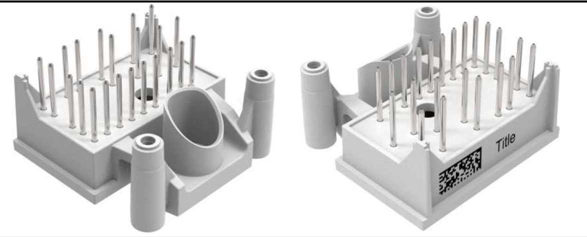
10-0B06PPA010RC-L025A09
datasheet

flow PIM 0B + PFC — 600 V / 10 A

Features

- Converter, PFC, inverter in one housing
- New high speed IGBT for PFC
- One screw heatsink mounting

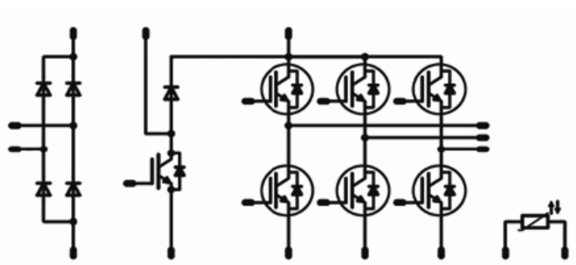
flow 0 B housing



Target applications

- Embedded drives

Schematic



Types

- 10-0B06PPA010RC-L025A09

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Switch					
Collector-emitter break down voltage	V_{CES}			600	V
DC collector current	I_C	$T_j=T_jmax$	T_h=80°C	15	A
Pulsed collector current	I_{Cpulse}	t_p limited by T_jmax		30	A
Turn off safe operating area		Tj≤ 150°C, VCE≤ 600V		20	A
Power dissipation	P_{tot}	$T_j=T_jmax$	T_h=80°C	44	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	Tj≤ 150°C VGE= 15V		5 400	μs V
Maximum Junction Temperature	T_jmax			175	°C

Parameter	Symbol	Condition		Value	Unit
PFC Switch					
Collector-emitter break down voltage	V_{CES}			650	V
DC collector current	I_C	$T_j=T_jmax$	$T_h=80°C$	27	A
Pulsed collector current	I_{Cpulse}	t_p limited by T_jmax		90	A
Turn off safe operating area		Tj≤ 150°C, VCE≤ 650V		90	A
Power dissipation	P_{tot}	$T_j=T_jmax$	$T_h=80°C$	55	W
Gate-emitter peak voltage	V_{GE}			±20	V
Maximum Junction Temperature	T_jmax			175	°C

Parameter	Symbol	Conditions		Value	Unit
PFC Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
DC forward current	I_F	$T_j=T_jmax$	$T_h=80°C$	34	A
Repetitive peak forward current	I_{FRM}			60	A
Power dissipation	P_{tot}	$T_j=T_jmax$	$T_h=80°C$	45	W
Maximum Junction Temperature	T_jmax			175	°C

Parameter	Symbol	Conditions		Value	Unit
PFC Switch Protection Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
DC forward current	I_F	$T_j=T_jmax$	$T_h=80°C$	12	A
Repetitive peak forward current	I_{FRM}			12	A
Power dissipation	P_{tot}	$T_j=T_jmax$	$T_h=80°C$	32	W
Maximum Junction Temperature	T_jmax			175	°C

Parameter	Symbol	Conditions		Value	Unit
Rectifier Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1600	V
DC forward current	I_{FAV}	$T_j=T_jmax$	$T_h=80°C$	13	A
Non-repetitive peak surge current	I_{FSM}	60Hz Single Half Sine Wave		150	A
Power dissipation	P_{tot}	$T_j=T_jmax$	$T_h=80°C$	34	W
Maximum Junction Temperature	T_jmax			150	°C

Characteristic Values

Inverter Switch

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j[°C]	Min	Typ	Max	Unit
Static										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,00017	25 125	4,4	5	5,6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		10	25 125 150	1,68	2,19 2,28 2,30	2,42	V
Collector-emitter cut-off	I_{CES}		0	600		25 125			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		655		pF
Output capacitance	C_{oss}							37		
Reverse transfer capacitance	C_{rss}							22		
Gate charge	Q_{Gate}		15	480	10	25		64		nC
Thermal										
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						2,15		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	Rgoff=32Ω Rgon=32Ω	±15	400	10	25 125		74 71		ns
Rise time	t_r					25 125		18 22		
Turn-off delay time	$t_{d(off)}$					25 125		97 105		
Fall time	t_f					25 125		5 35		
Turn-on energy loss per pulse	E_{on}	QrrFWD=0,5µC QrrFWD=0,9µC				25 125		0,244 0,357		mWs
Turn-off energy loss per pulse	E_{off}					25 125		0,122 0,181		
FWD Switching										
Peak recovery current	I_{RRM}	di/dt=452A/µs di/dt=483A/µs	±15	400	10	25 125		7 10		A
Reverse recovery time	t_{rr}					25 125		174 233		ns
Reverse recovery charge	Q_{rr}					25 125		0,451 0,893		µC
Reverse recovered energy	E_{rec}					25 125		0,121 0,243		mWs
Peak rate of fall of recovery current	di(rec)max /dt					25 125		93 83		A/µs

PFC Switch

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	
Static										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,0003	25 125	3,3	4	4,7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		30	25 125 150	-	1,69 1,92 -	2,22	V
Collector-emitter cut-off	I_{CES}		0	650		25 125			40	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Input capacitance	C_{ies}	f=1MHz	0	25		25		1800		pF
Output capacitance	C_{oss}							45		
Reverse transfer capacitance	C_{rss}							7		
Gate charge	Q_{Gate}		15	520	30	25		70		nC
Thermal										
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material λ=3,4W\mK						1,74		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	Rgoff=16Ω Rgon=16Ω	15/0	400	10	25 125		21 19		ns
Rise time	t_r					25 125		5 7		
Turn-off delay time	$t_{d(off)}$					25 125		157 189		
Fall time	t_f					25 125		5 4		
Turn-on energy loss per pulse	E_{on}	QrrFWD=0,4µC QrrFWD=0,9µC				25 125		0,238 0,380		mWs
Turn-off energy loss per pulse	E_{off}					25 125		0,048 0,091		

PFC Diode

Parameter	Symbol	Conditions					Value			Unit
		dI_F/dt [A/us]		V_r [V]	I_F [A]	T_j	Min	Typ	Max	
Static										
Forward voltage	V_F				30	25°C 125°C 150°C		1,43 1,34 1,31	2,22	V
Reverse leakage current	I_{rm}			650		25°C 150°C			1,6 -	µA
Thermal										
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material λ = 3,4 W/mK						2,09		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt=538A/µs di/dt=651A/µs	15/0	400	10	25 125		15 22		A
Reverse recovery time	t_{rr}					25 125		44 66		ns
Reverse recovery charge	Q_{rr}					25 125		0,447 0,926		µC
Reverse recovered energy	E_{rec}					25 125		0,079 0,166		mWs
Peak rate of fall of recovery current	di(rec)max /dt					25 125		1996 1635		A/µs

PFC Protection Diode

Parameter	Symbol	Conditions					Value			Unit
		dI_F/dt [A/us]		V_r [V]	I_F [A]	T_j	Min	Typ	Max	
Static										
Forward voltage	V_F				6	25°C 125°C 150°C		1,73 1,59 1,54	1,87	V
Reverse leakage current	I_{rm}			650		25°C 150°C			0,1 -	µA
Thermal										
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material Λ=3,4W/mK						3,01		K/W

Rectifier Diode

Parameter	Symbol	Conditions					Value			Unit
		dI_F/dt [A/us]		V_r [V]	I_F [A]	T_j	Min	Typ	Max	
Static										
Forward voltage	V_F				7	25°C 125°C 150°C		1,04 0,97 -	1,14	V
Reverse leakage current	I_r			1600		25°C 150°C			20 -	µA
Thermal										
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material ʎ=3,4W/mK						2,09		K/W

Thermistor

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j[°C]	Min	Typ	Max	
Rated resistance	R					25		21,5		kΩ
Deviation of R100	ΔR/R	R100=1486 Ω				100	-4,5		+4,5	%
Power dissipation	P					25		210		mW
Power dissipation constant						25		3,5		mW/K
B-value	B(25/50)					25		3884		K
B-value	B(25/100)					25		3964		K
Vincotech NTC Reference									F	

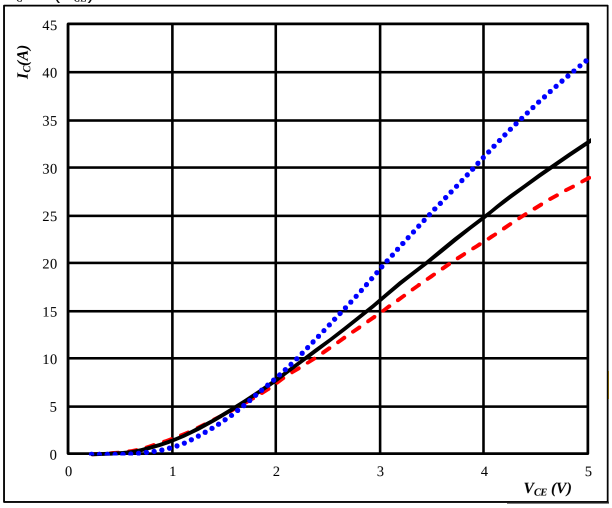
Module Properties

Parameter	Symbol	Conditions		Value	Unit
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(Tjmax - 25)	°C
Insulation Properties					
Insulation voltage	V_{is}	DC voltage	t=2s	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm
Comparative tracking index	CTI			>200	

