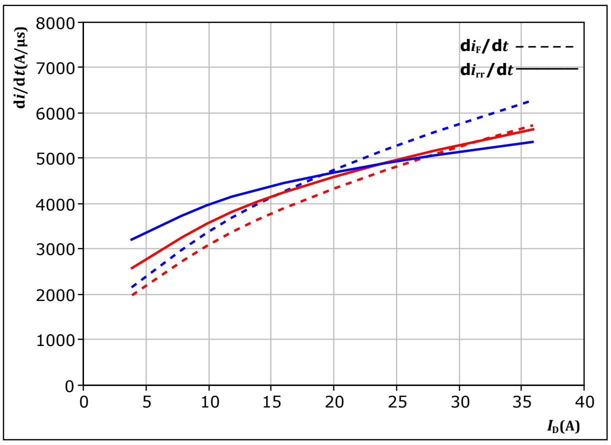
At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
I_D =	20	A		

PFC Switching Characteristics

figure 45. **FWD**

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

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

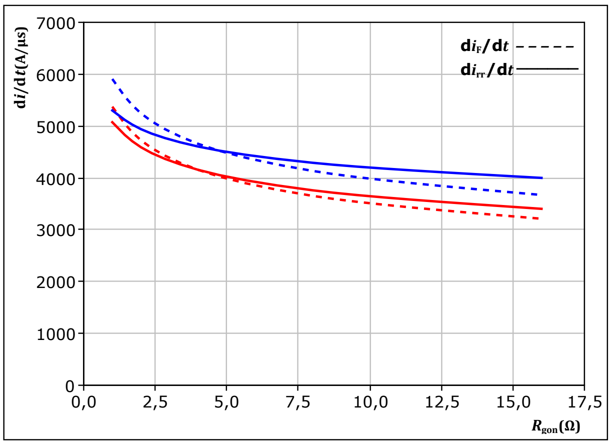


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
R_{gon} =	4	Ω		

figure 46. **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})

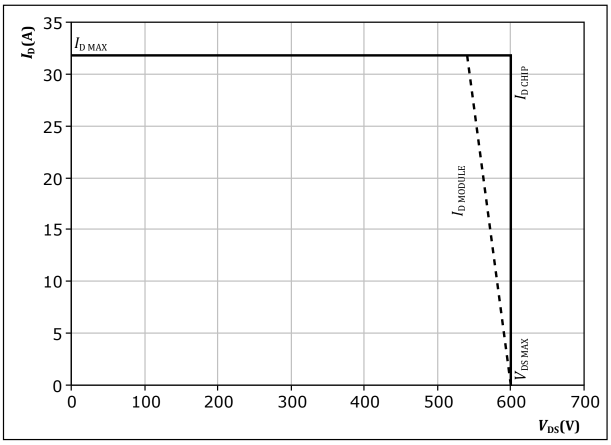


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
I_D =	20	A		

figure 47. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At		
T_j =	125	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Inverter Switching Definitions

