Vincotech

10-F107PPA030I704-PD52B69
datasheet

_flow_PIM 1 + PFC **650 V / 30 A**

Topology features

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

Component features

- Easy paralleling
- Low collector emitter saturation voltage
- Low turn-off losses
- Positive temperature coefficient

Housing features

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

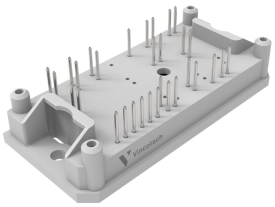
Target applications

- Embedded Drives
- HVAC
- Industrial Drives

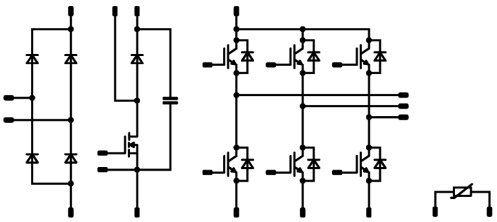
Types

- 10-F107PPA030I704-PD52B69

flow 1 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	38	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	90	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	60	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 400 V T_j = 150 °C	3	µs
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	24	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	60	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	40	W
Maximum junction temperature	T_{jmax}		175	°C
PFC Switch				
Drain-source voltage	V_{DSS}		750	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}	61	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	39	W
Gate-source voltage	V_{GSS}	static	-4 / 21	V
		dynamic	-4 / 23	V
Maximum Junction Temperature	T_{jmax}		175	°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	28	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	104	A
Surge current capability	I^2t			54	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	47	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	62	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	400	A
Surge current capability	I^2t			800	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	89	W
Maximum junction temperature	T_{jmax}			175	°C
Capacitor (PFC)					
Maximum DC voltage	V_{MAX}			630	V
Operation Temperature	T_{op}			-55 ... 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
Creepage distance				>12,7	mm
Clearance				>12,7	mm
Comparative Tracking Index	CTI			≥ 600	

*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	$V_{GE(th)}$	V_{CE} = V_{GE}			0,0003	25	4,35	5	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150		1,3 1,37 1,39	1,65(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			20	µA
Gate-emitter leakage current	I_{GES}		0	650		25			100	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		1900		pF
Output capacitance	C_{oes}							62		pF
Reverse transfer capacitance	C_{res}							20		pF
Gate charge	Q_g	V_{CC} = 520 V	15		30	25		180		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,59		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	350	30	25 125 150		121,7 125,15 125,61		ns
Rise time	t_r					25 125 150		36,56 37,09 37,55		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		166,33 196,2 203,3		ns
Fall time	t_f					25 125 150		26,4 45,13 49,49		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,541 µC Q_{rFWD}=1,15 µC Q_{rFWD}=1,33 µC				25 125 150		0,825 1,07 1,19		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,47 0,715 0,789		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				20	25 125 150		1,71 1,6 1,55	2[1]	V
Reverse leakage current	I_R	V_r = 650 V				25			20	µA
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						2,38		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=642 A/µs di/dt=722 A/µs di/dt=613 A/µs	±15	350	30	25 125 150		8,88 13,06 14,07		A
Reverse recovery time	t_{rr}					25 125 150		105,28 149,31 161,59		ns
Recovered charge	Q_r					25 125 150		0,541 1,15 1,33		µC
Reverse recovered energy	E_{rec}					25 125 150		0,097 0,224 0,266		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		246,16 182,3 150,35		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	
PFC Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		18		17	25 125 150		39,7 59,3 66,6	57(1)	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,00889	25	2,8	3,5	4,8	V
Gate to Source Leakage Current	I_{GSS}		21	0		25	-100		100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	750		25		1	80	µA
Internal gate resistance	r_g							4		Ω
Gate charge	Q_g		18	500	17	25		63		nC
Gate to source charge	Q_{GS}							14		
Gate to drain charge	Q_{GD}							19		
Short-circuit input capacitance	C_{iss}	f = 1 Mhz	0	500	0	25		1460		pF
Short-circuit output capacitance	C_{oss}							69		
Reverse transfer capacitance	C_{rss}							5		
Diode forward voltage	V_{SD}		0		17	25		3,3		V
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						2,42		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	-4/15	400	17	25 125 150		12,15 11,71 11,6		ns
Rise time	t_r					25 125 150		5,76 5,92 5,98		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		28,71 32,79 33,66		ns
Fall time	t_f					25 125 150		5,42 5,61 6,41		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,111 µC Q_{rFWD}=0,121 µC Q_{rFWD}=0,122 µC				25 125 150		0,087 0,084 0,083		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,012 0,013 0,014		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				20	25 125 150		1,36 1,42 1,45	1,5(1) 1,71(1)	V
Reverse leakage current	I_R	V_r = 650 V				25 150		0,06 4	100 400	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						2,03		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=3155 A/µs di/dt=3523 A/µs di/dt=3580 A/µs	-4/15	400	17	25 125 150		17,16 18,74 19,17		A
Reverse recovery time	t_{rr}					25 125 150		11,17 11,12 11,11		ns
Recovered charge	Q_r					25 125 150		0,111 0,121 0,122		µC
Reverse recovered energy	E_{rec}					25 125 150		0,019 0,023 0,024		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		4246,93 4884,77 5160,78		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				35	25 125 150		1,19 1,16 1,16	1,5(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			50 1000	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,07		K/W
Capacitor (PFC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		33		nF
Tolerance							-5		5	%
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

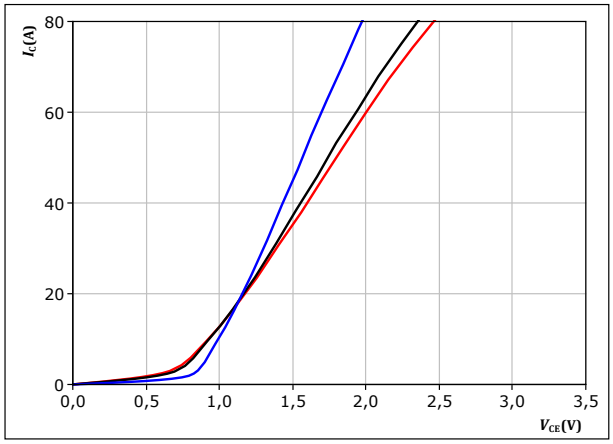
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

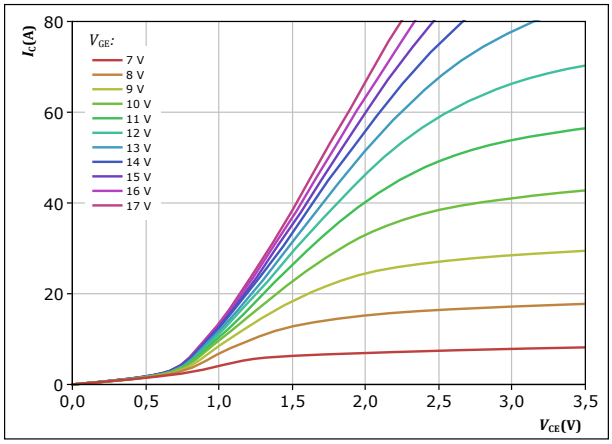


t_p =	250	µs	T_j:	25 °C
V_{GE} =	15	V		125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



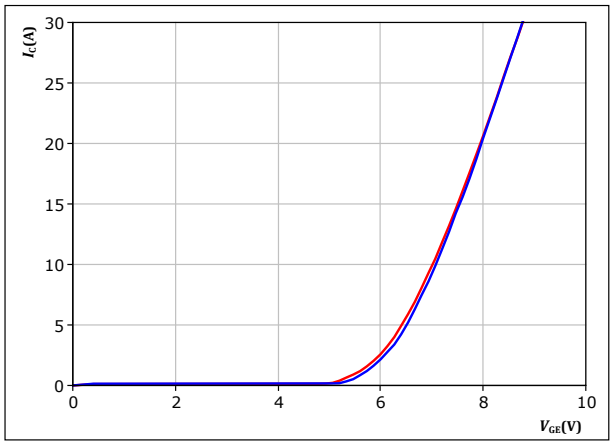
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

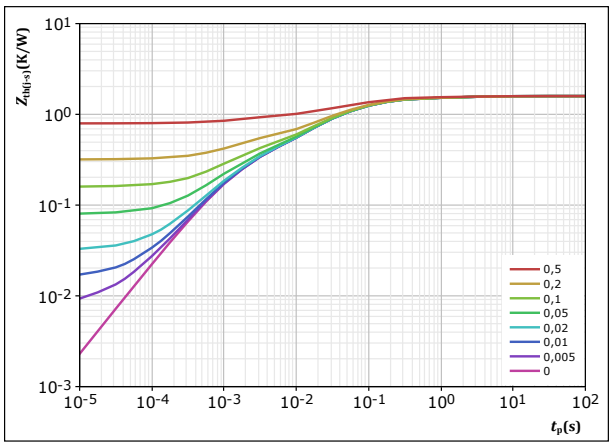


t_p =	250	µs	T_j:	125 °C
V_{CE} =	9	V		150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,589	K/W