Inverter Switch Characteristics

Typical output characteristics **IGBT**

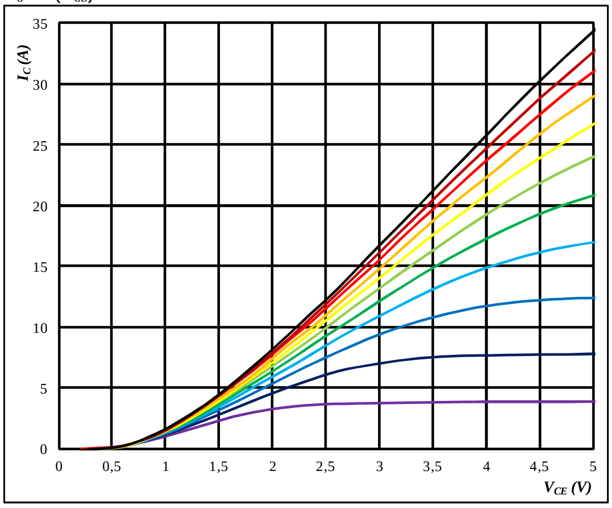
$I_C = f(V_{CE})$



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

Typical output characteristics **IGBT**

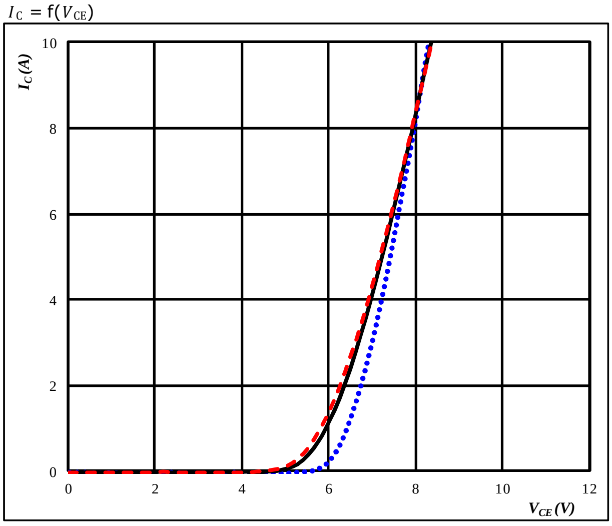
$I_C = f(V_{CE})$



t_p = 250 μs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

Typical transfer characteristics **IGBT**

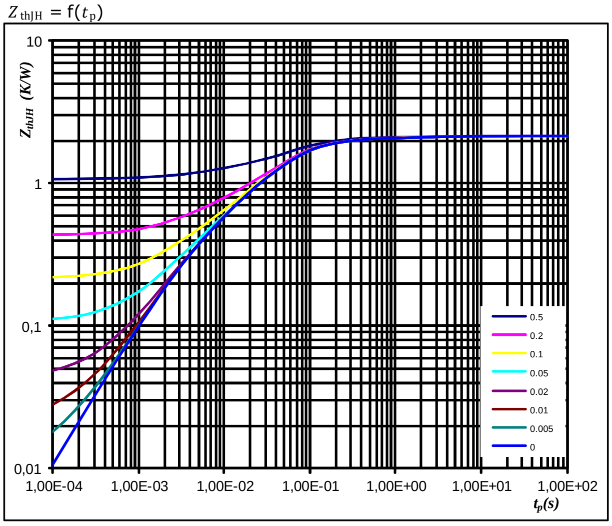
$I_C = f(V_{CE})$



t_p =	100	μs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – –

Transient thermal impedance as a function of pulse width **IGBT**

$Z_{thJH} = f(t_p)$



D = t_p / T
R_{thJH} = 2,15 K/W

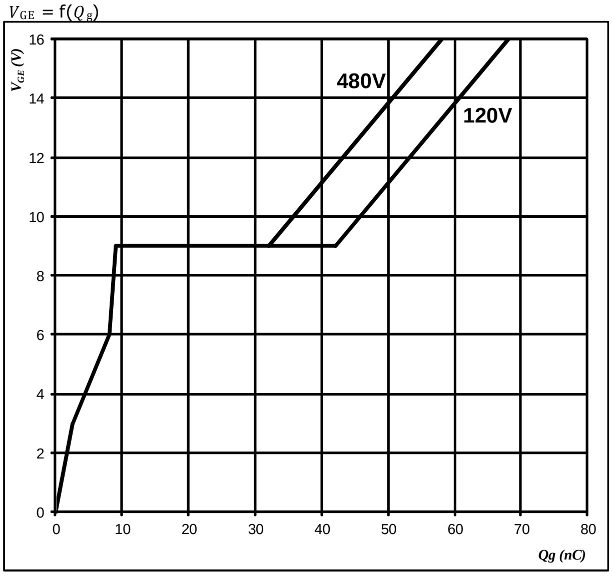
IGBT thermal model values

R (K/W)	Tau (s)
7,60E-02	2,82E+00
1,59E-01	4,19E-01
1,01E+00	6,63E-02
6,48E-01	2,63E-02
2,57E-01	3,72E-03

Inverter Switch Characteristics

Gate voltage vs Gate charge IGBT

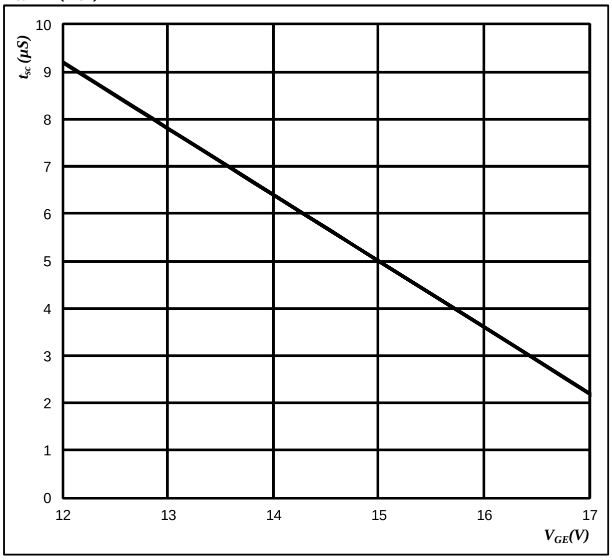
$V_{GE} = f(Q_g)$



At
I_C= 10 A

Short circuit withstand time as a function of V_{GE} IGBT

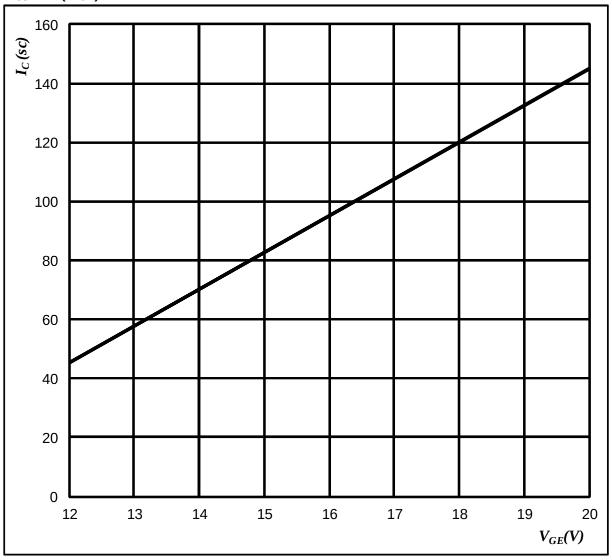
$t_{sc} = f(V_{GE})$



At
V_{CE} = 400 V
T_j ≤ 150 ºC

Typical short circuit collector current as a function of V_{GE} IGBT

$I_{SC} = f(V_{GE})$

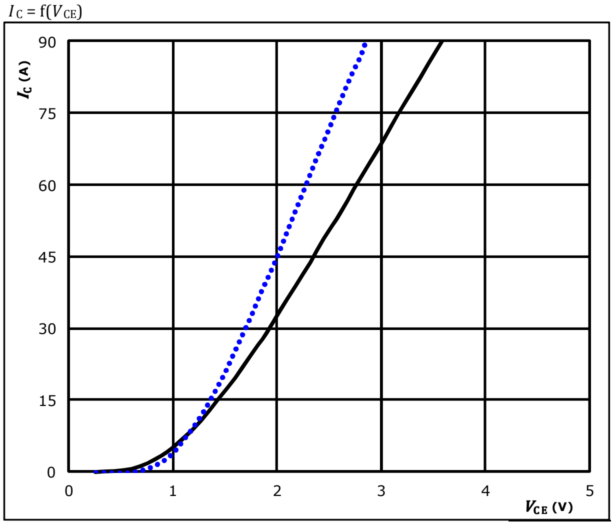


At
V_{CE} ≤ 400 V
T_j ≤ 25 ºC

PFC Switch Characteristics

Typical output characteristics — IGBT

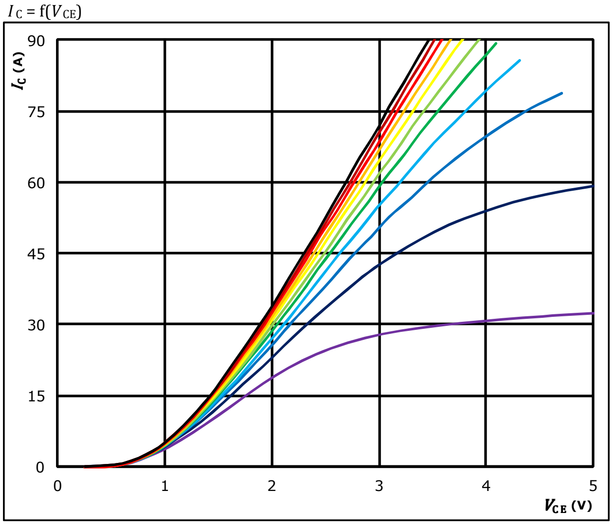
$I_C = f(V_{CE})$



t_p =	250	µs	25 °C	dotted blue
V_{GE}=	15	V	125 °C	solid black
			150 °C	dashed red

Typical output characteristics — IGBT

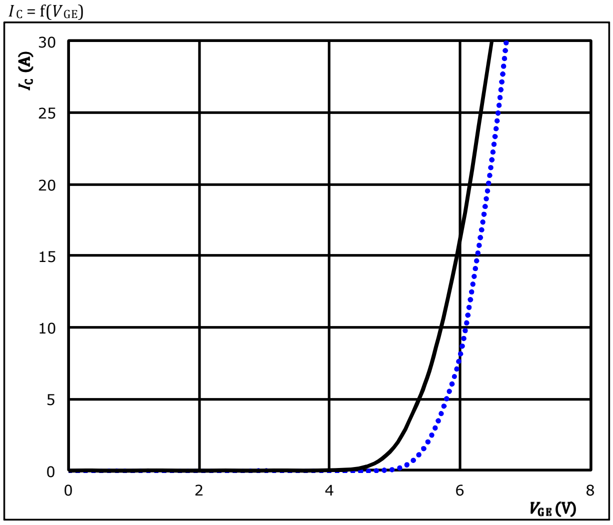
$I_C = f(V_{CE})$



t_p = 250 µs
T_j = 125 °C
V_{GE} from 7 V to 17 V in steps of 1 V

Typical transfer characteristics — IGBT

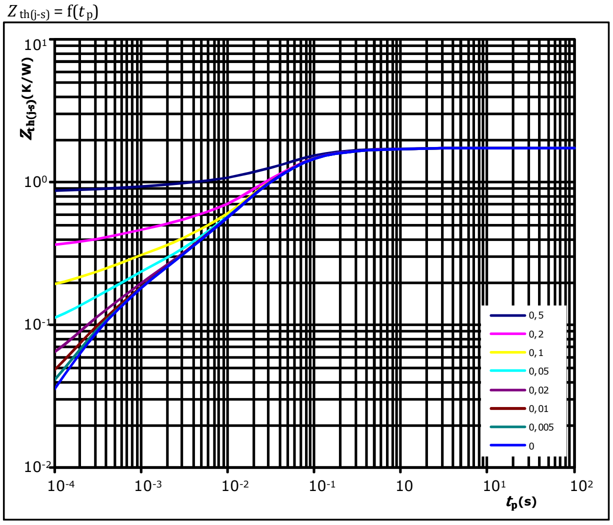
$I_C = f(V_{GE})$



t_p =	100	µs	25 °C	dotted blue
V_{CE} =	10	V	125 °C	solid black
			150 °C	dashed red