figure 48. **IGBT**

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

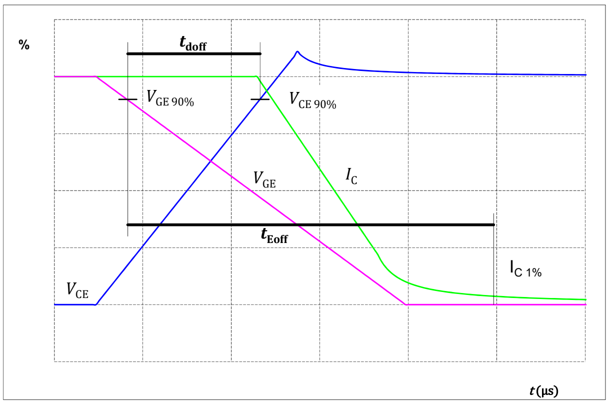


figure 49. **IGBT**

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

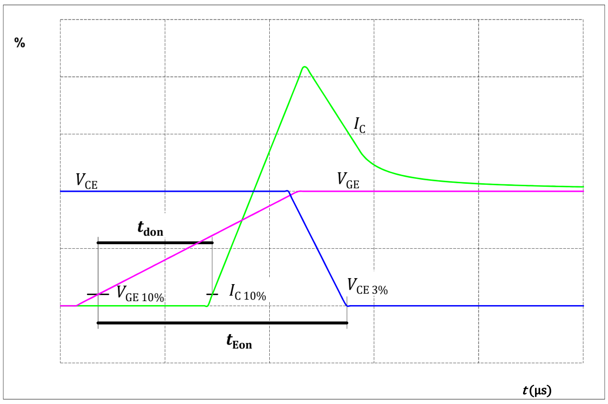


figure 50. **IGBT**

Turn-off Switching Waveforms & definition of t_f

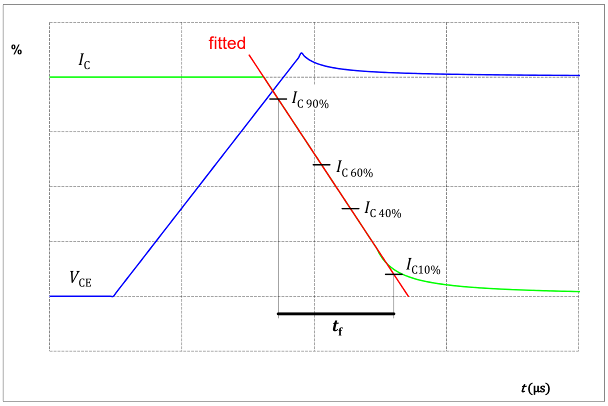
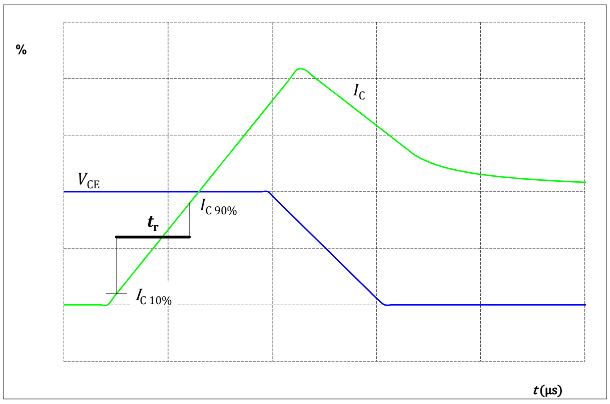


figure 51. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Inverter Switching Definitions

figure 52. FWD

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

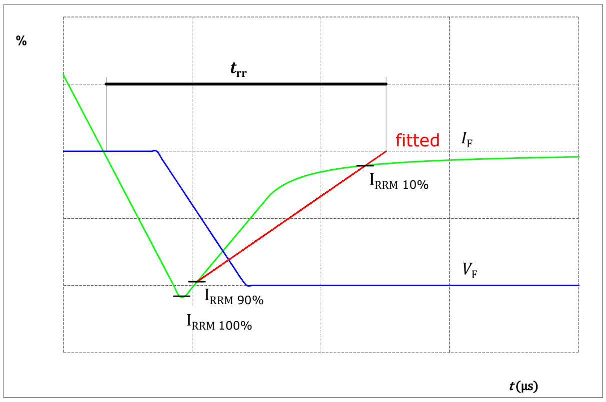
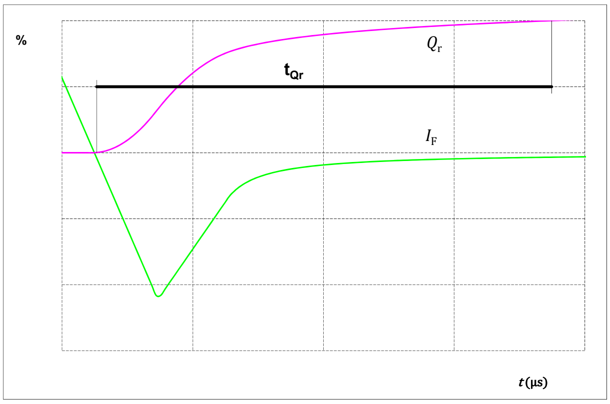