IGBT thermal model values

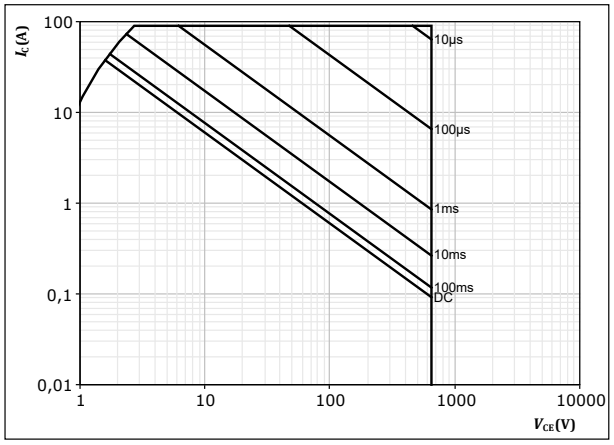
R (K/W)	τ (s)
6,07E-02	3,79E+00
9,88E-02	6,48E-01
6,29E-01	8,64E-02
5,46E-01	1,85E-02
2,54E-01	1,32E-03

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$

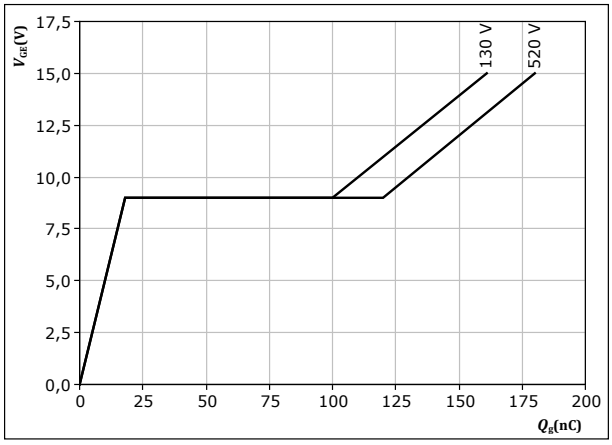


$D =$ single pulse
$T_s =$ 80 °C
$V_{GE} =$ 15 V
$T_j =$ T_{jmax}

figure 6. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_g)$



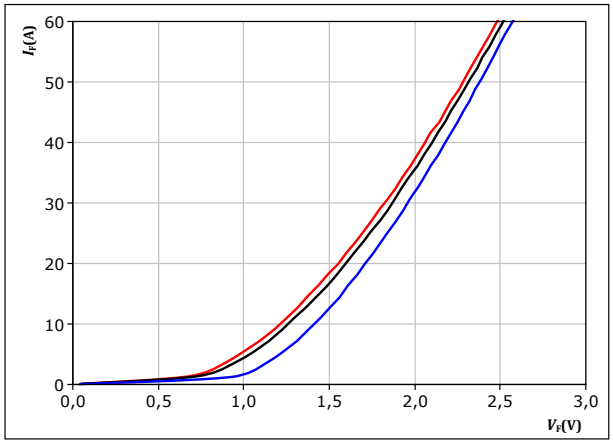
$I_C =$ 30 A
$T_j =$ 25 °C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



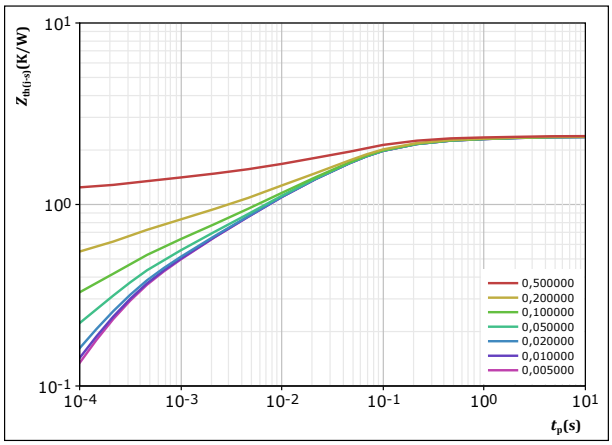
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,381 K/W

FWD thermal model values

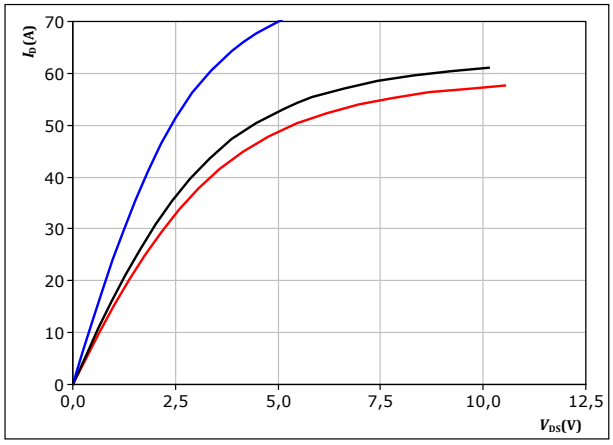
R (K/W)	τ (s)
6,09E-02	1,10E+02
1,14E-01	1,40E+00
3,76E-01	1,57E-01
8,89E-01	3,94E-02
4,69E-01	6,22E-03
2,44E-01	1,08E-03
2,57E-01	2,13E-04

PFC Switch Characteristics

figure 9. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

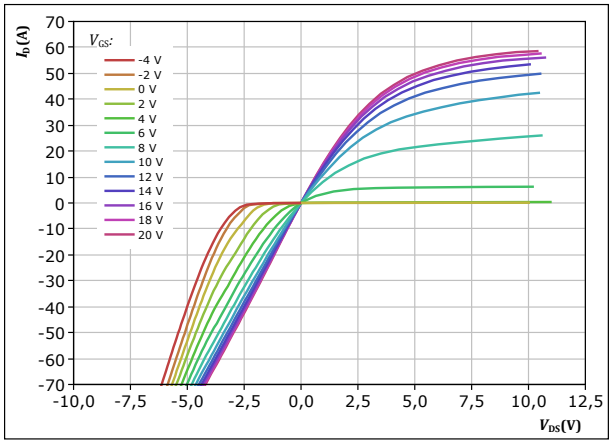


t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

figure 10. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



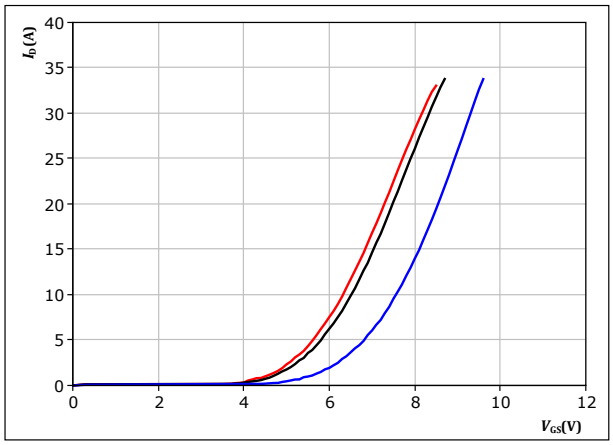
t_p =	250	µs
T_j =	150	°C

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

figure 11. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

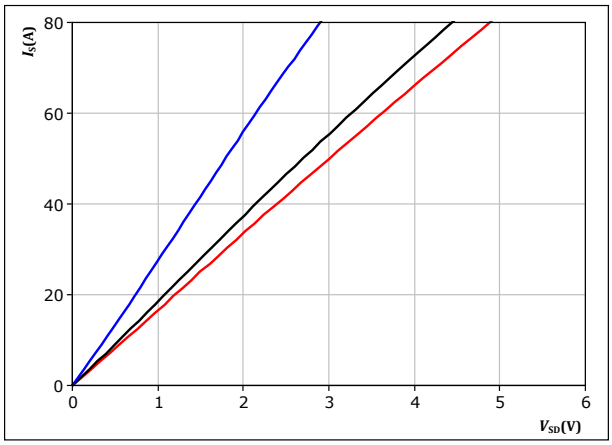


t_p =	250	µs		
V_{DS} =	10	V	T_j:	25 °C
				125 °C
				150 °C

figure 12. **MOSFET**

Typical reverse drain current characteristics

$I_{SD} = f(V_{SD})$



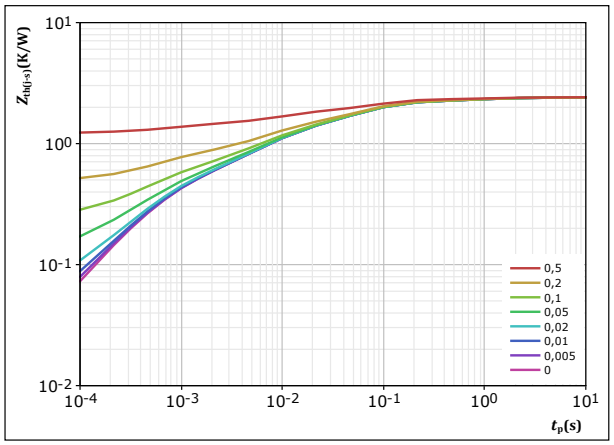
t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

