10-F117PMA029SA01-LF00A34
datasheet

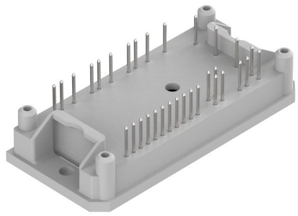
Vincotech

***flow*PIM 1** — **1700 V / 29 A**

Features

- PIM (CIB) with open emitter
- 1700V Trench IGBT3 chip technology
- Compact and low inductive design
- Integrated temperature sensor

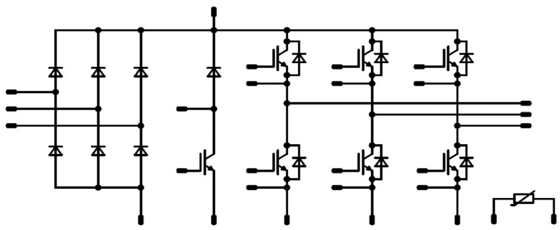
***flow* 1 17mm housing**



Target applications

- Industrial Drives

Schematic



Types

- 10-F117PMA029SA01-LF00A34

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Rectifier Diode					
Peak repetitive reverse voltage	V_{RRM}			1800	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	28	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 10 ms	T_j = 150 °C	230	A
Surge current capability	I^2t	50 Hz Single Half Sine Wave t_p = 10 ms	T_j = 150 °C	260	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	42	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			1700	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	31	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		87	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	74	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			150	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			1800	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	24	A
Surge (non-repetitive) forward current	I_{FSM}		T_j = 45 °C	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	57	W
Maximum junction temperature	T_{jmax}			175	°C
Brake Switch					
Collector-emitter voltage	V_{CES}			1700	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	31	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		87	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	74	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			150	°C
Brake Diode					
Peak repetitive reverse voltage	V_{RRM}			1800	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	28	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 10 ms	T_j = 150 °C	230	A
Surge current capability	I^2t			260	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	42	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Module Properties					
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
Creepage distance				min. 12,7	mm
Clearance				min. 12,7	mm
Comparative Tracking Index	*CTI*			> 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Value			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				20	25 125		1,10 1,06		V
Reverse leakage current	I_R			1800		25 150			10 1000	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,66		K/W
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0012	25	5,2	5,8	6,4	V
Collector-emitter saturation voltage	V_{CEsat}		15		29	25 125	1,6	1,88 2,16	2,4	V
Collector-emitter cut-off current	I_{CES}		0	1700		25			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25			600	nA
Internal gate resistance	r_g							32		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	25		25		2500		pF
Reverse transfer capacitance	C_{res}	f= 1 Mhz	0	25		25		84		pF
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,95		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	850	30	25 125 150		407 435 441		ns
Rise time	t_r	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	850	30	25 125 150		33 37 39		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	850	30	25 125 150		505 605 629		ns
Fall time	t_f	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	850	30	25 125 150		190 263 302		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,3 µC Q_{rFWD} = 7,1 µC Q_{rFWD} = 8,6 µC	±15	850	30	25 125 150		5,714 7,986 8,269		mWs
Turn-off energy (per pulse)	E_{off}		±15	850	30	25 125 150		5,489 8,310 8,831		mWs

Characteristic Values

Parameter	Symbol	Conditions					Value			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		2,05 2,22 2,17	2,2	V
Reverse leakage current	I_R			1800		25			50	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,66		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 1099 A/µs di/dt = 944 A/µs di/dt = 918 A/µs	±15	850	30	25 125 150		45 48 49		A
Reverse recovery time	t_{rr}					25 125 150		304 401 581		ns
Recovered charge	Q_r					25 125 150		4,300 7,069 8,594		µC
Reverse recovered energy	E_{rec}					25 125 150		1,685 3,163 4,104		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1269 874 755		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Value			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	
Brake Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0012	25	5,2	5,8	6,4	V
Collector-emitter saturation voltage	V_{CEsat}		15		29	25 125	1,6	1,88 2,16	2,4	V
Collector-emitter cut-off current	I_{CES}		0	1700		25			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25			600	nA
Internal gate resistance	r_g							32		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	25		25		2500		pF
Reverse transfer capacitance	C_{res}							84		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,95		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	0 / 15	850	30	25 125 150		122 124 126		ns
Rise time	t_r					25 125 150		47 54 54		
Turn-off delay time	$t_{d(off)}$					25 125 150		990 1120 1158		
Fall time	t_f					25 125 150		143 222 260		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 60,2 µC Q_{rFWD} = 59,4 µC Q_{rFWD} = 59,1 µC				25 125 150		36,085 41,044 41,706		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,953 9,048 9,284		