Transient Thermal Impedance as function of Pulse duration — IGBT

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



D = t_p / T
$R_{th(j\text{-}s)}$ = 1,74 K/W

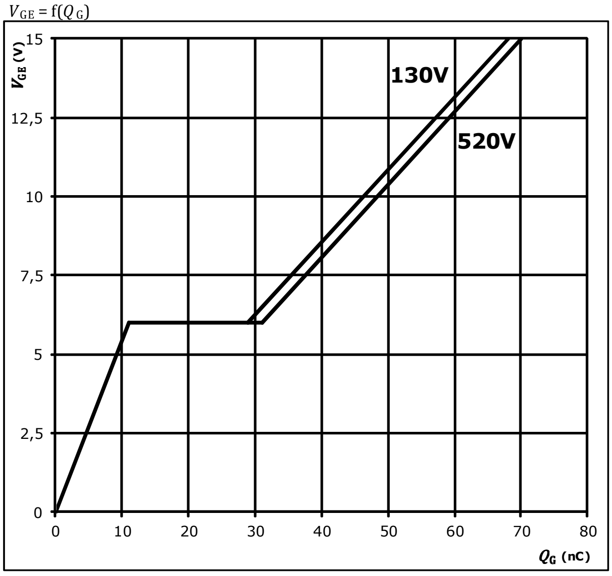
IGBT thermal model values

R_{th} (K/W)	τ (s)
1,29E-01	5,83E-01
7,29E-01	6,38E-02
6,55E-01	2,28E-02
1,29E-01	2,24E-03
9,92E-02	3,38E-04

PFC Switch Characteristics

Gate voltage vs Gate charge IGBT

$V_{GE} = f(Q_G)$



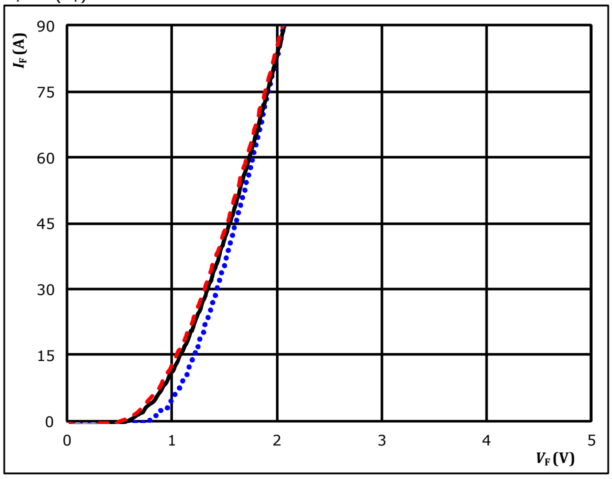
At

I_C= 30 A

PFC Diode Characteristics

Typical forward characteristics FWD

$I_F = f(V_F)$

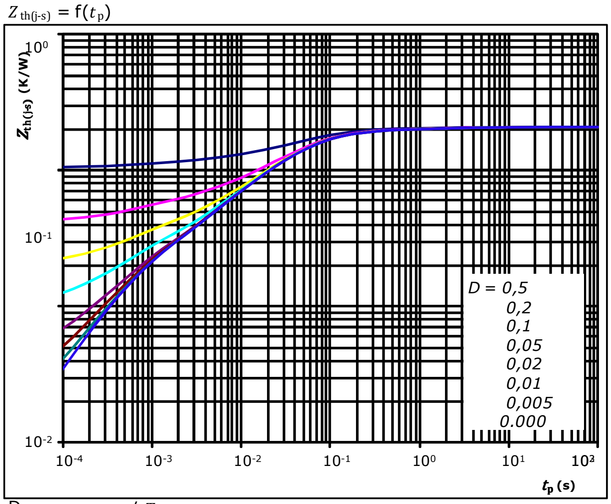


t_p = 250 μs

T_j:
25 °C
125 °C
150 °C

Transient thermal impedance as a function of pulse width FWD

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



D = t_p / T

$R_{th(j-s)}$ = 2,09 K/W

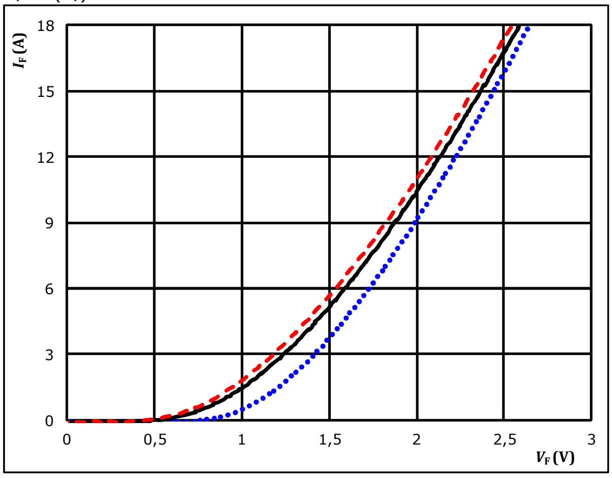
FWD thermal model values

R (K/W)	τ (s)
4,06E-02	7,59E+00
1,41E-01	7,59E-01
6,53E-01	8,62E-02
8,80E-01	2,66E-02
2,25E-01	4,54E-03
1,55E-01	5,55E-04

PFC Protection Diode characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

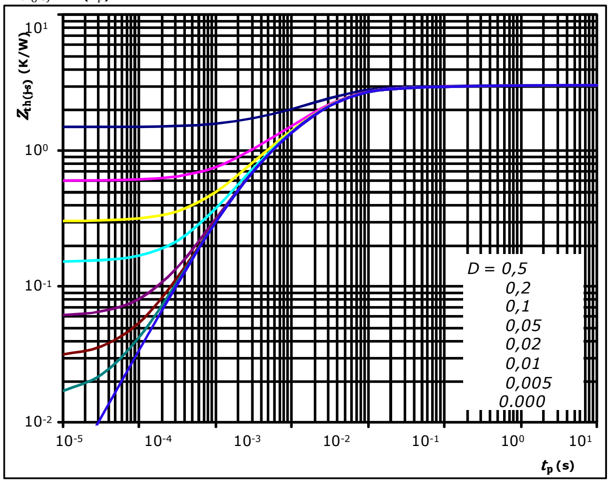


t_p = 250 µs

T_j: 25 °C; 125 °C; 150 °C

Transient thermal impedance as a function of pulse width **FWD**

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



$D = t_p / T$

$R_{th(j-s)}$ = 3,01 K/W

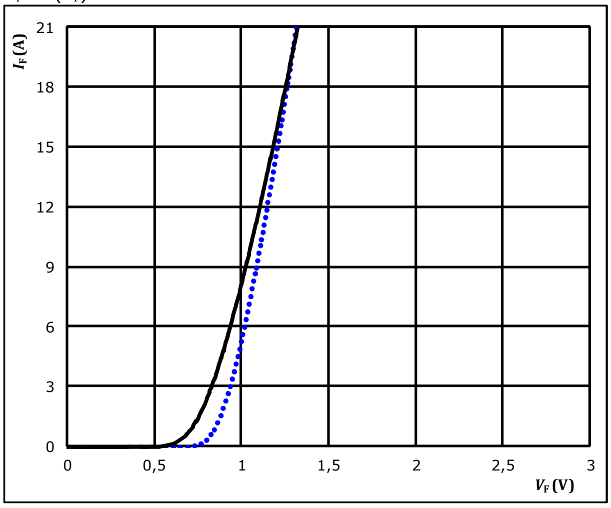
FWD thermal model values

R (K/W)	τ (s)
5,15E-02	9,38E+00
9,53E-02	8,91E-01
3,22E-01	1,25E-01
1,35E+00	2,97E-02
8,32E-01	8,19E-03
3,58E-01	1,78E-03

Rectifier characteristics

Typical forward characteristics — Rectifier Diode

$I_F = f(V_F)$

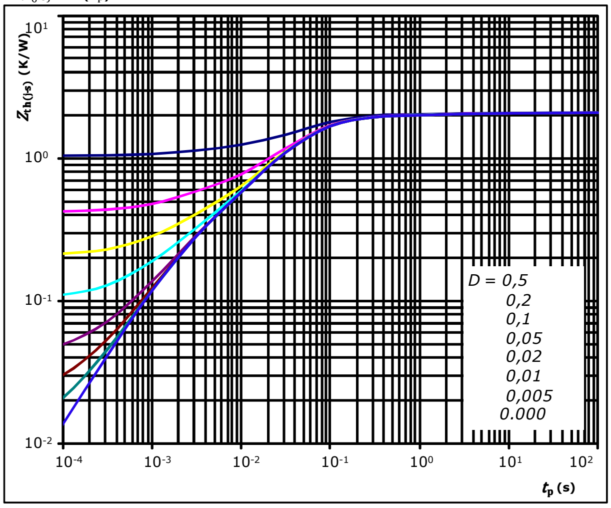


t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

Transient thermal impedance as a function of pulse width — Rectifier Diode

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



$D = t_p / T$

$R_{th(j-s)}$ = 2,09 K/W

Diode thermal model values

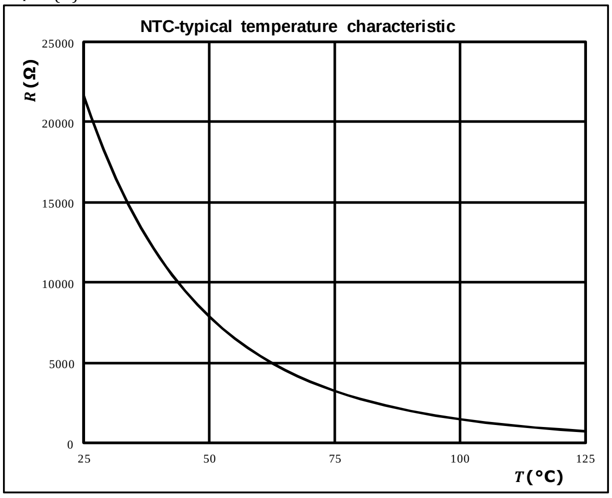
R (K/W)	τ (s)
4,86E-02	1,03E+01
1,45E-01	6,91E-01
1,18E+00	6,09E-02
5,40E-01	1,88E-02
1,74E-01	1,96E-03

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic as a function of temperature