PFC Switch Characteristics

figure 13. **MOSFET**

Transient thermal impedance as a function of pulse width

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



$D =$ t_p / T

$R_{th(j-s)} =$ 2,415 K/W

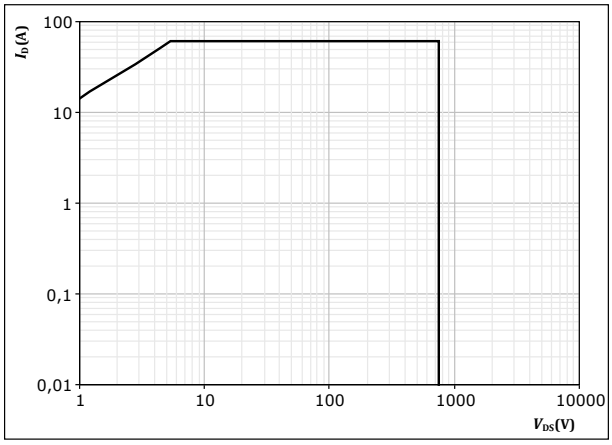
MOSFET thermal model values

R (K/W)	τ (s)
5,06E-02	9,42E+00
2,10E-01	7,23E-01
1,06E+00	5,90E-02
7,35E-01	6,64E-03
3,69E-01	5,63E-04

figure 14. **MOSFET**

Safe operating area

$I_D = f(V_{DS})$



$D =$ single pulse

$T_s =$ 80 °C

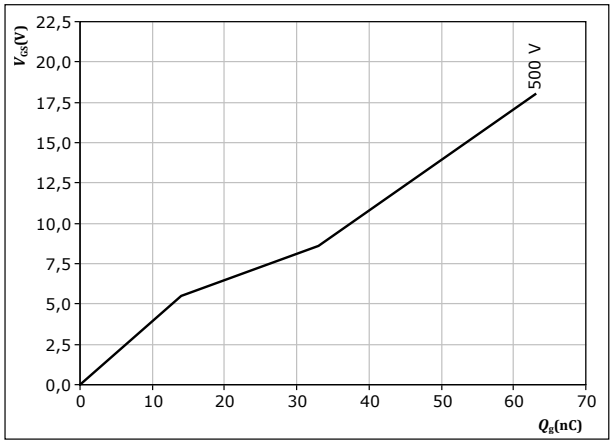
$V_{GS} =$ 18 V

$T_j =$ T_{jmax}

figure 15. **MOSFET**

Gate voltage vs gate charge

$V_{GS} = f(Q_g)$



$I_D =$ 17 A

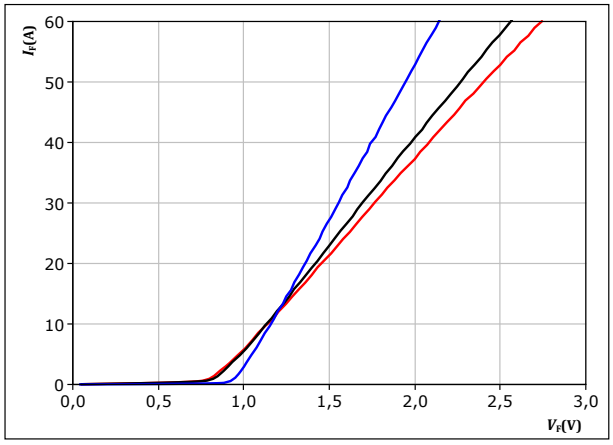
$T_j =$ 25 °C

PFC Diode Characteristics

figure 16. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



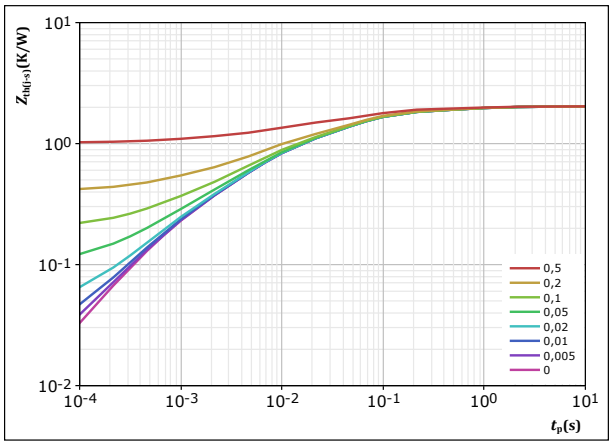
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 17. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,03 K/W

FWD thermal model values

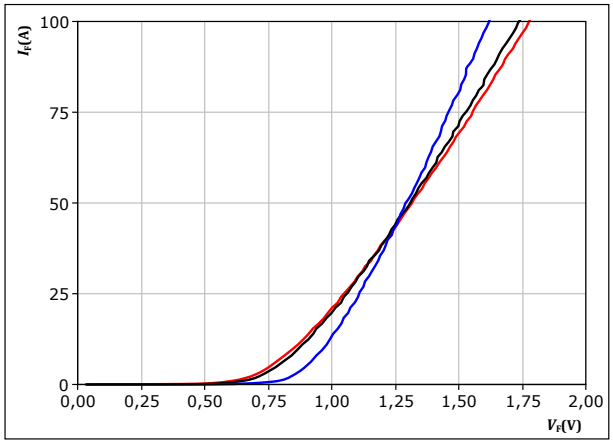
R (K/W)	τ (s)
3,34E-02	5,97E+00
2,38E-01	5,50E-01
9,88E-01	5,14E-02
6,25E-01	6,08E-03
1,51E-01	6,79E-04

Rectifier Diode Characteristics

figure 18. **Rectifier**

Typical forward characteristics

$I_F = f(V_F)$



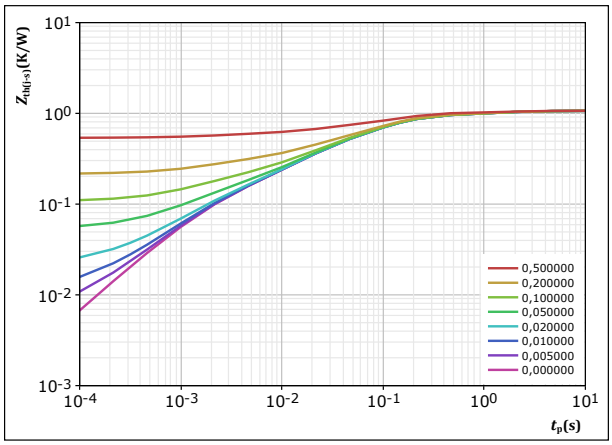
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 19. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,068 K/W

Rectifier thermal model values

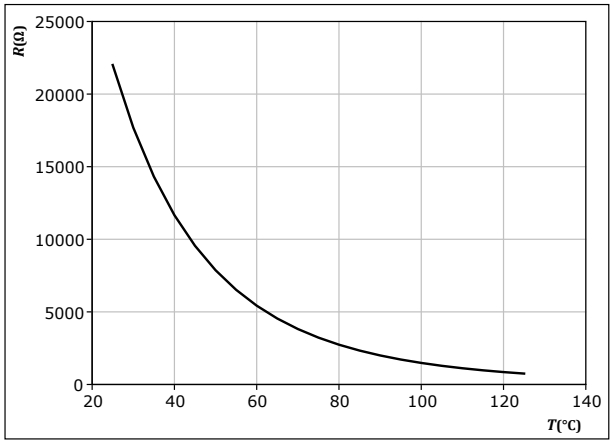
R (K/W)	τ (s)
1,68E-02	1,30E+01
1,38E-01	1,14E+00
6,07E-01	1,03E-01
2,28E-01	1,76E-02
8,32E-02	1,67E-03

Thermistor Characteristics

figure 20. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

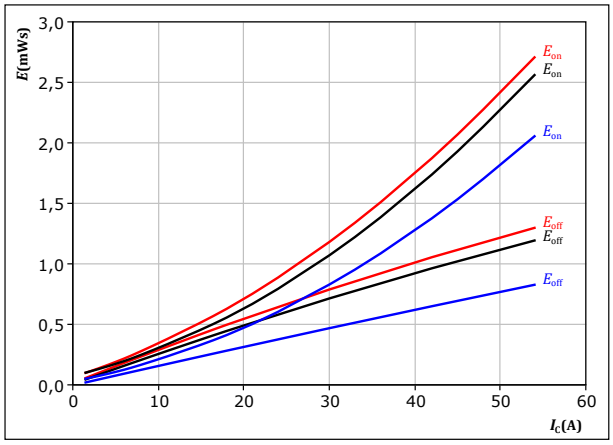


Inverter Switching Characteristics

figure 21. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



With an inductive load at

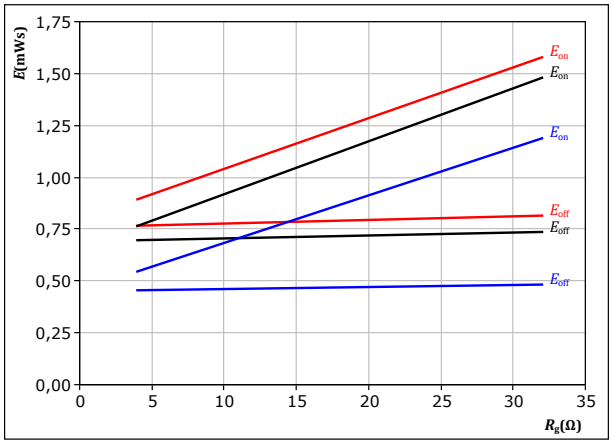
V_{CE} =	350	V	
V_{GE} =	±15	V	
R_{gon} =	16	Ω	
R_{goff} =	16	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 22. **IGBT**