Characteristic Values

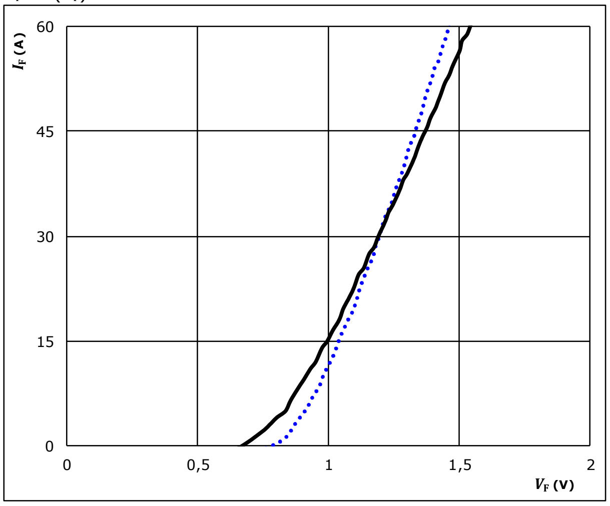
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Brake Diode										
Static										
Forward voltage	V_F				20	25 125		1,10 1,06		V
Reverse leakage current	I_R			1800		25 150			10 1000	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,66		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 479 A/µs di/dt = 471 A/µs di/dt = 468 A/µs	0 / 15	850	30	25 125 150		84 76 73		A
Reverse recovery time	t_{rr}					25 125 150		1713 1947 1981		ns
Recovered charge	Q_r					25 125 150		60,241 59,441 59,114		µC
Reverse recovered energy	E_{rec}					25 125 150		25,680 23,346 22,913		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		85 89 86		A/µs
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-12		+14	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				25		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				25		3998		K
Vincotech Thermistor Reference									B	

Rectifier Diode Characteristics

figure 1. **Rectifier Diode**

Typical forward characteristics

$I_F = f(V_F)$



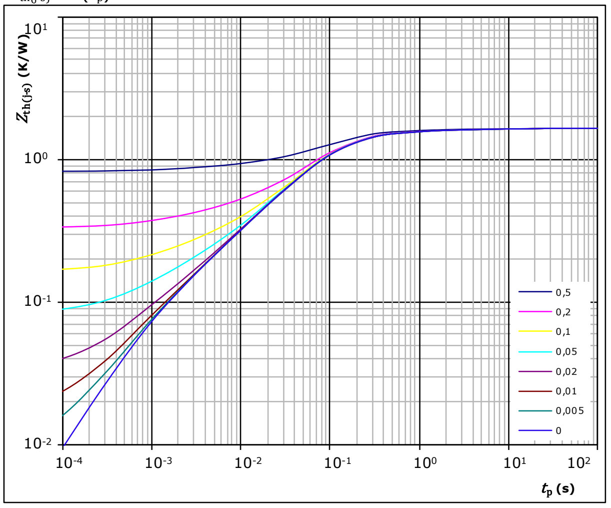
t_p = 250 µs

T_j: 25 °C (dotted) / 125 °C (solid)

figure 2. **Rectifier Diode**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,66 K/W

Diode thermal model values

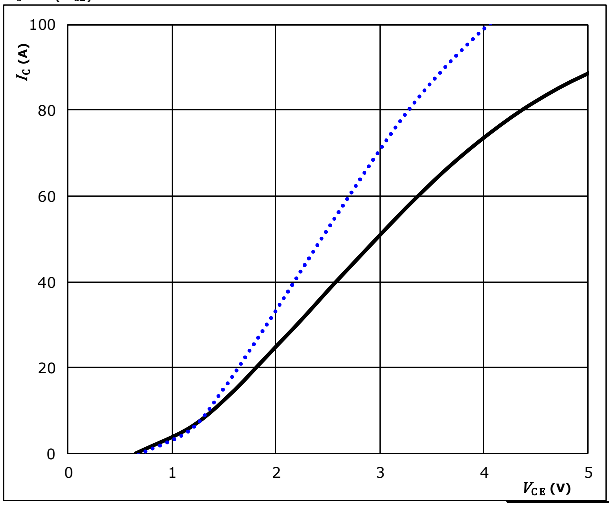
R (K/W)	τ (s)
5,42E-02	8,81E+00
1,80E-01	6,52E-01
8,23E-01	1,06E-01
4,25E-01	3,96E-02
1,21E-01	5,81E-03
5,59E-02	9,07E-04

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

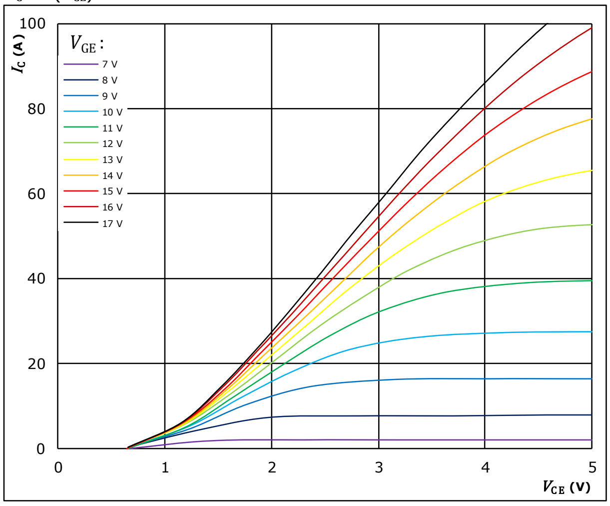


t_p =	250	µs	T_j:	25 °C	dotted
V_{GE} =	15	V		125 °C	solid

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 µs

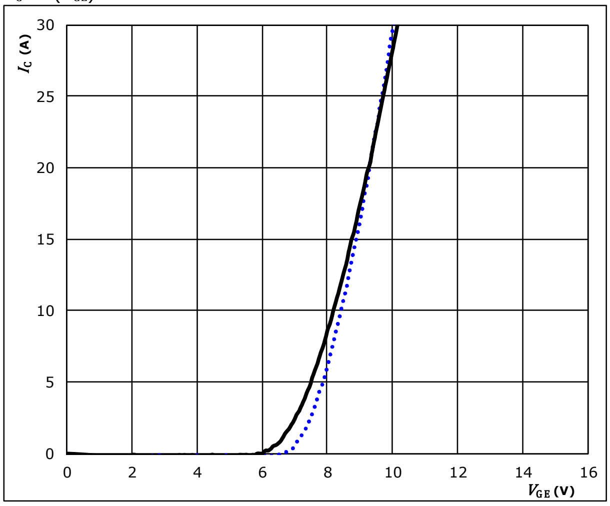
T_j = 125 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