$R_T = f(T)$

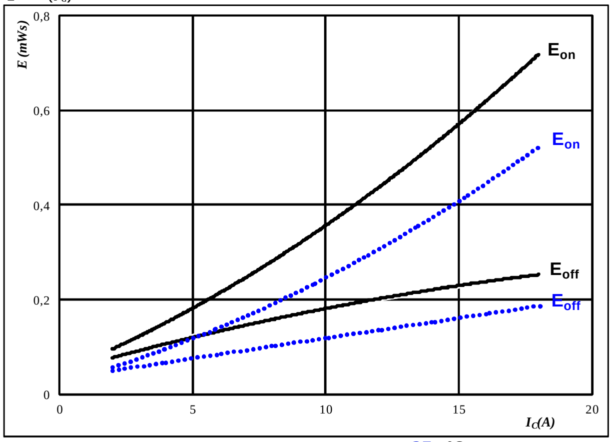


Inverter Switching Definitions

Figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



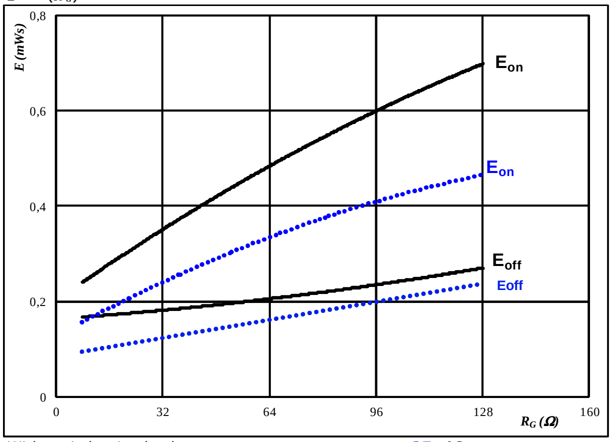
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	32	Ω		150 °C
R_{goff} =	32	Ω		

Figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



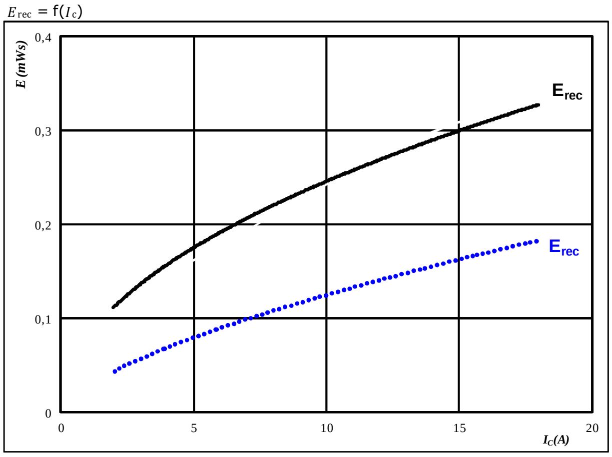
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	10	A		150 °C

Figure 3. FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



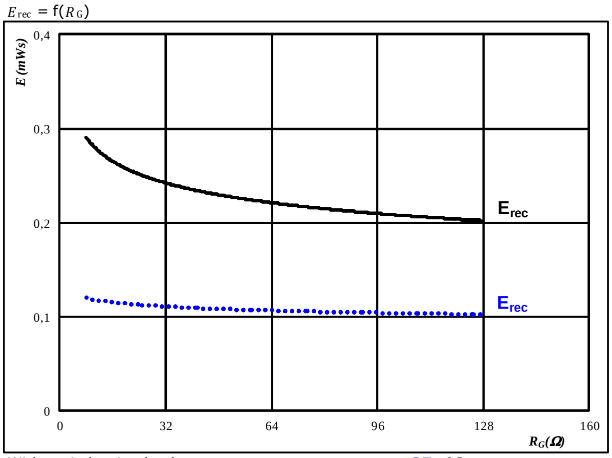
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	32	Ω		150 °C

Figure 4. FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

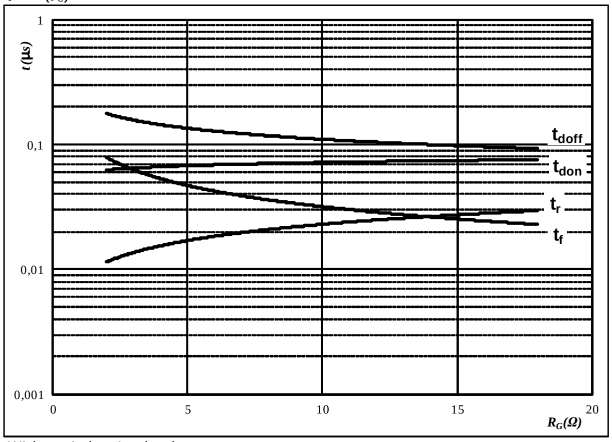
V_{CE}=	400	V	T_j:	25 °C
V_{GE}=	±15	V		125 °C
I_C=	10	A		150 °C

Inverter Switching Definitions

Figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



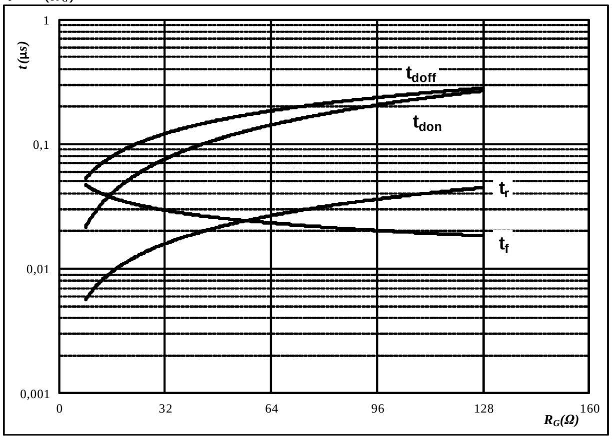
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	±15	V
R_{gon} =	32	Ω
R_{goff} =	32	Ω

Figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



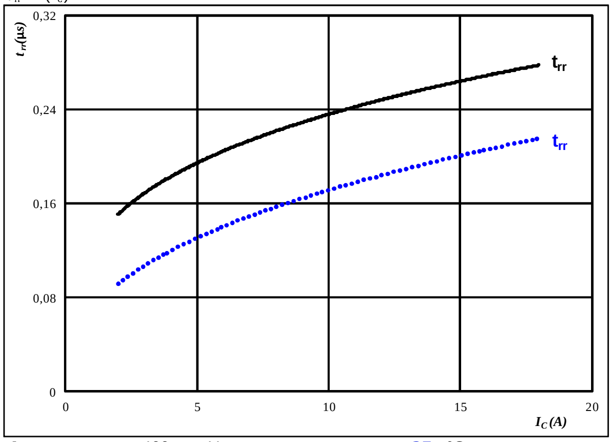
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	±15	V
I_C =	10	A

Figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

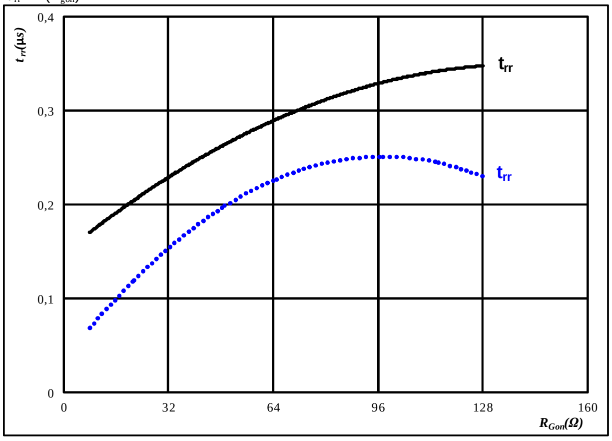


At	V_{CE}=	400	V		25 °C	•••••••••••••
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	32	Ω		150 °C	— — — —

Figure 8. FWD

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

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



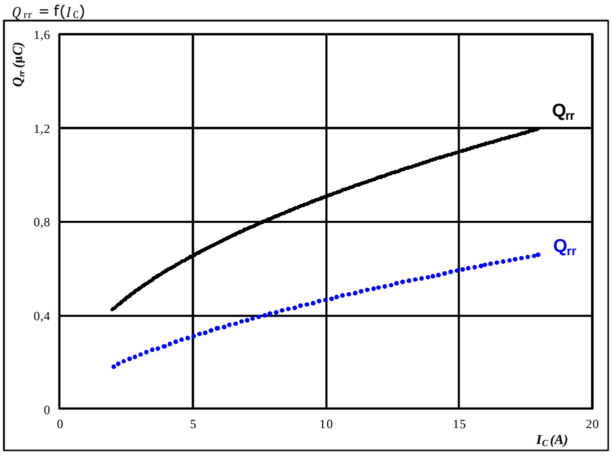
At	V_{CE}=	400	V		25 °C	•••••••••••••
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	10	A		150 °C	— — — —

Inverter Switching Definitions

Figure 9. FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$

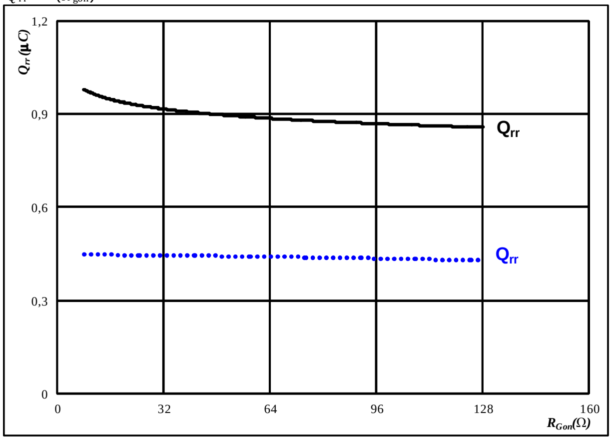


At					
V_{CE}=	400	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –

Figure 10. FWD

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

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

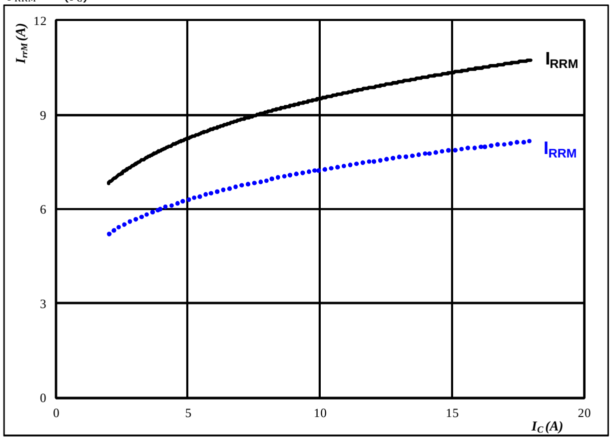


At					
V_{CE}=	400	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	10	A		150 °C	– – – –

Figure 11. FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$

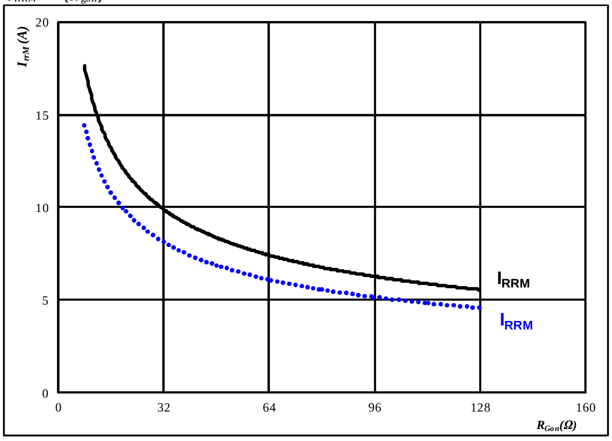


At					
V_{CE}=	400	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –

Figure 12. FWD

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

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



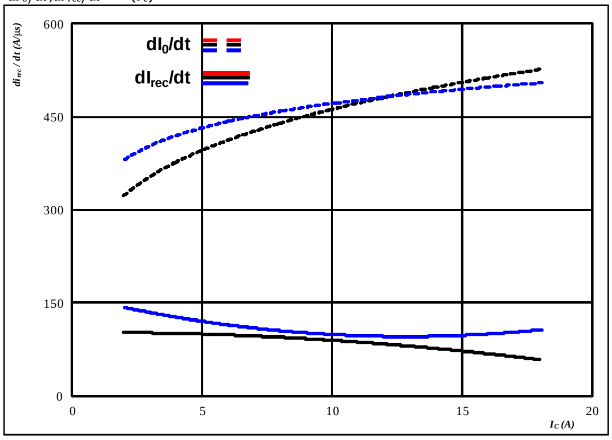
At					
V_{CE}=	400	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	10	A		150 °C	– – – –