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

$E = f(R_g)$



With an inductive load at

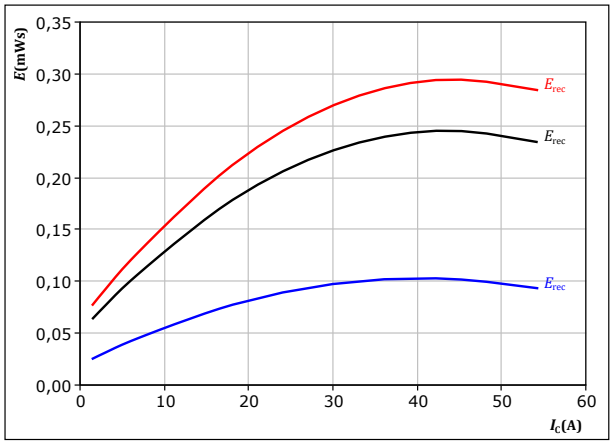
V_{CE} =	350	V	
V_{GE} =	±15	V	
I_C =	30	A	

T_j: 25 °C, 125 °C, 150 °C

figure 23. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

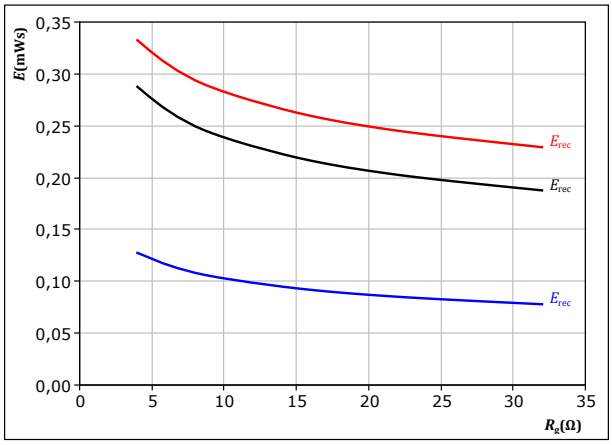
V_{CE} =	350	V	
V_{GE} =	±15	V	
R_{gon} =	16	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 24. **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	
V_{GE} =	±15	V	
I_C =	30	A	

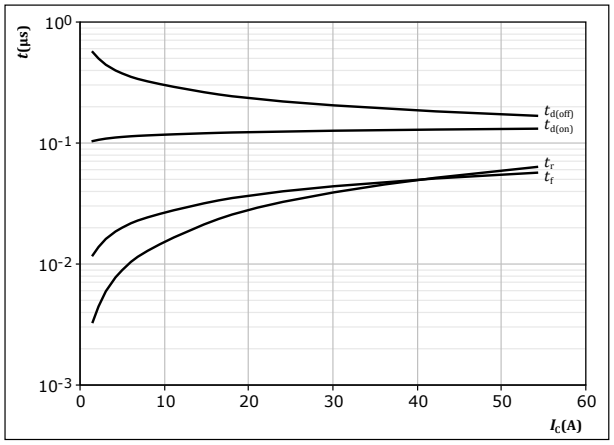
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 25. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



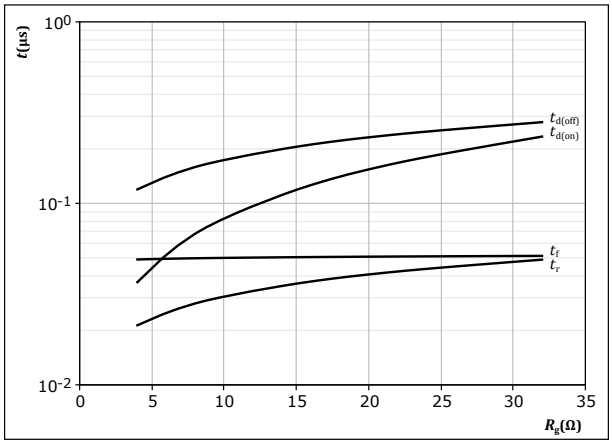
With an inductive load at

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

figure 26. **IGBT**

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

t = f(R_g)



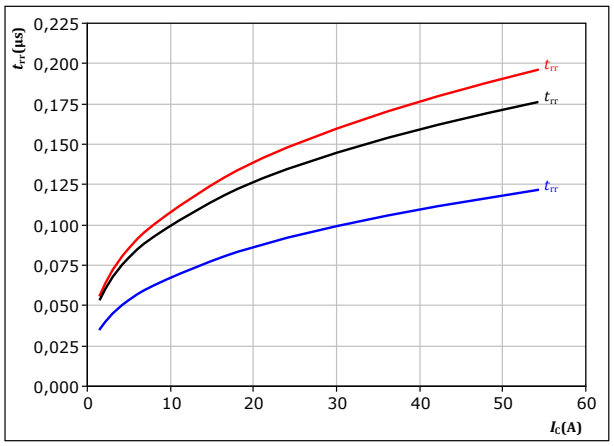
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

figure 27. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

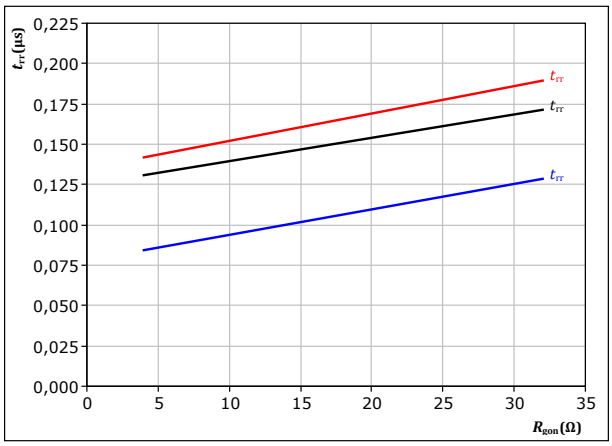
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 28. **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 =	30	A

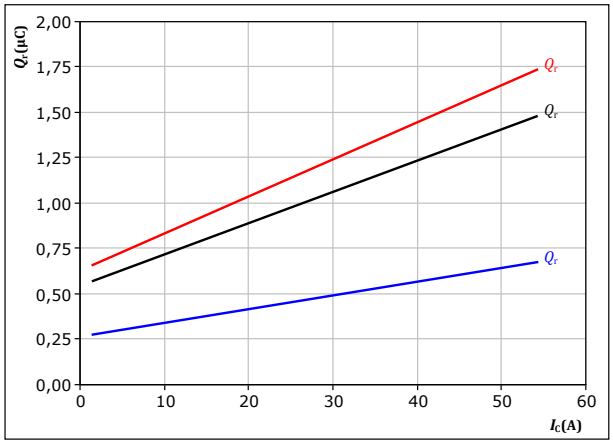
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 29. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



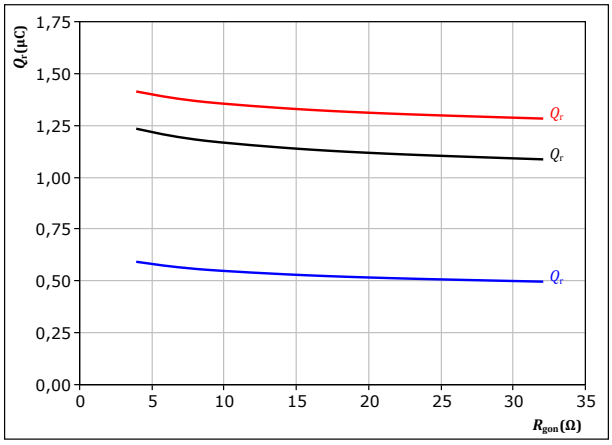
With an inductive load at

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

figure 30. **FWD**

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

$Q_r = f(R_{gon})$



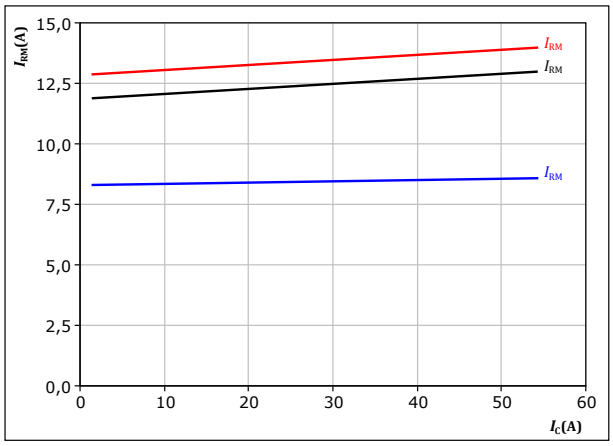
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	30	A	150 °C