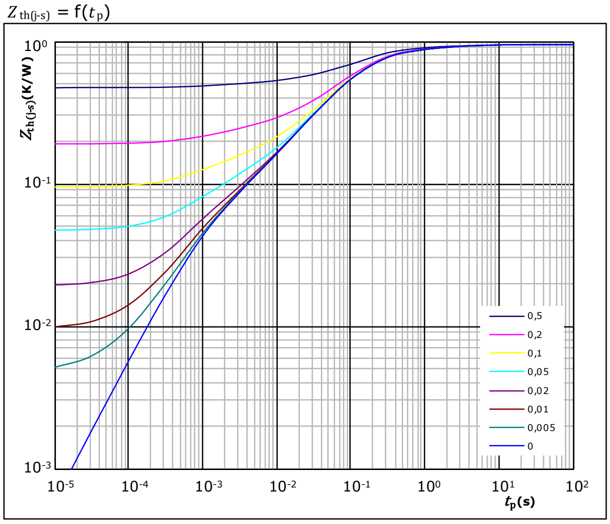


t_p =	100	µs	T_j:	25 °C	dotted
V_{CE} =	10	V		125 °C	solid

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,95 K/W

IGBT thermal model values

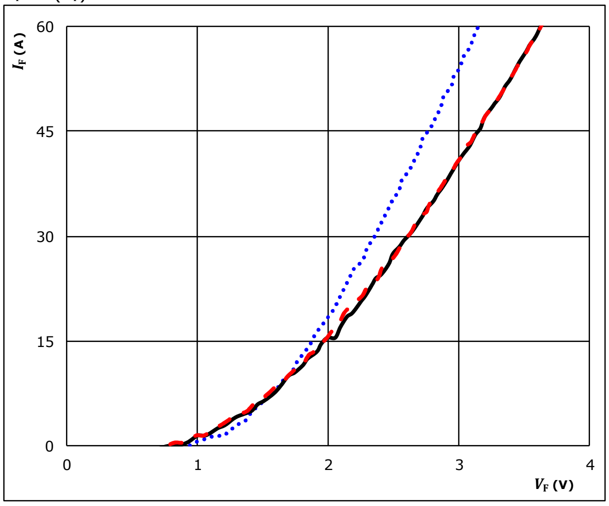
R (K/W)	τ (s)
4,64E-02	4,54E+00
1,02E-01	9,09E-01
3,90E-01	1,65E-01
2,91E-01	5,88E-02
7,16E-02	9,49E-03
4,70E-02	1,04E-03

Inverter Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



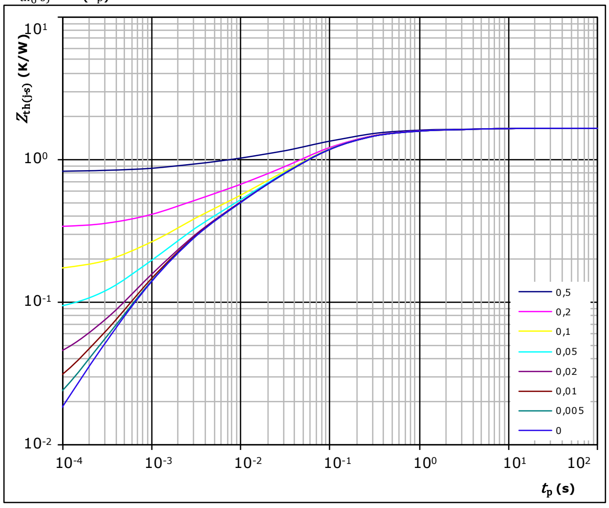
t_p = 250 µs

T_j: 25 °C; 125 °C; 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,66 K/W

FWD thermal model values

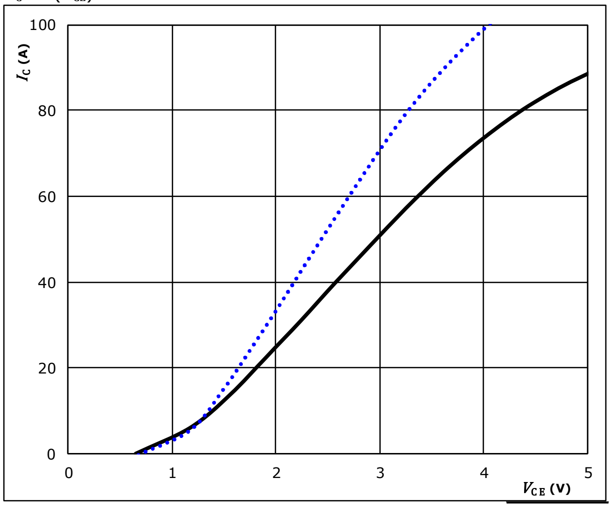
R (K/W)	τ (s)
9,21E-02	2,67E+00
3,57E-01	2,55E-01
7,21E-01	6,16E-02
2,70E-01	1,08E-02
1,72E-01	2,05E-03
4,76E-02	6,92E-04