Inverter Switching Definitions

Figure 13. FWD

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

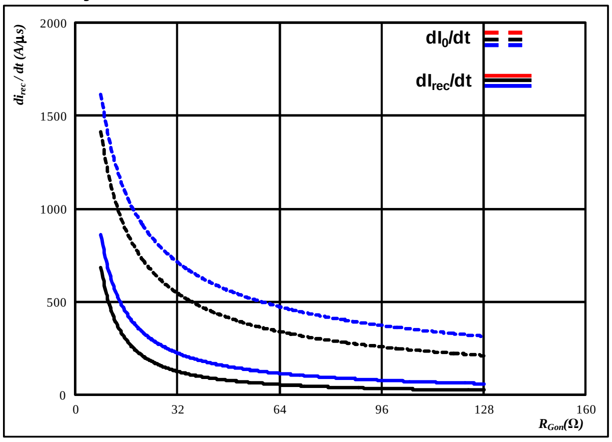
$dI_0/dt, dI_{rec}/dt = f(I_C)$



At
V_{CE}= 400 V
V_{GE} = ±15 V
R_{gon} = 32 Ω

Figure 14. FWD

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

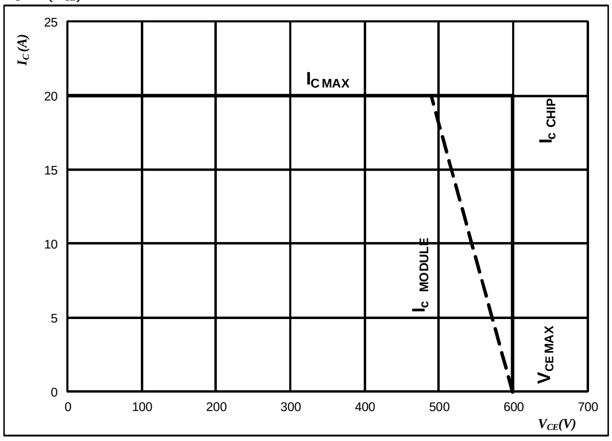


At
V_{CE}= 400 V
V_{GE} = ±15 V
I_C= 10 A

Figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At
T_j = 175 °C
R_{gon} = 32 Ω
R_{goff} = 32 Ω

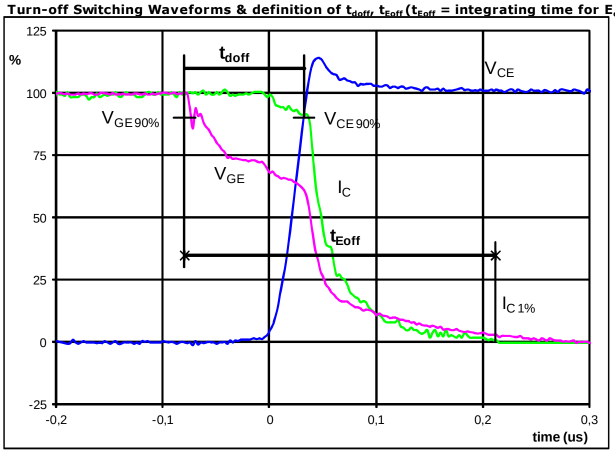
Inverter Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	32 Ω
R_{goff}	=	32 Ω

Figure 1. IGBT

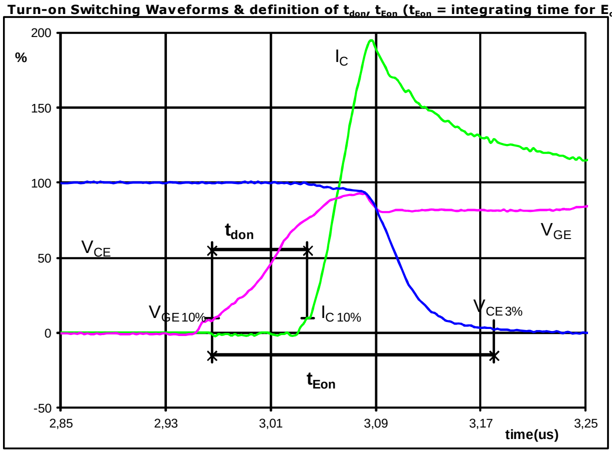
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) = -15 V
V_{GE} (100%) = 15 V
V_C (100%) = 400 V
I_C (100%) = 10 A
t_{doff} = 0,105 µs
t_{Eoff} = 0,292 µs

Figure 2. IGBT

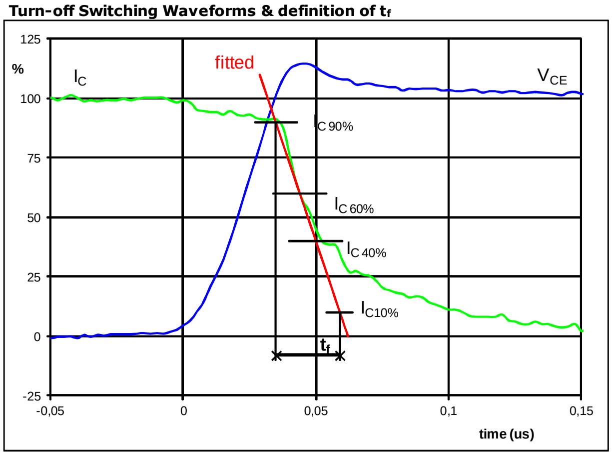
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



V_{GE} (0%) = -15 V
V_{GE} (100%) = 15 V
V_C (100%) = 400 V
I_C (100%) = 10 A
t_{don} = 0,071 µs
t_{Eon} = 0,215 µs

Figure 3. IGBT

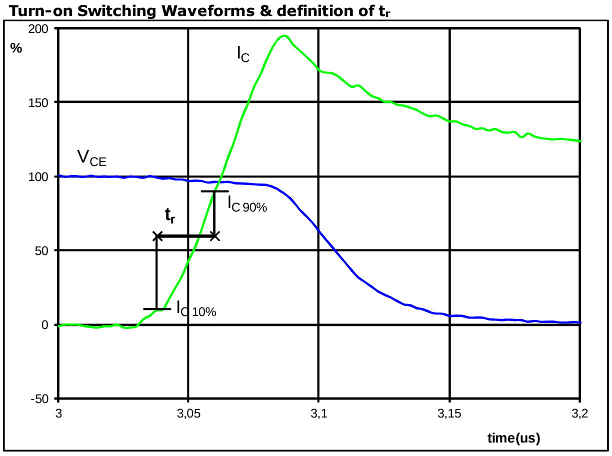
Turn-off Switching Waveforms & definition of t_f



V_C (100%) = 400 V
I_C (100%) = 10 A
t_f = 0,035 µs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

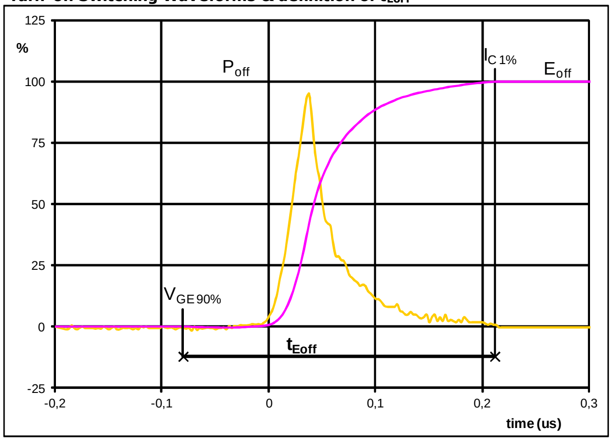


V_C (100%) = 400 V
I_C (100%) = 10 A
t_r = 0,022 µs

Inverter Switching Definitions

Figure 5. IGBT

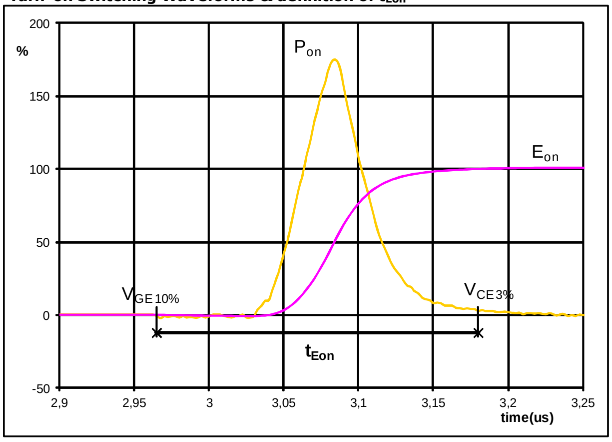
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	4,00	kW
E_{off} (100%) =	0,18	mJ
t_{Eoff} =	0,29	μs

Figure 6. IGBT

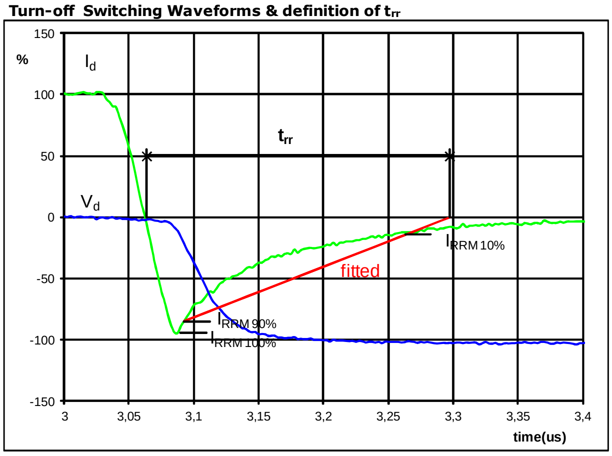
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	4,00	kW
E_{on} (100%) =	0,36	mJ
t_{Eon} =	0,21	μs