figure 31. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



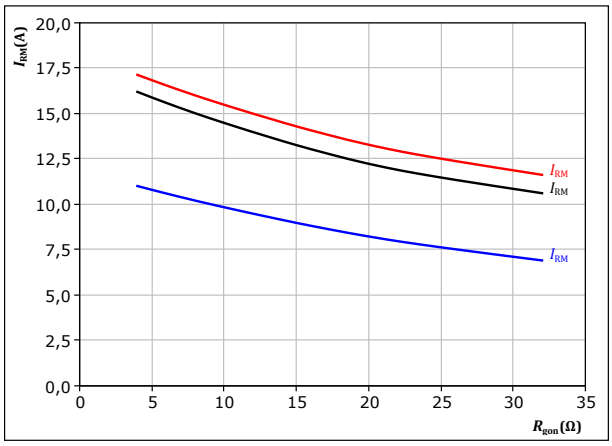
With an inductive load at

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

figure 32. **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

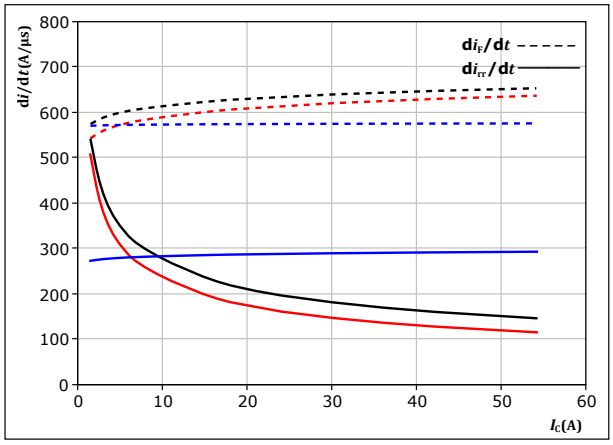
V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	30	A	150 °C

Inverter Switching Characteristics

figure 33. **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)



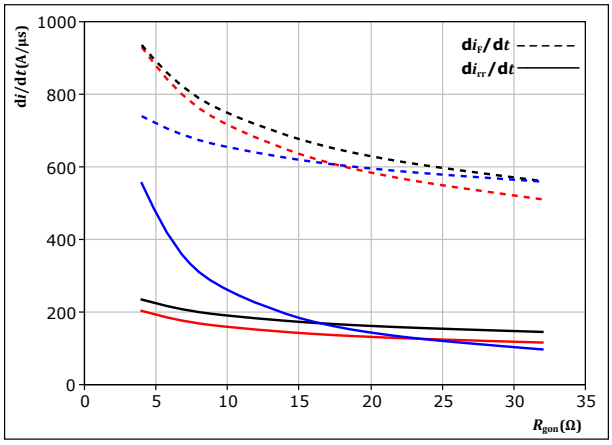
With an inductive load at

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

figure 34. **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})



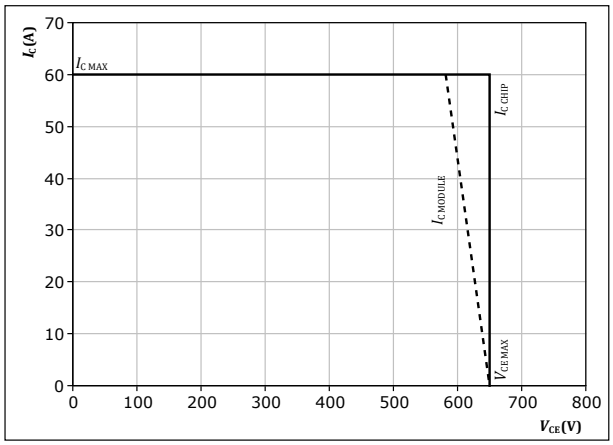
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	30	A		150 °C

figure 35. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

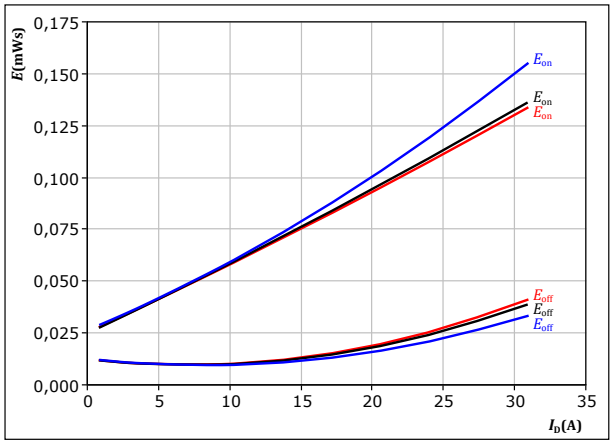
T_j =	150	°C	
R_{gon} =	16	Ω	
R_{goff} =	16	Ω	

PFC Switching Characteristics

figure 36. **MOSFET**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



With an inductive load at

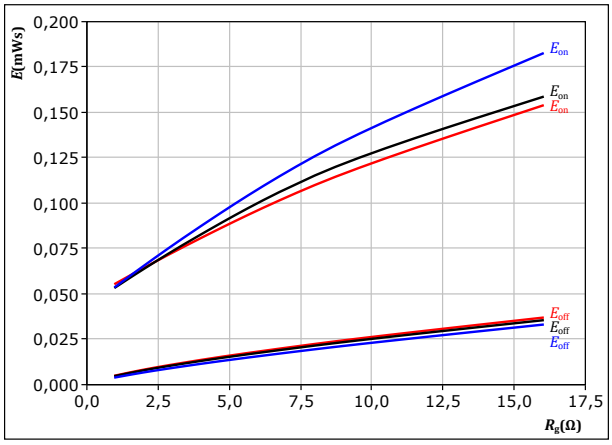
V_{DS} =	400	V	
V_{GS} =	-4/15	V	
R_{gon} =	4	Ω	
R_{goff} =	4	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 37. **MOSFET**

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

$E = f(R_g)$



With an inductive load at

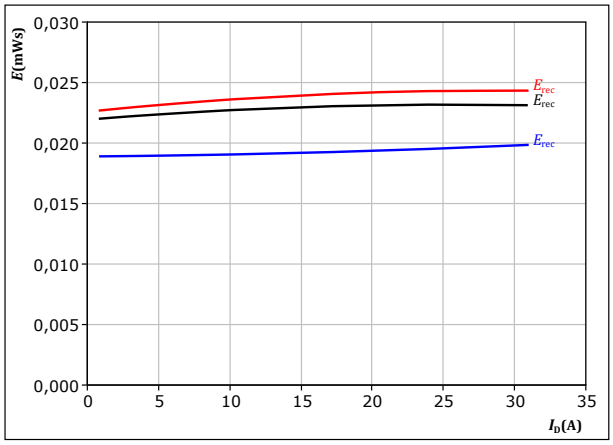
V_{DS} =	400	V	
V_{GS} =	-4/15	V	
I_D =	17	A	

T_j: 25 °C, 125 °C, 150 °C

figure 38. **FWD**

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



With an inductive load at

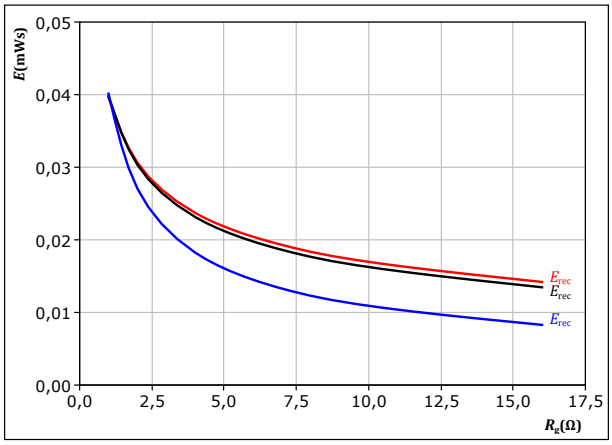
V_{DS} =	400	V	
V_{GS} =	-4/15	V	
R_{gon} =	4	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 39. **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} =	-4/15	V	
I_D =	17	A	

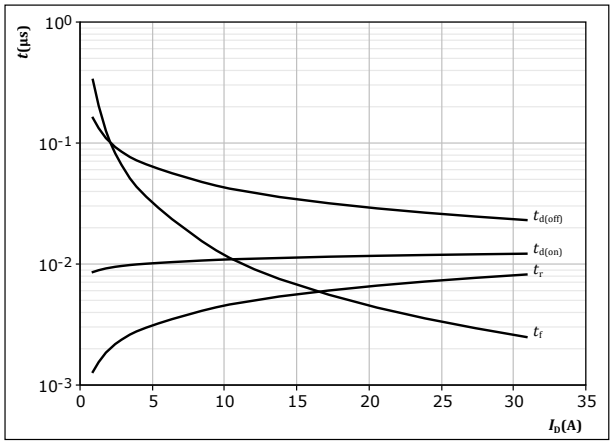
T_j: 25 °C, 125 °C, 150 °C

PFC Switching Characteristics

figure 40. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



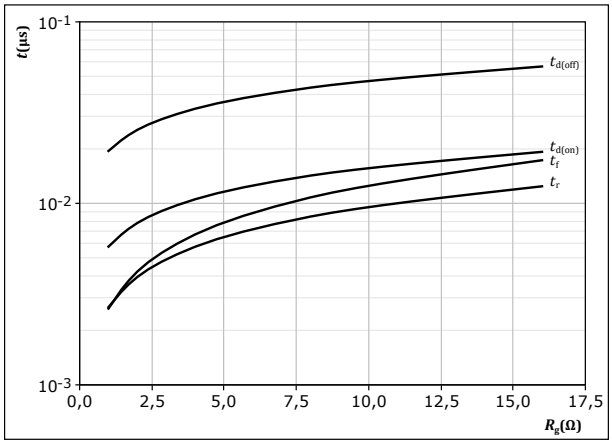
With an inductive load at

T_j =	150	°C
V_{DS} =	400	V
V_{GS} =	-4/15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 41. **MOSFET**