Brake Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

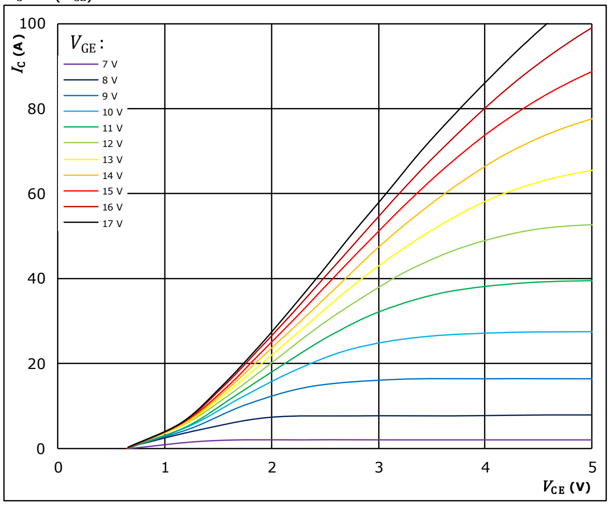


t_p =	250	µs	T_j:	25 °C	dotted
V_{GE} =	15	V		125 °C	solid

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

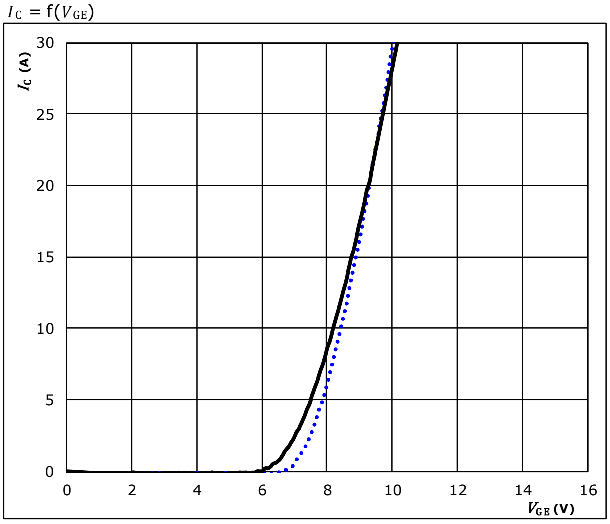


t_p = 250 µs
T_j = 125 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

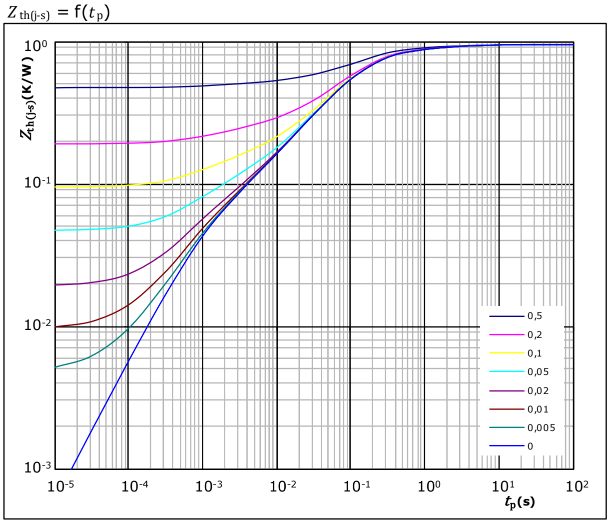


t_p =	100	µs	T_j:	25 °C	dotted
V_{CE} =	10	V		125 °C	solid

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T
$R_{th(j-s)}$ = 0,95 K/W

IGBT thermal model values

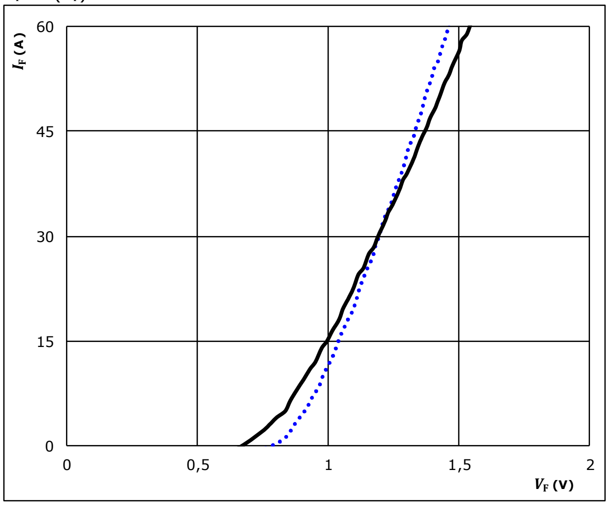
R (K/W)	τ (s)
4,64E-02	4,54E+00
1,02E-01	9,09E-01
3,90E-01	1,65E-01
2,91E-01	5,88E-02
7,16E-02	9,49E-03
4,70E-02	1,04E-03