figure 53. FWD

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



PFC Switching Definitions

figure 48. **MOSFET**

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

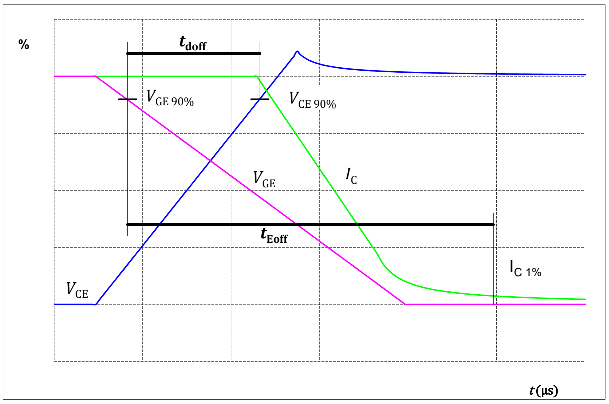


figure 49. **MOSFET**

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

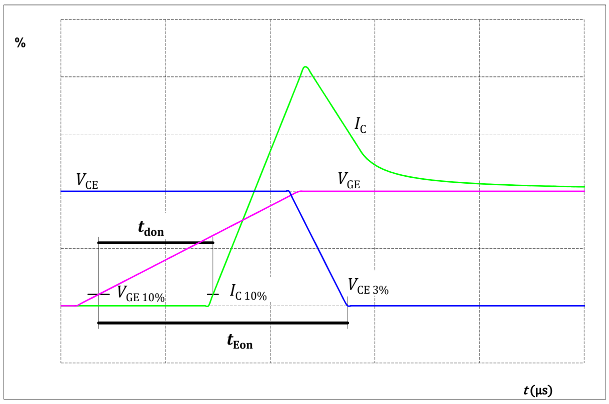


figure 50. **MOSFET**

Turn-off Switching Waveforms & definition of t_f

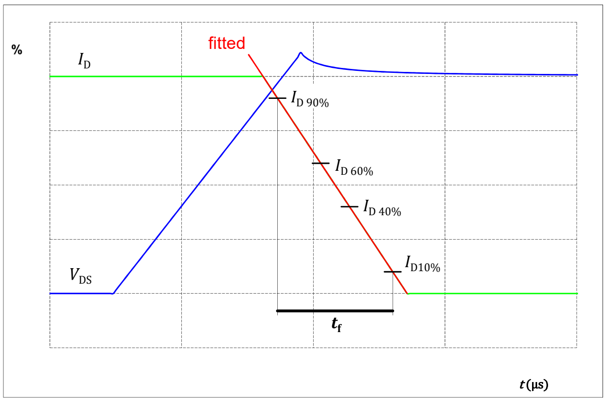
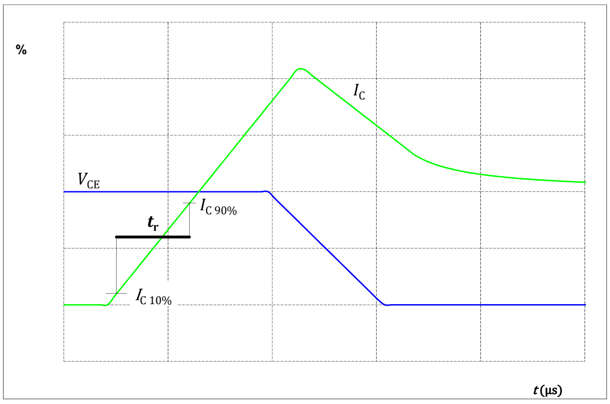