Figure 7. FWD

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

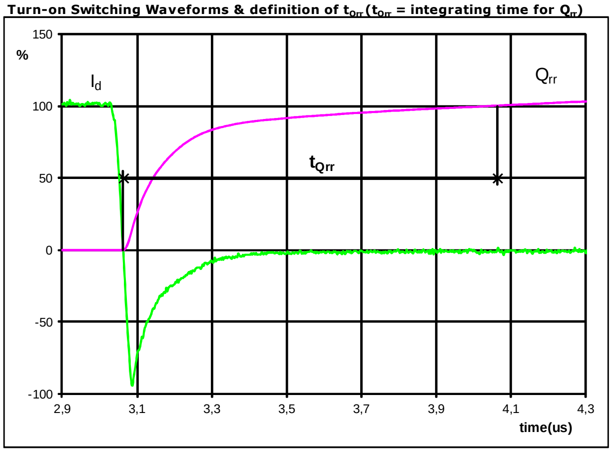


V_d (100%) =	400	V
I_d (100%) =	10	A
I_{RRM} (100%) =	-10	A
t_{rr} =	0,233	μs

Inverter Switching Definitions

Figure 8. FWD

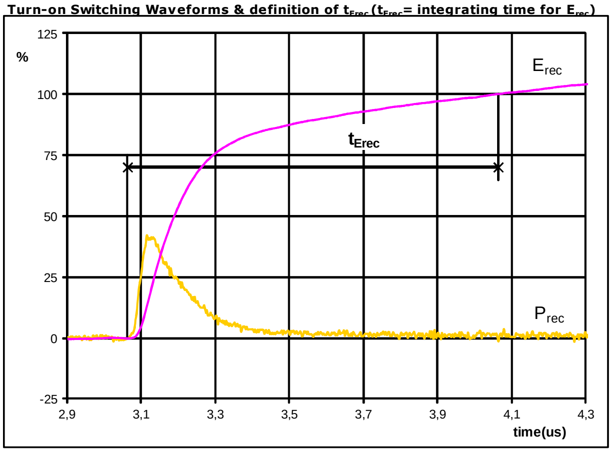
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	10	A
Q_{rr} (100%) =	0,89	µC
t_{Qrr} =	1,00	µs

Figure 9. FWD

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



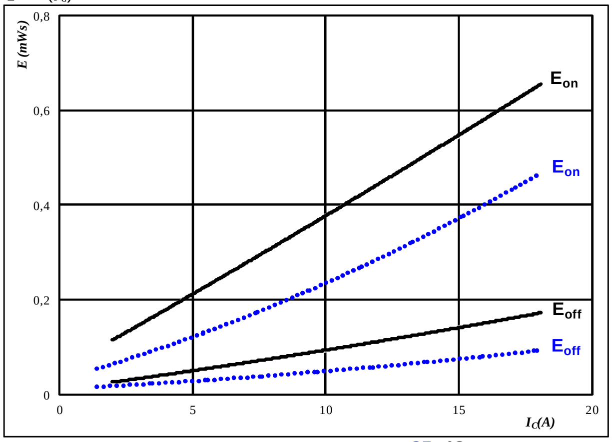
P_{rec} (100%) =	4,00	kW
E_{rec} (100%) =	0,24	mJ
t_{Erec} =	1,00	µs

PFC Switching Definitions

Figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



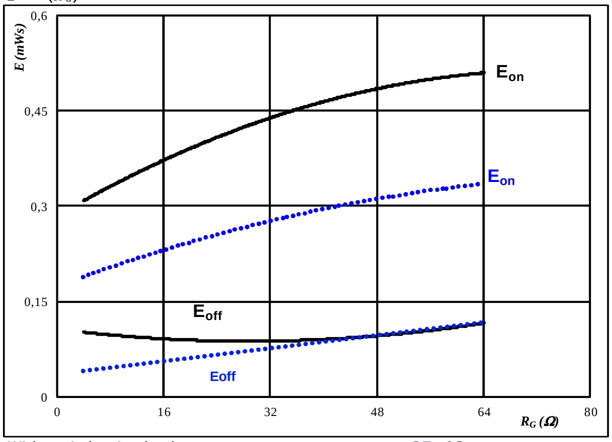
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	·············
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –
R_{goff} =	16	Ω			

Figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



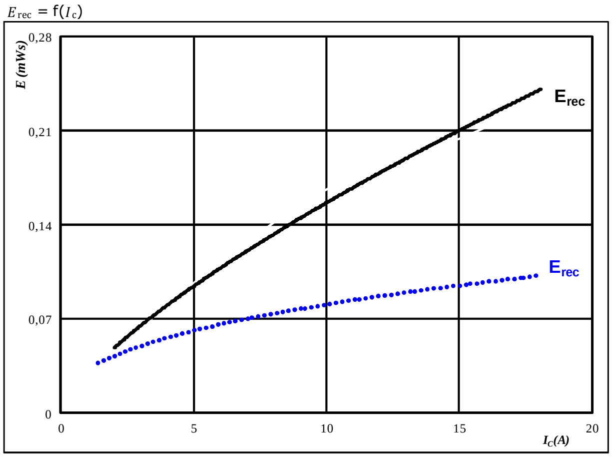
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	·············
V_{GE} =	15/0	V		125 °C	———
I_C =	10	A		150 °C	– – – –

Figure 3. FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



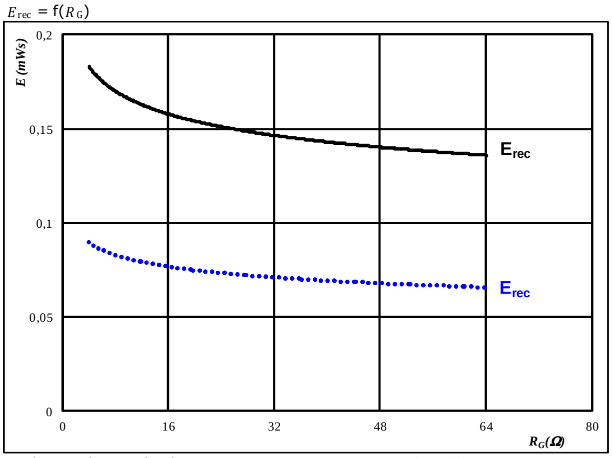
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	·············
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –

Figure 4. FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

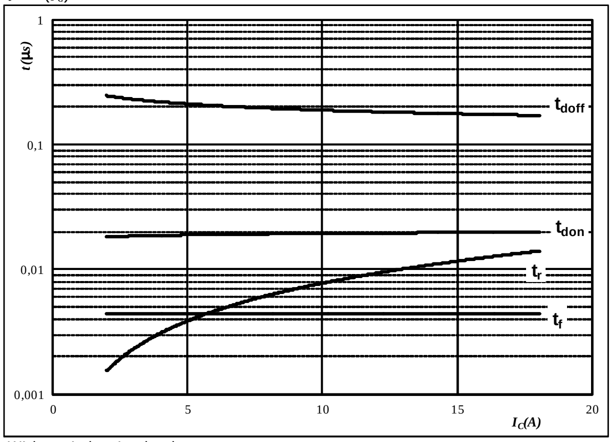
V_{CE}=	400	V	T_j:	25 °C	·············
V_{GE}=	15/0	V		125 °C	———
I_C=	10	A		150 °C	– – – –

PFC Switching Definitions

Figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



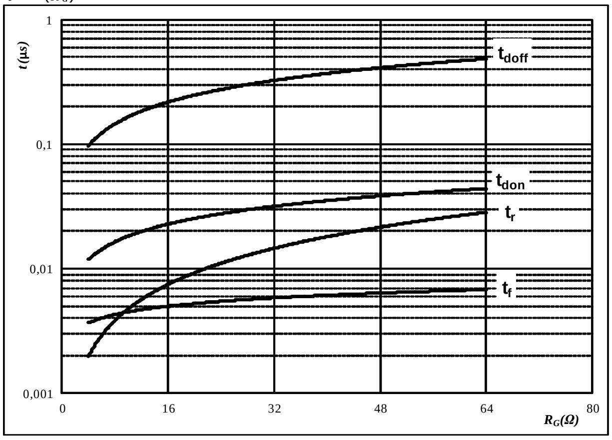
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	15/0	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



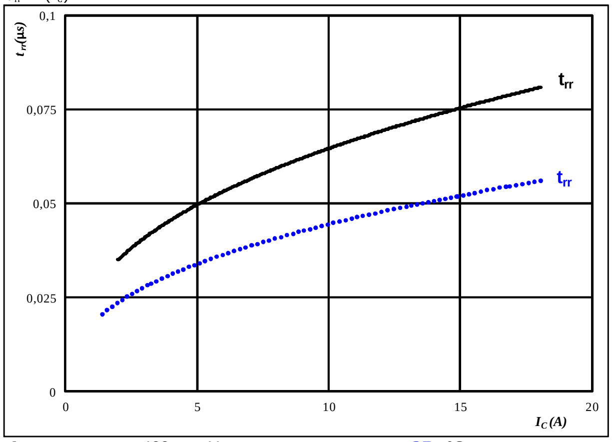
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	15/0	V
I_C =	10	A

Figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

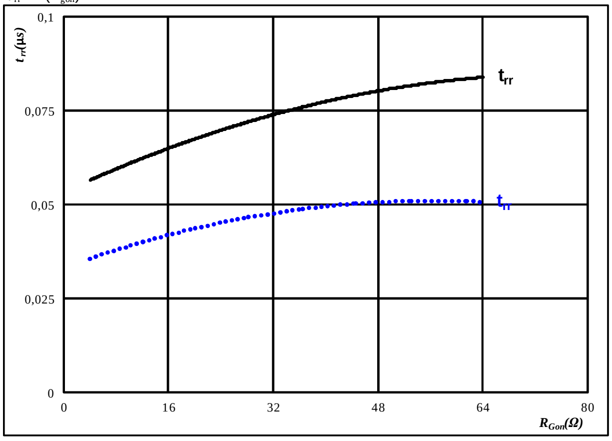


At					
V_{CE}=	400	V		**25 °C**	··········
V_{GE} =	15/0	V	T_j:	**125 °C**	———
R_{gon} =	16	Ω		**150 °C**	– – – –

Figure 8. FWD

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

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



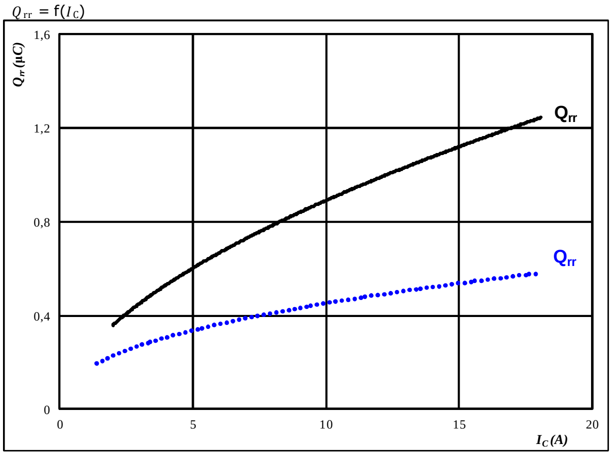
At					
V_{CE}=	400	V		**25 °C**	··········
V_{GE} =	15/0	V	T_j:	**125 °C**	———
I_C=	10	A		**150 °C**	– – – –