Brake Diode Characteristics

figure 1. **Rectifier Diode**

Typical forward characteristics

$I_F = f(V_F)$



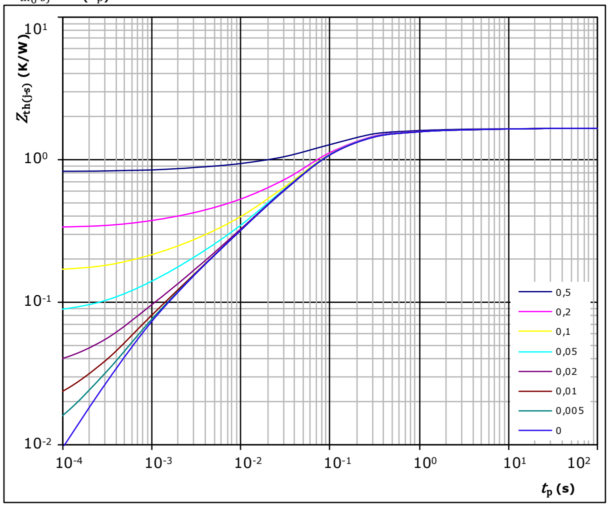
t_p = 250 µs

T_j: 25 °C (dotted), 125 °C (solid)

figure 2. **Rectifier Diode**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,66 K/W

Diode thermal model values

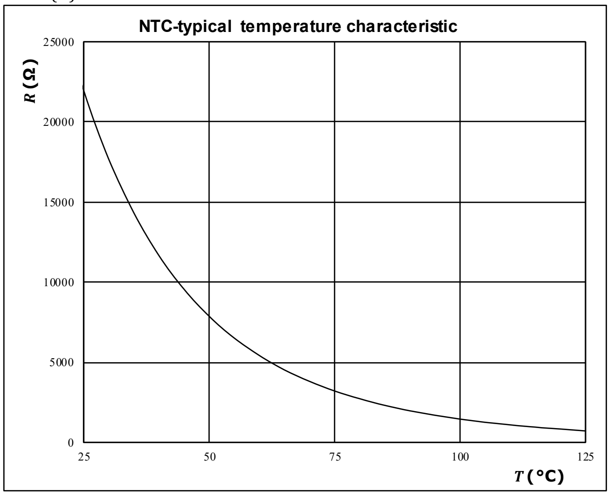
R (K/W)	τ (s)
5,42E-02	8,81E+00
1,80E-01	6,52E-01
8,23E-01	1,06E-01
4,25E-01	3,96E-02
1,21E-01	5,81E-03
5,59E-02	9,07E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic
as a function of temperature

$R = f(T)$

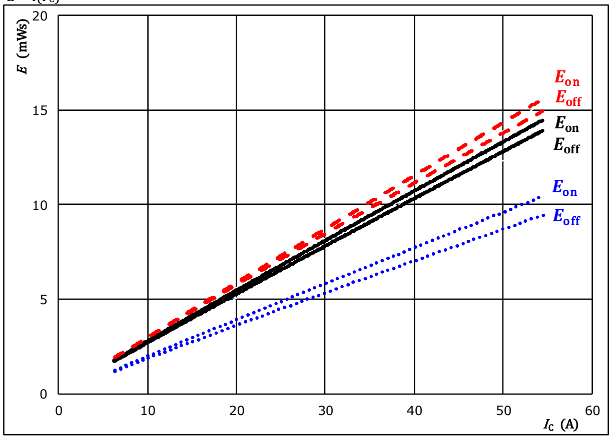


Inverter Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



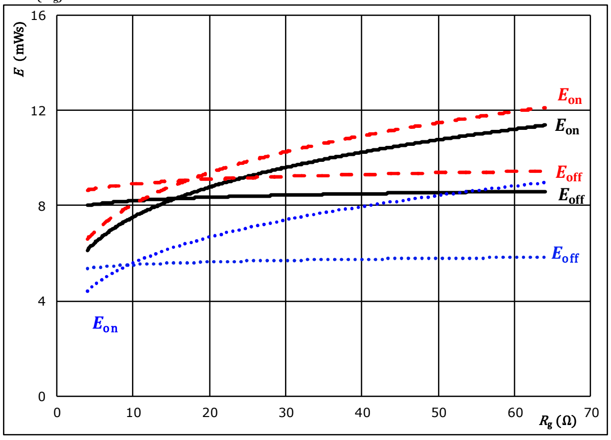
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	16	Ω		150 °C	dashed
R_{goff} =	16	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



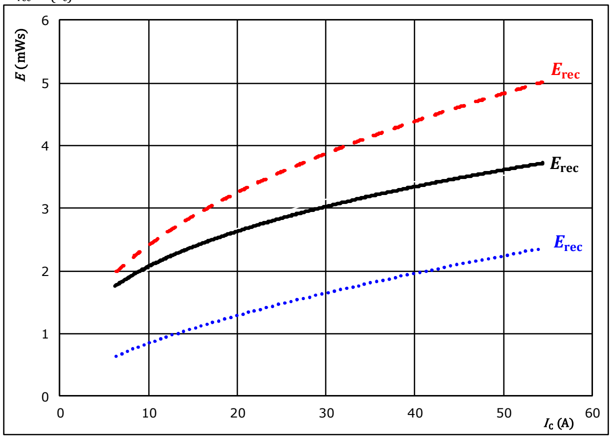
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	30	A		150 °C	dashed