figure 51. **MOSFET**

Turn-on Switching Waveforms & definition of t_r



PFC Switching Definitions

figure 52. **FWD**

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

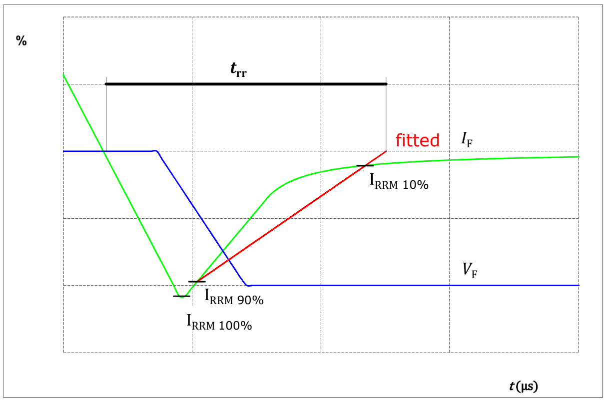


figure 53. **FWD**

Turn-on Switching Waveforms & definition of t_{Qrr} **(** t_{Qrr} **= integrating time for** Q_{rr}**)**

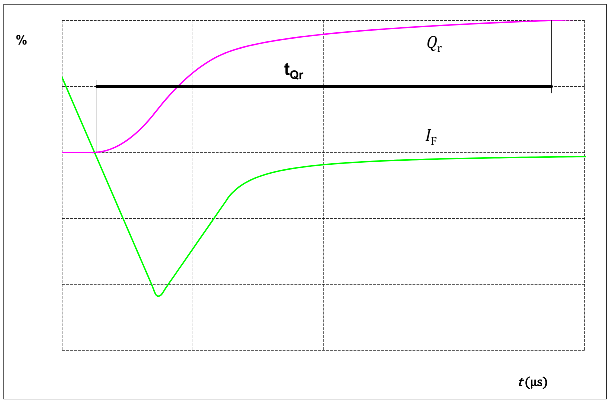
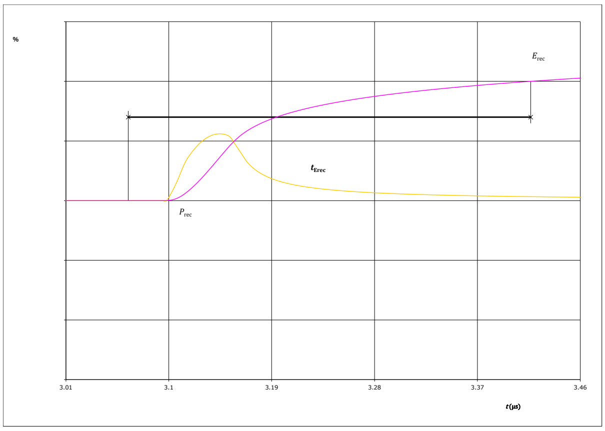


figure 54. **FWD**

Turn-on Switching Waveforms & definition of t_{Erec} **(** t_{Erec} **= integrating time for** E_{rec}**)**



Ordering Code

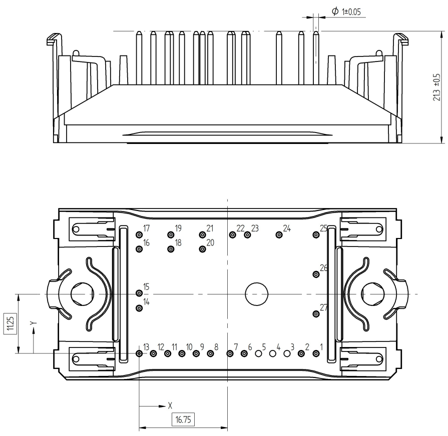
Version	Ordering Code
Without thermal paste	10-F006PPA010M701-LT23B79
With thermal paste (5,2 W/mK, PTM6000HV)	10-F006PPA010M701-LT23B79-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-F006PPA010M701-LT23B79-/3/