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

$t = f(R_g)$



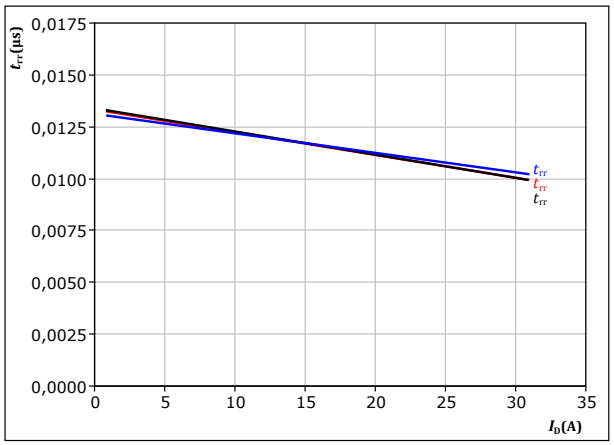
With an inductive load at

T_j =	150	°C
V_{DS} =	400	V
V_{GS} =	-4/15	V
I_D =	17	A

figure 42. **FWD**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



At

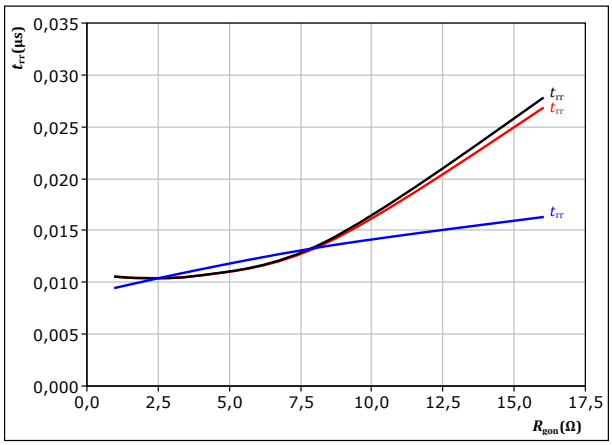
V_{DS} =	400	V
V_{GS} =	-4/15	V
R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 43. **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} =	-4/15	V
I_D =	17	A

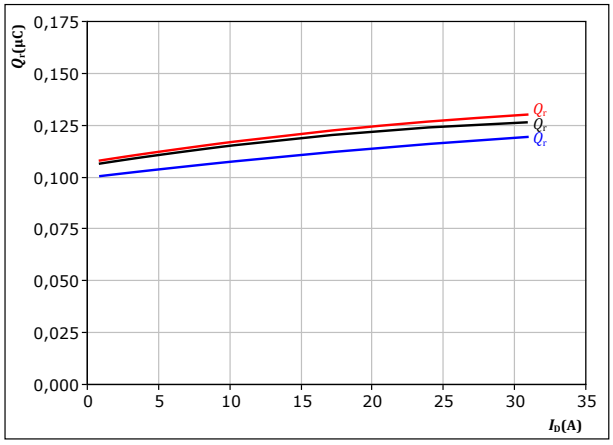
T_j: 25 °C, 125 °C, 150 °C

PFC Switching Characteristics

figure 44. **FWD**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

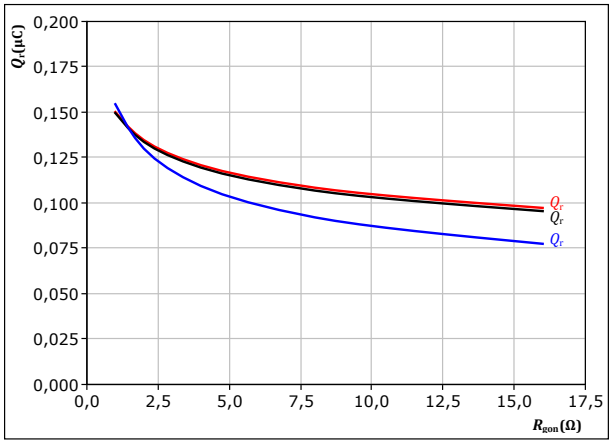


At					
	V_{DS} =	400	V		
	V_{GS} =	-4/15	V	T_j:	25 °C
	R_{gon} =	4	Ω		125 °C
					150 °C

figure 45. **FWD**

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

$Q_r = f(R_{gon})$

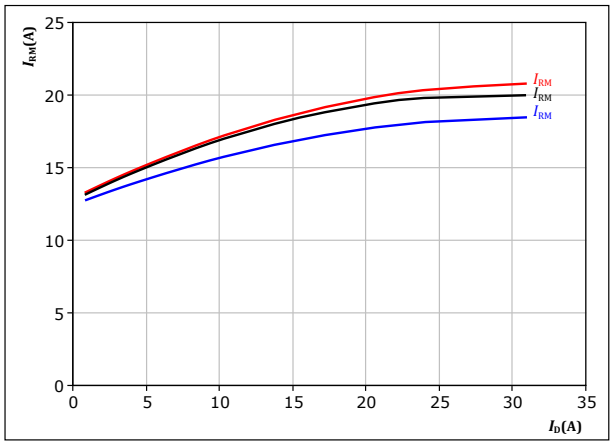


At					
	V_{DS} =	400	V		
	V_{GS} =	-4/15	V	T_j:	25 °C
	I_D =	17	A		125 °C
					150 °C

figure 46. **FWD**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

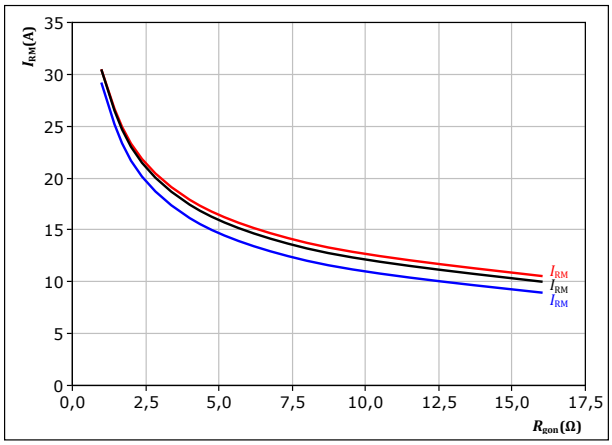


At					
	V_{DS} =	400	V		
	V_{GS} =	-4/15	V	T_j:	25 °C
	R_{gon} =	4	Ω		125 °C
					150 °C

figure 47. **FWD**

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

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



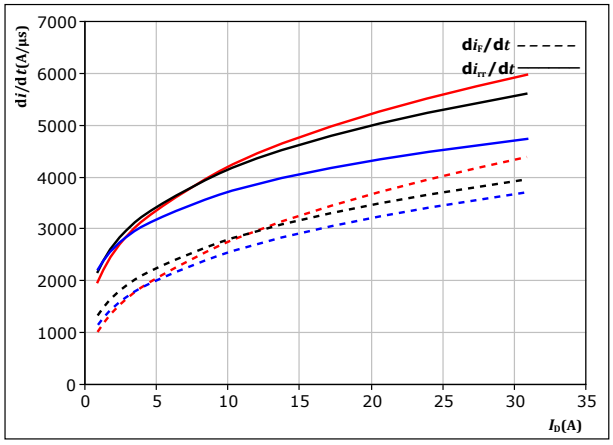
At					
	V_{DS} =	400	V		
	V_{GS} =	-4/15	V	T_j:	25 °C
	I_D =	17	A		125 °C
					150 °C

PFC Switching Characteristics

figure 48. **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)

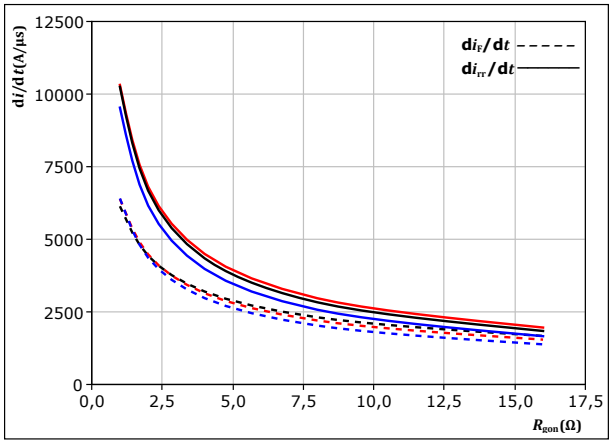


At					
	V_{DS} =	400	V		
	V_{GS} =	-4/15	V	T_j:	25 °C
	R_{gon} =	4	Ω		125 °C
					150 °C

figure 49. **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})