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



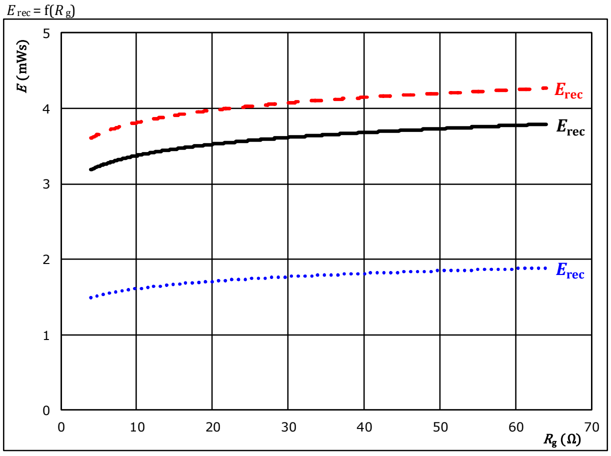
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	16	Ω		150 °C	dashed

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

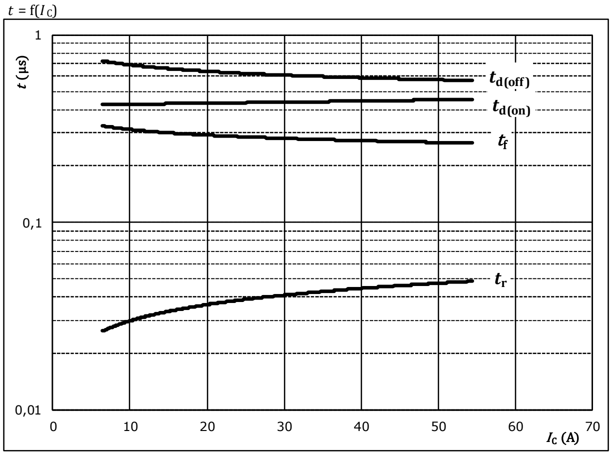
V_{CE} =	850	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	30	A		150 °C	dashed

Inverter Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



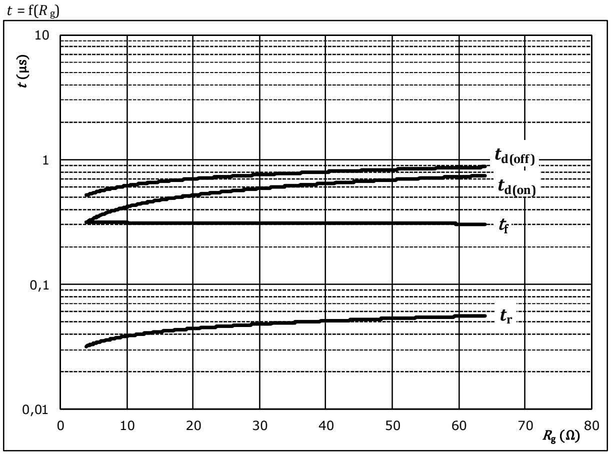
With an inductive load at

T_j =	150	°C
V_{CE} =	850	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



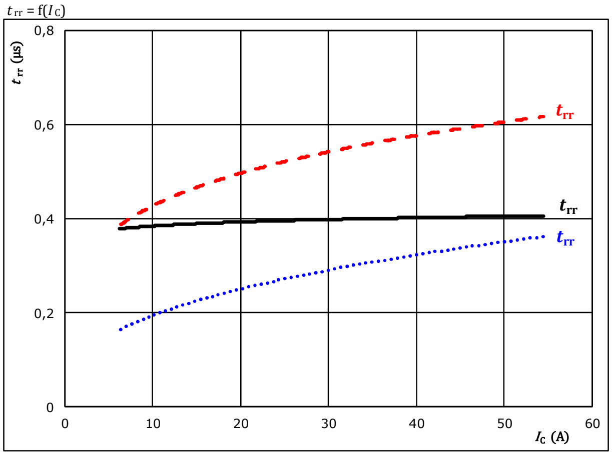
With an inductive load at

T_j =	150	°C
V_{CE} =	850	V
V_{GE} =	±15	V
I_C =	30	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



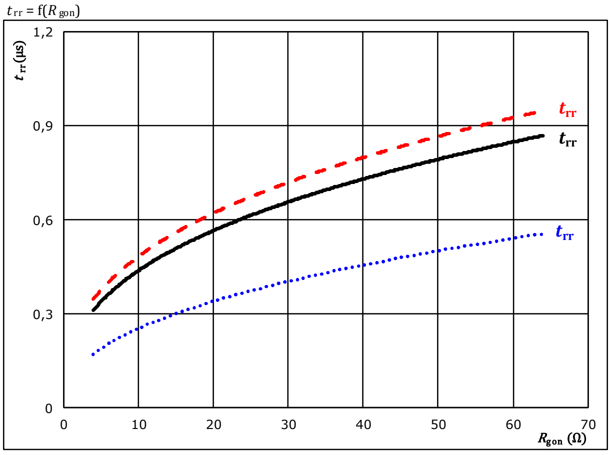
With an inductive load at

V_{CE}=	850	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
R_{gon} =	16	Ω		150 °C (dashed)

figure 8. **FWD**

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

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



With an inductive load at

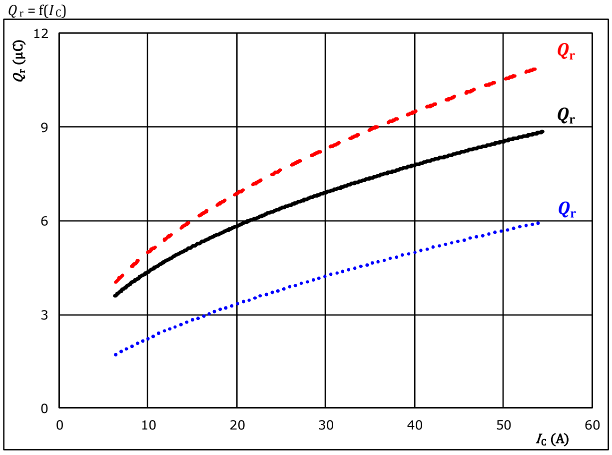
V_{CE} =	850	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
I_C =	30	A		150 °C (dashed)