Marking

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

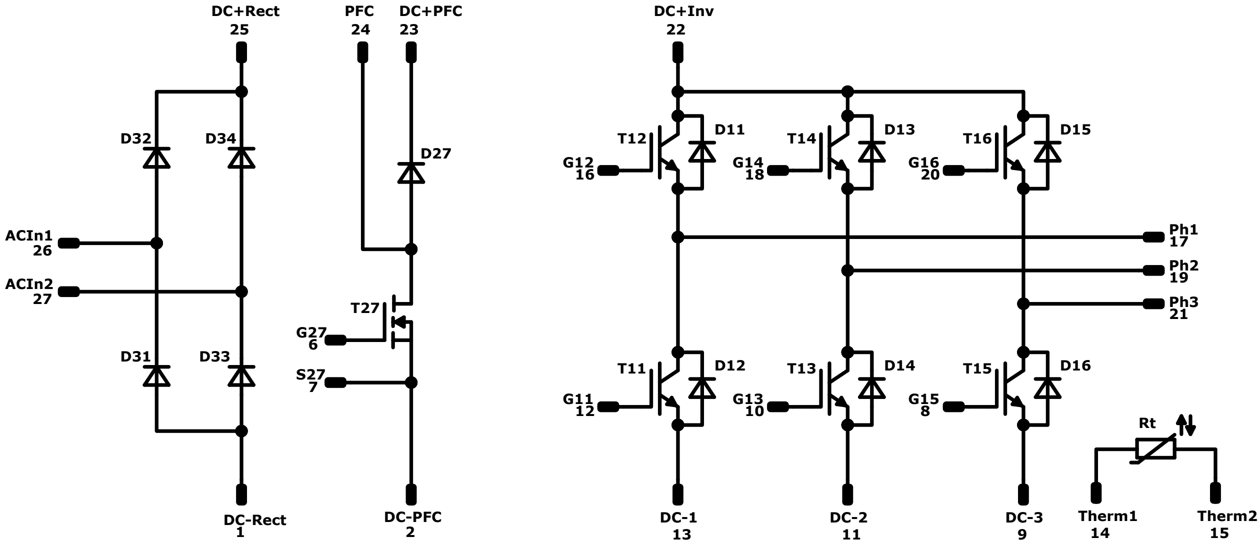
Outline

Pin table [mm]			
Pin	X	Y	Function
1	33,5	0	DC-Rect
2	30,7	0	DC-PFC
3	not assembled		
4	not assembled		
5	not assembled		
6	19,9	0	G27
7	17,2	0	S27
8	13,5	0	G15
9	10,8	0	DC-3
10	8,1	0	G13
11	5,4	0	DC-2
12	2,7	0	G11
13	0	0	DC-1
14	0	8,6	Therm1
15	0	11,45	Therm2
16	0	19,8	G12
17	0	22,5	Ph1
18	6	19,8	G14
19	6	22,5	Ph2
20	12	19,8	G16
21	12	22,5	Ph3
22	17,7	22,5	DC+Inv
23	20,5	22,5	DC+PFC
24	26,5	22,5	PFC
25	33,5	22,5	DC+Rect
26	33,5	15	ACIn1
27	33,5	7,5	ACIn2



Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	650 V	10 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	650 V	10 A	Inverter Diode	
T27	MOSFET	600 V	49 mΩ	PFC Switch	
D27	FWD	650 V	8 A	PFC Diode	
D31, D32, D33, D34	Rectifier	1600 V	18 A	Rectifier Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 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-F006PPA010M701-LT23B79-D2-14	26 Jul. 2022	Correct Ifsm and Ifrm of PFC Diode according to PCN-31-2022	