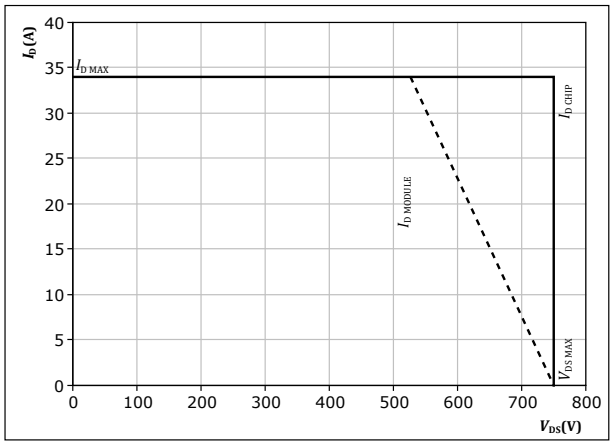


At					
	V_{DS} =	400	V		
	V_{GS} =	-4/15	V	T_j:	25 °C
	I_D =	17	A		125 °C
					150 °C

figure 50. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At			
	T_j =	150	°C
	R_{gon} =	4	Ω
	R_{goff} =	4	Ω

Inverter Switching Definitions

figure 51. **IGBT**

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

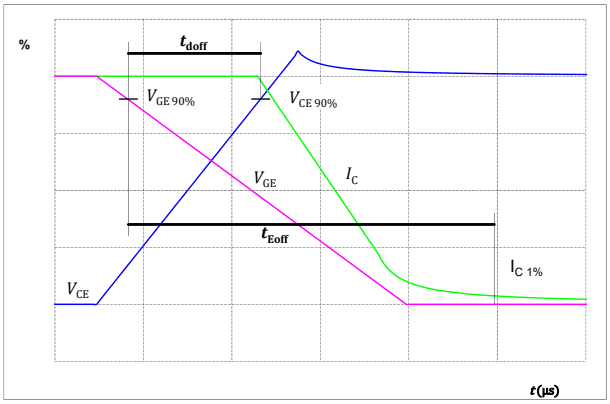


figure 52. **IGBT**

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

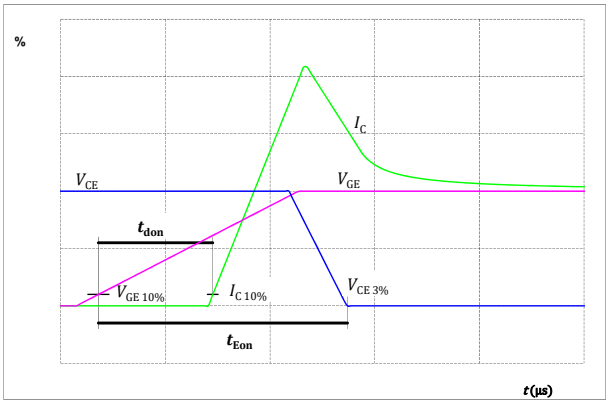


figure 53. **IGBT**

Turn-off Switching Waveforms & definition of t_f

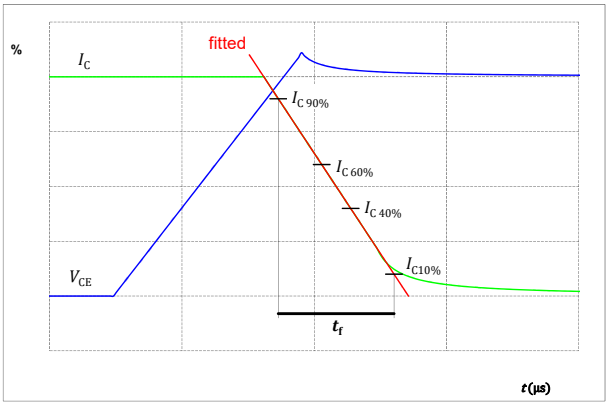
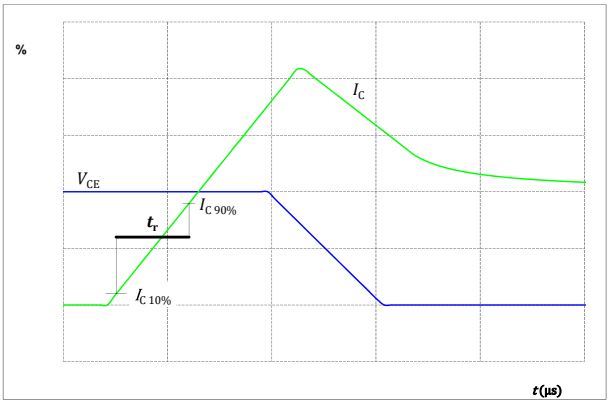


figure 54. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Inverter Switching Definitions

figure 55. **FWD**

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

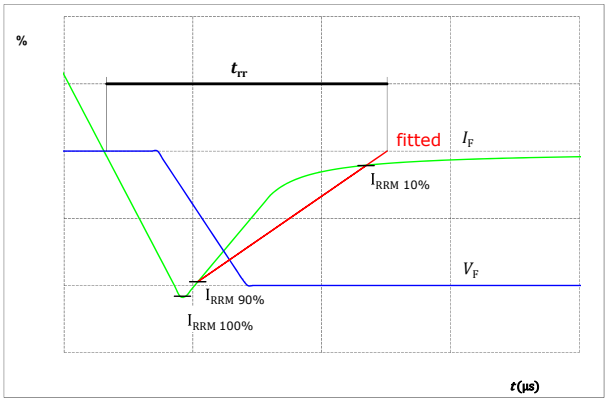
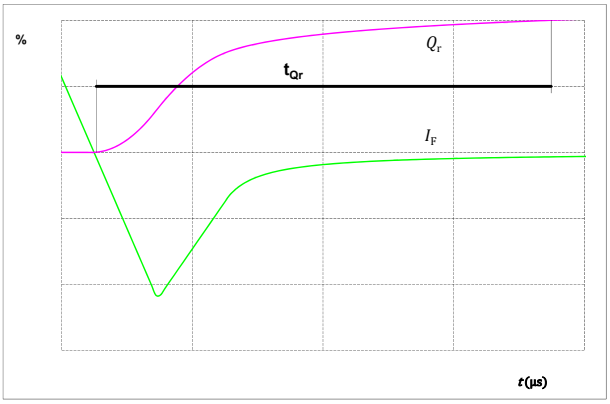


figure 56. **FWD**

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



PFC Switching Definitions

figure 51. MOSFET

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

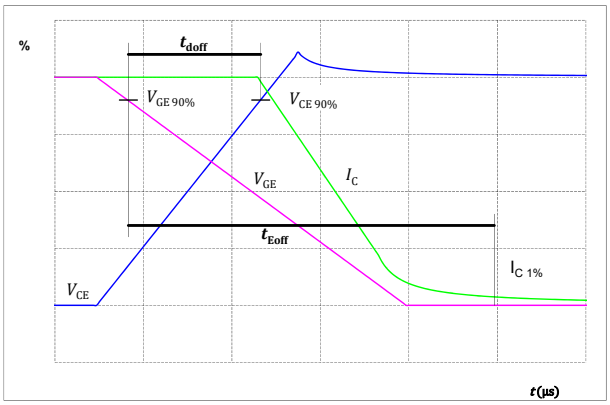


figure 52. MOSFET

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

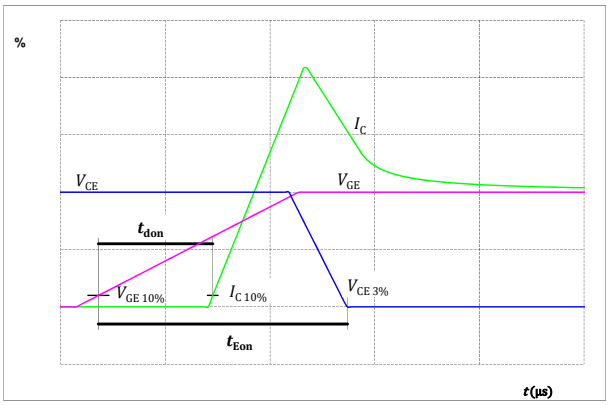


figure 53. MOSFET

Turn-off Switching Waveforms & definition of t_f

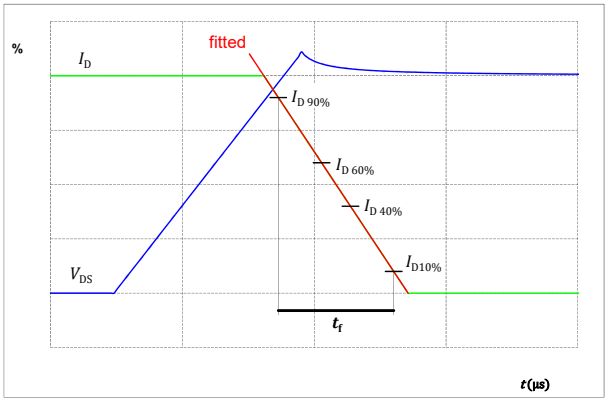
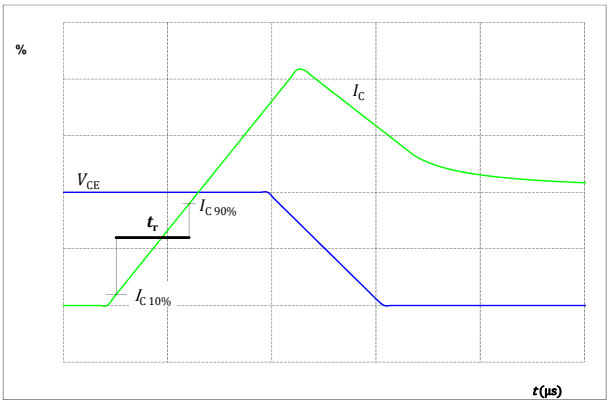