PFC Switching Definitions

Figure 9. FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$

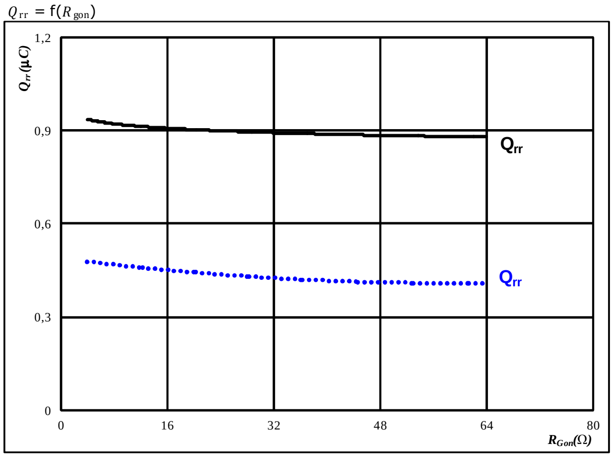


At					
V_{CE}=	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –

Figure 10. FWD

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

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

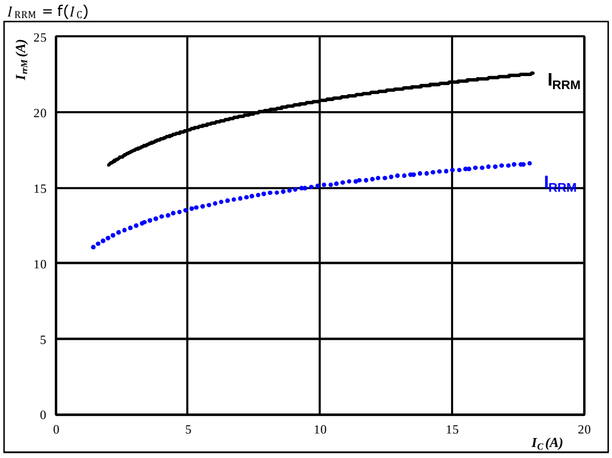


At					
V_{CE}=	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C=	10	A		150 °C	– – – –

Figure 11. FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$

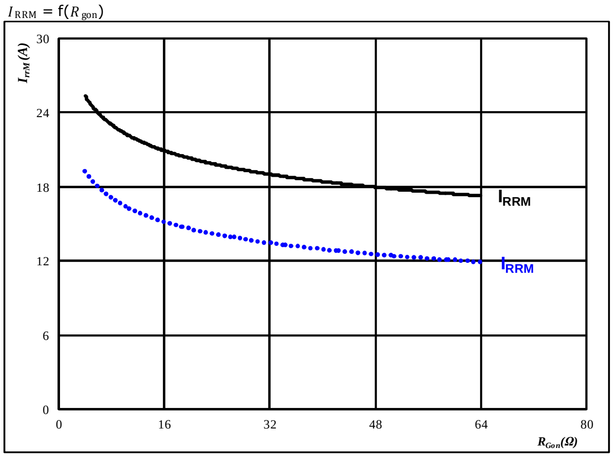


At					
V_{CE}=	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –

Figure 12. FWD

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

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



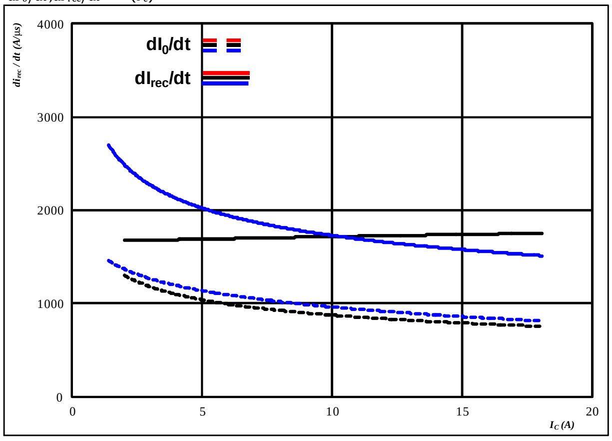
At					
V_{CE}=	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C=	10	A		150 °C	– – – –

PFC Switching Definitions

Figure 13. FWD

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

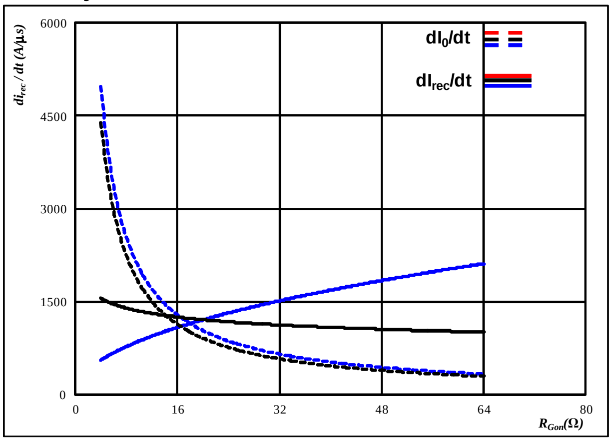
$dI_0/dt, dI_{rec}/dt = f(I_c)$



At			
	V_{CE} =	400	V
	V_{GE} =	15/0	V
	R_{gon} =	16	Ω

Figure 14. FWD

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

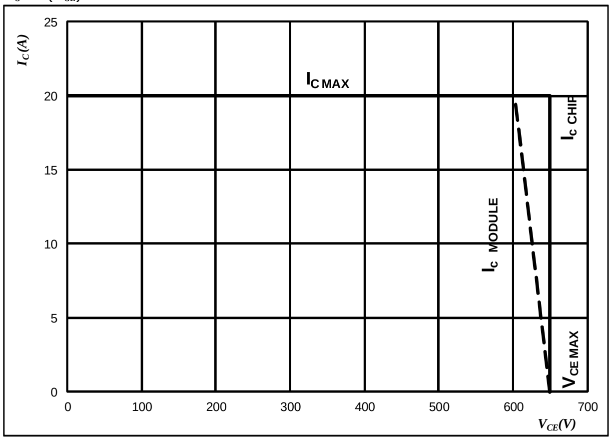


At			
	V_{CE} =	400	V
	V_{GE} =	15/0	V
	I_C =	10	A

Figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At			
	T_j =	175	°C
	R_{gon} =	16	Ω
	R_{goff} =	16	Ω

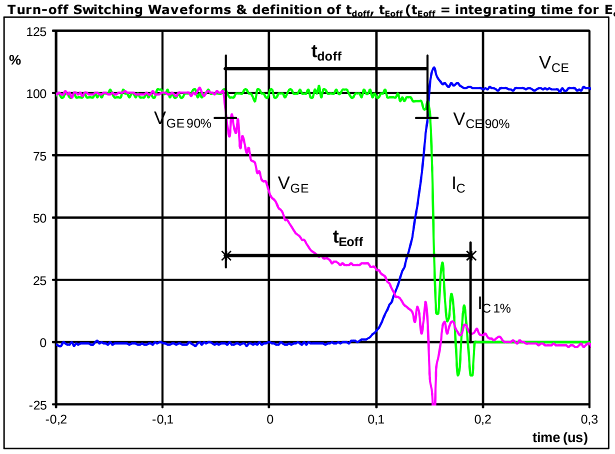
PFC Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

Figure 1. IGBT

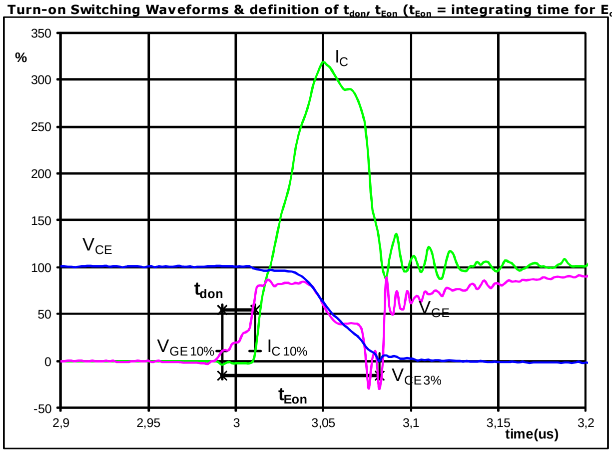
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	400	V
I_C (100%) =	10	A
t_{doff} =	0,189	µs
t_{Eoff} =	0,230	µs

Figure 2. IGBT

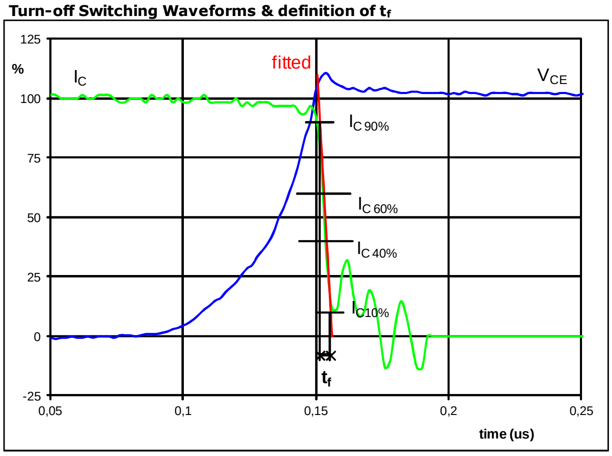
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	400	V
I_C (100%) =	10	A
t_{don} =	0,019	µs
t_{Eon} =	0,090	µs

Figure 3. IGBT

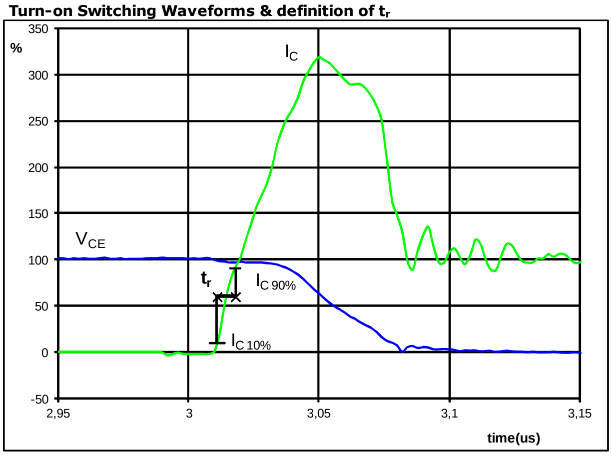
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	400	V
I_C (100%) =	10	A
t_f =	0,004	µs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