Inverter Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



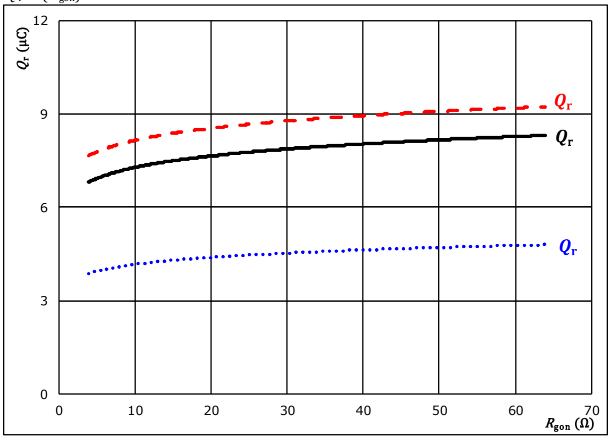
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	16	Ω		150 °C	dashed

figure 10. FWD

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

$Q_r = f(R_{gon})$



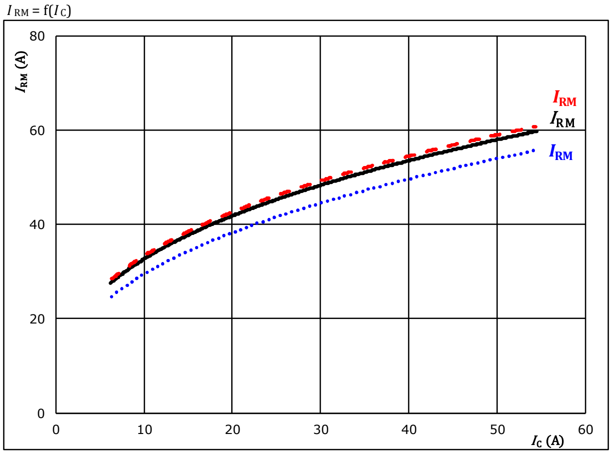
With an inductive load at

V_{CE}=	850	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C=	30	A		150 °C	dashed

figure 11. FWD

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$



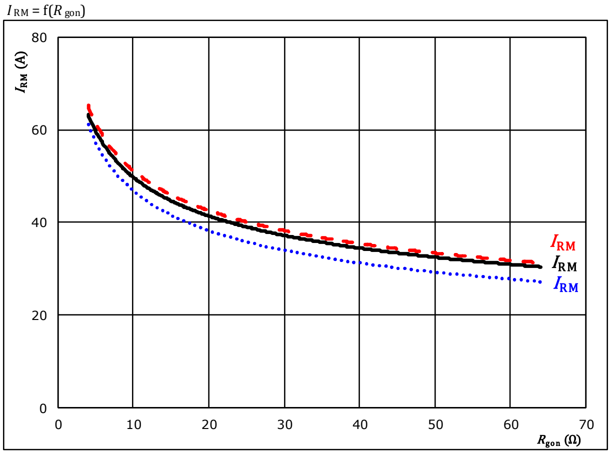
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	16	Ω		150 °C	dashed

figure 12. 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

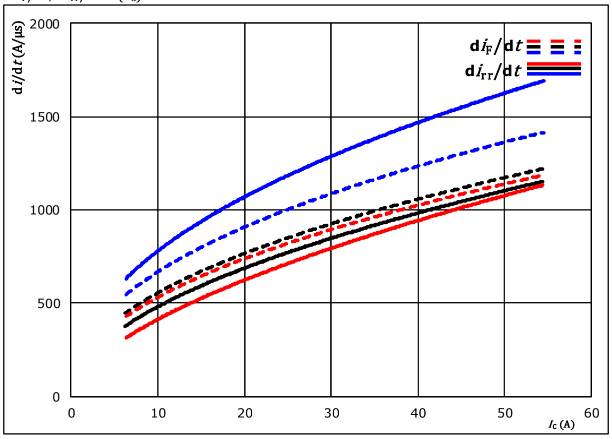
V_{CE}=	850	V	T_j:	25 °C	dotted
V_{GE}=	±15	V		125 °C	solid
I_C=	30	A		150 °C	dashed