figure 54. MOSFET

Turn-on Switching Waveforms & definition of t_r



PFC Switching Definitions

figure 55. **FWD**

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

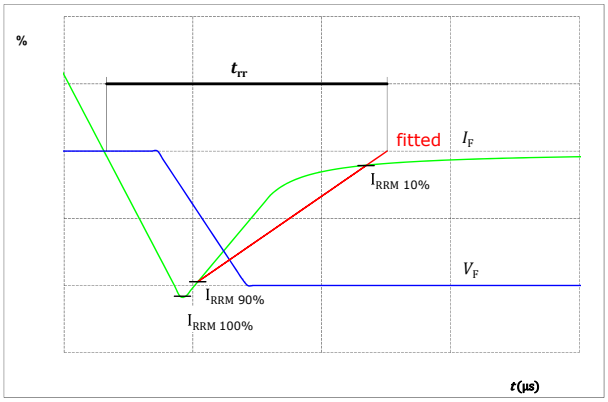


figure 56. **FWD**

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

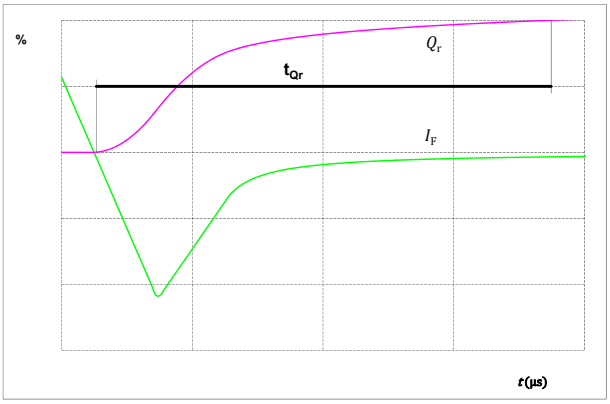
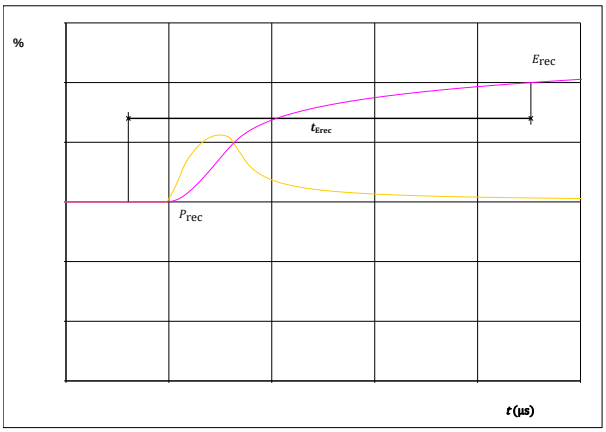


figure 57. **FWD**

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



Ordering Code

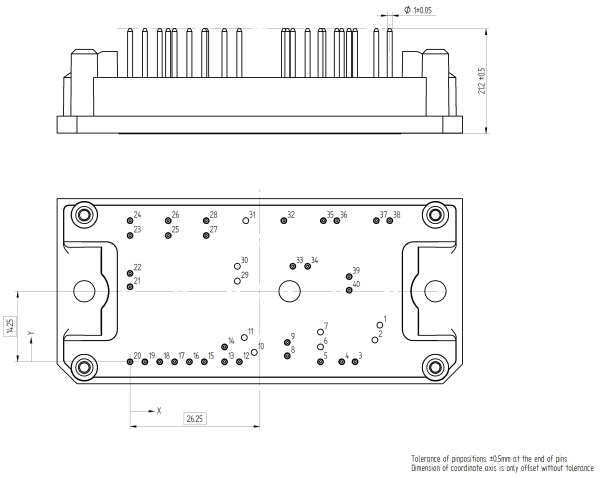
Version	Ordering Code
Without thermal paste	10-F107PPA030I704-PD52B69
With thermal paste (5,2 W/mK, PTM6000HV)	10-F107PPA030I704-PD52B69-/7/

Marking

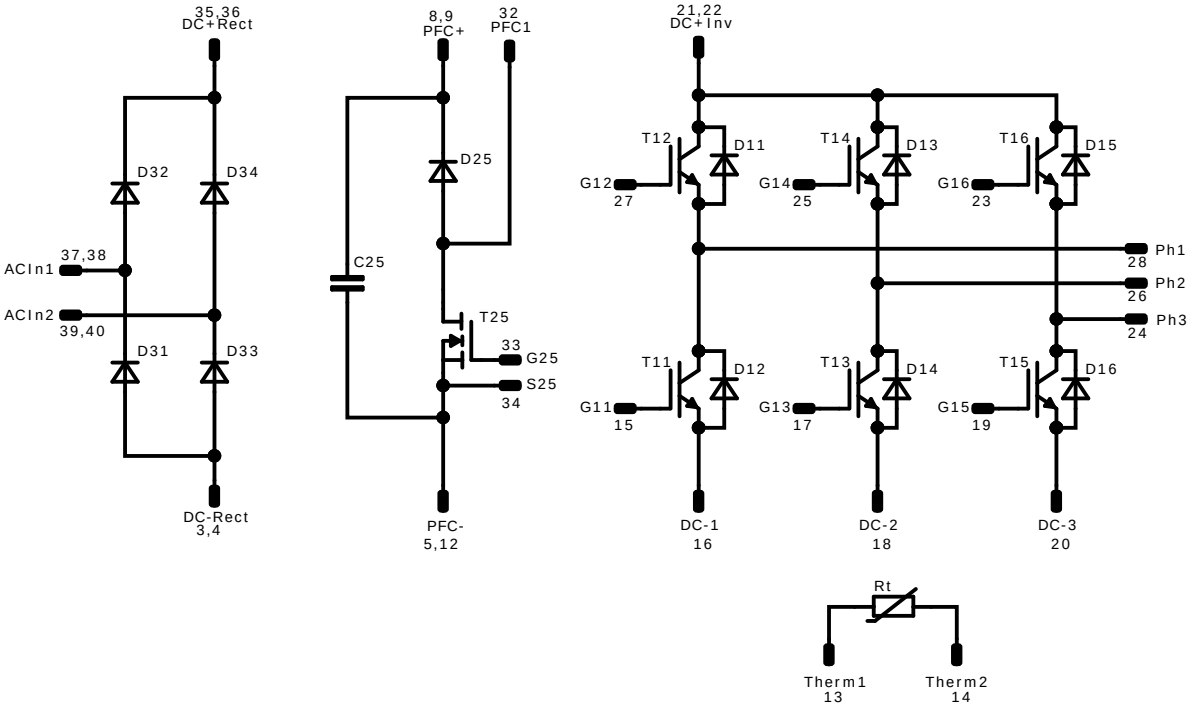
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	not assembled		
2	not assembled		
3	45,5	0	DC-Rect
4	42,8	0	DC-Rect
5	38,5	0	PFC-
6	not assembled		
7	not assembled		
8	31,8	1,2	PFC+
9	31,8	3,9	PFC+
10	not assembled		
11	not assembled		
12	22,1	0	PFC-
13	19,1	0	Therm1
14	19,1	3	Therm2
15	15	0	G11
16	12	0	DC-1
17	9	0	G13
18	6	0	DC-2
19	3	0	G15
20	0	0	DC-3
21	0	15,15	DC+Inv
22	0	17,85	DC+Inv
23	0	25,5	G16
24	0	28,5	Ph3
25	7,7	25,5	G14
26	7,7	28,5	Ph2
27	15,4	25,5	G12
28	15,4	28,5	Ph1
29	not assembled		
30	not assembled		
31	not assembled		
32	31,1	28,5	PFC1
33	32,9	19,3	G25
34	35,9	19,3	S25
35	39,1	28,5	DC+Rect
36	41,8	28,5	DC+Rect
37	49,8	28,5	ACIn1
38	52,5	28,5	ACIn1
39	44,3	17,2	ACIn2
40	44,3	14,45	ACIn2



Pinout



Identification					
ID	**Component**	**Voltage**	**Current**	**Function**	**Comment**
T11, T12, T13, T14, T15, T16	IGBT	650 V	30 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	650 V	20 A	Inverter Diode	
T25	MOSFET	750 V	45 mΩ	PFC Switch	
D25	FWD	650 V	20 A	PFC Diode	
D31, D32, D33, D34	Rectifier	1600 V	35 A	Rectifier Diode	
C27	Capacitor	630 V		Capacitor (PFC)	
Rt	Thermistor			Thermistor	

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

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

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

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

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}$=175°C and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-F107PPA030I704-PD52B69-D1-14	11 Sep. 2025	Initial Release	

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