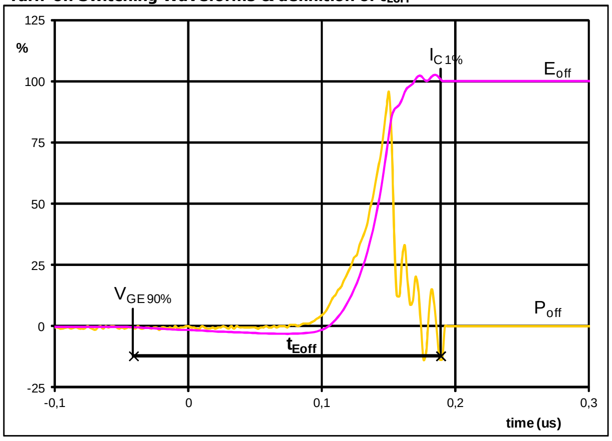


V_C (100%) =	400	V
I_C (100%) =	10	A
t_r =	0,007	µs

PFC Switching Definitions

Figure 5. IGBT

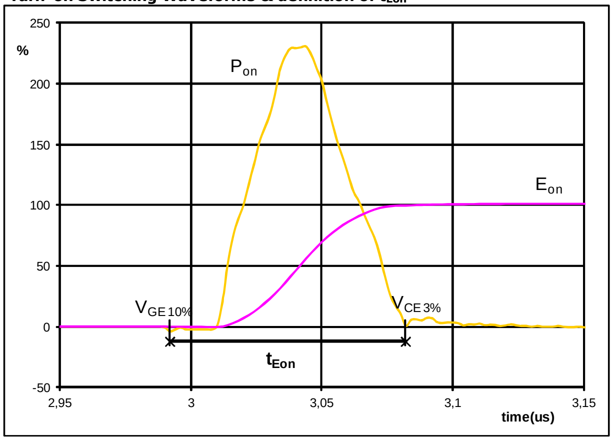
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	3,99	kW
E_{off} (100%) =	0,09	mJ
t_{Eoff} =	0,23	μs

Figure 6. IGBT

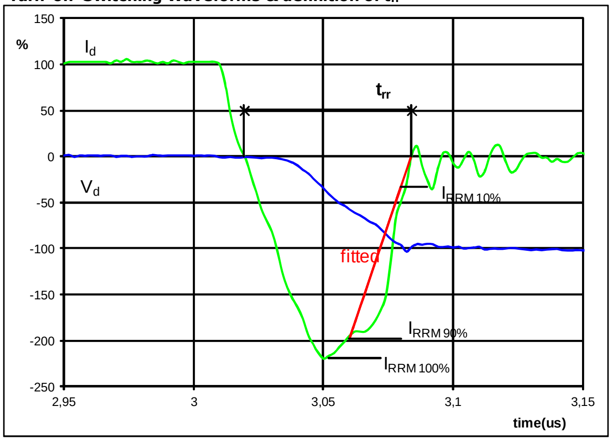
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	3,99	kW
E_{on} (100%) =	0,38	mJ
t_{Eon} =	0,09	μs

Figure 7. FWD

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

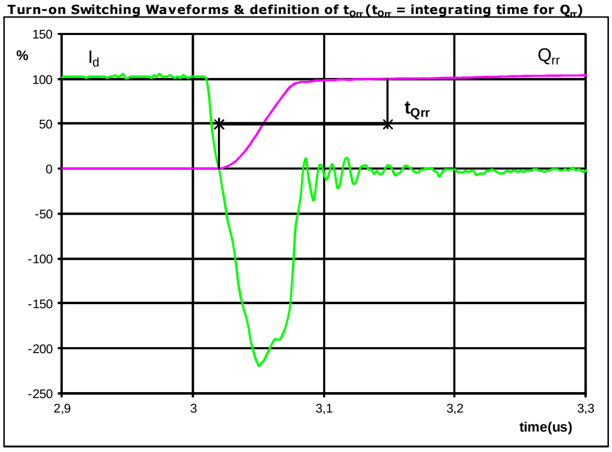


V_d (100%) =	400	V
I_d (100%) =	10	A
I_{RRM} (100%) =	-22	A
t_{rr} =	0,066	μs

PFC Switching Definitions

Figure 8. FWD

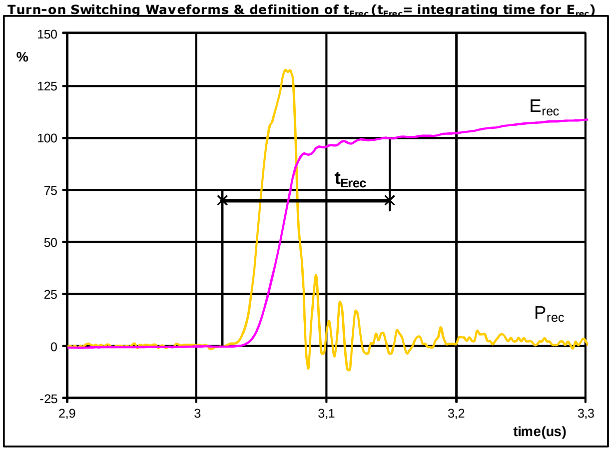
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	10	A
Q_{rr} (100%) =	0,93	μC
t_{Qrr} =	0,13	μs

Figure 9. FWD

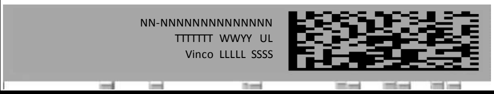
Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec}= integrating time for E_{rec})



P_{rec} (100%) =	3,99	kW
E_{rec} (100%) =	0,17	mJ
t_{Erec} =	0,13	μs

Ordering Code & Marking

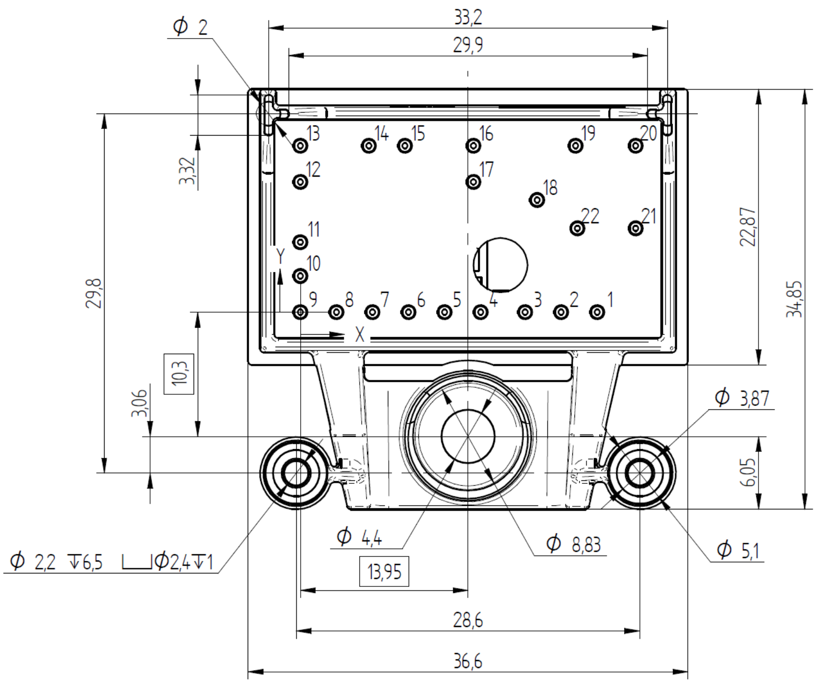
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	10-0B06PPA010RC-L025A09	L025A09	L025A09



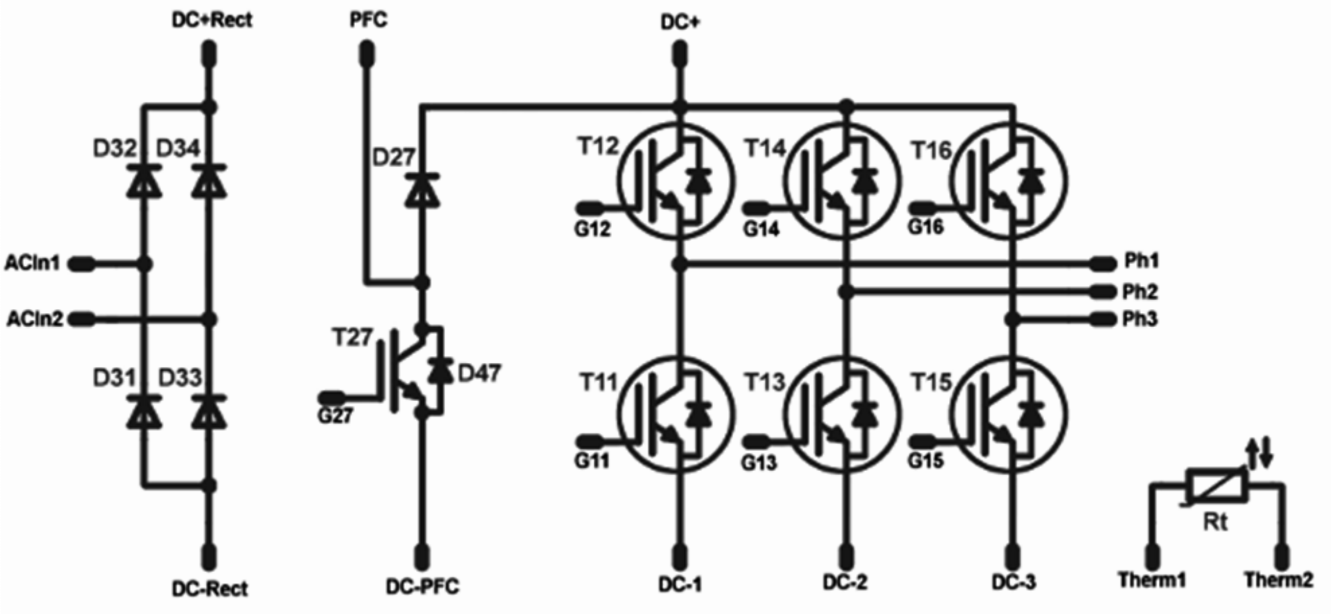
	Name		Date code	UL & Vinco	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTT		WWYY	UL Vinco	LLLLL	SSSS
	Type	Lot number	Serial	Date code		
Datamatrix	TTTT-TTT	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	24,7	0	DC-Rect
2	21,7	0	DC-PFC
3	18,7	0	G27
4	15	0	DC-3
5	12	0	G15
6	9	0	DC-2
7	6	0	G13
8	3	0	DC-1
9	0	0	G11
10	0	3	Therm2
11	0	5,8	Therm1
12	0	10,8	G12
13	0	13,8	Ph1
14	5,7	13,8	G14
15	8,7	13,8	Ph2
16	14,4	13,8	Ph3
17	14,4	10,8	G16
18	19,7	9,3	DC+
19	22,9	13,8	PFC
20	27,9	13,8	ACIn1
21	27,9	6,95	ACIn2
22	23,05	6,95	DC+Rect



Pinout



Identification

ID	Component	Voltage	Technology	Current	Function	Comment
T11-T16	IGBT	600V		10A	Inverter switch	
T27	IGBT	650V		30A	PFC Switch	
D27	FWD	650V		30A	PFC Diode	
D47	Diode	650V		6A	PFC Switch Protection Diode	
D31-D34	Diode	1600V		7A	Rectifier Diode	
R_t	NTC	-		-	Thermistor	

Packaging instruction					
Standard packaging quantity (SPQ)	200	>SPQ	Standard	<SPQ	Sample

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

Document No.:	Date:	Modification:	Pages
10-0B06PPA010RC-L025A09-D2-14	04 Jun. 2015	3D drawing, Outline Pin-table (Pin 16 - 17)	1, 27