Inverter Switching Characteristics

figure 13. **FWD**

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

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



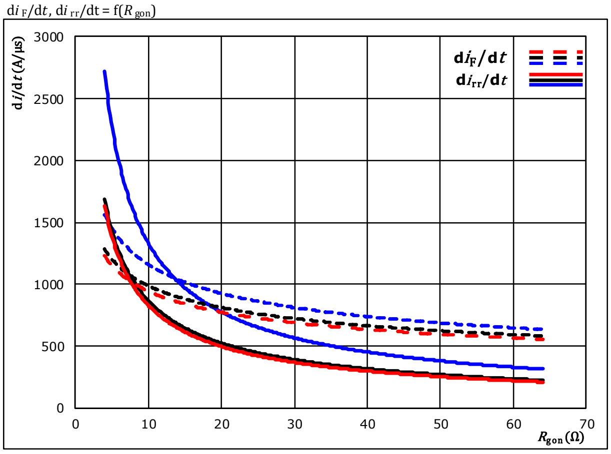
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 14. **FWD**

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

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



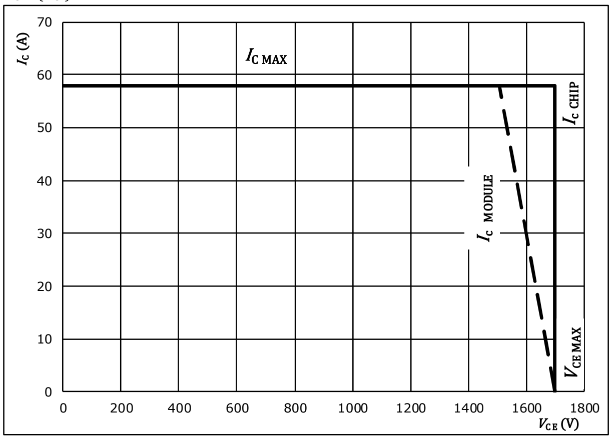
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	30	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

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

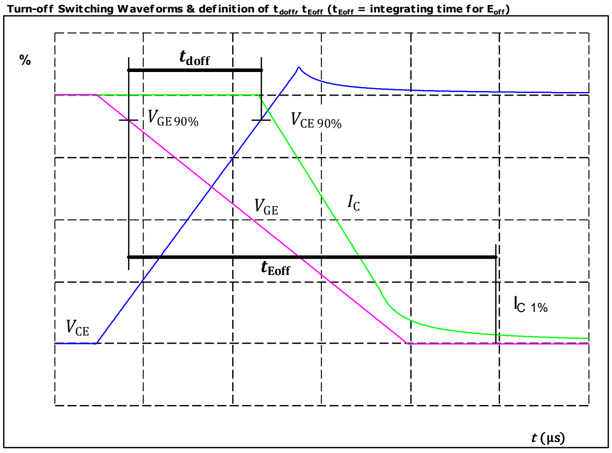
Inverter Switching Definitions

General conditions

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

figure 1. **IGBT**

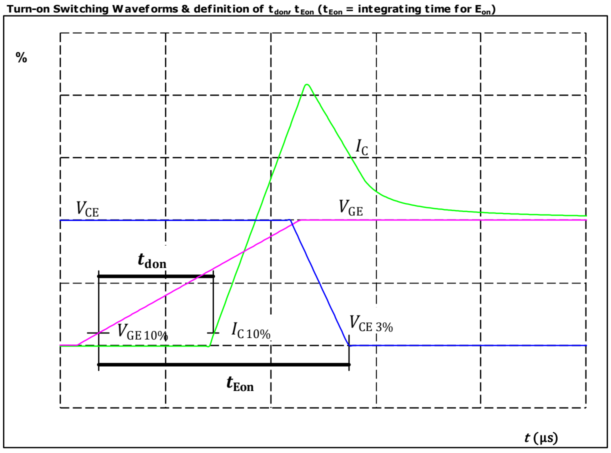
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_{doff} =	605	ns

figure 2. **IGBT**

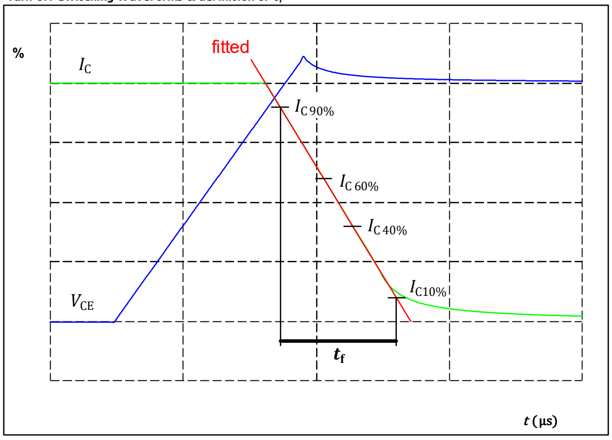
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_{don} =	435	ns

figure 3. **IGBT**

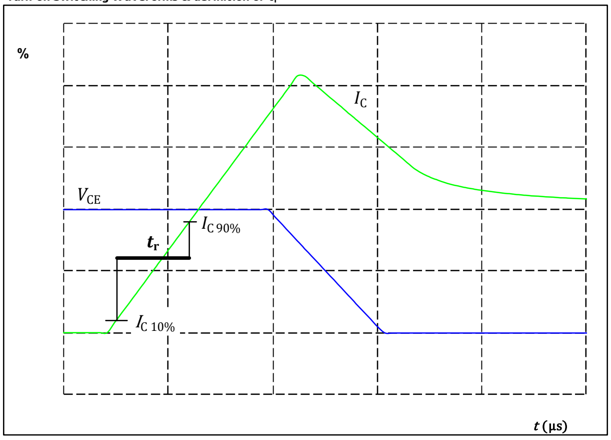
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_f =	263	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

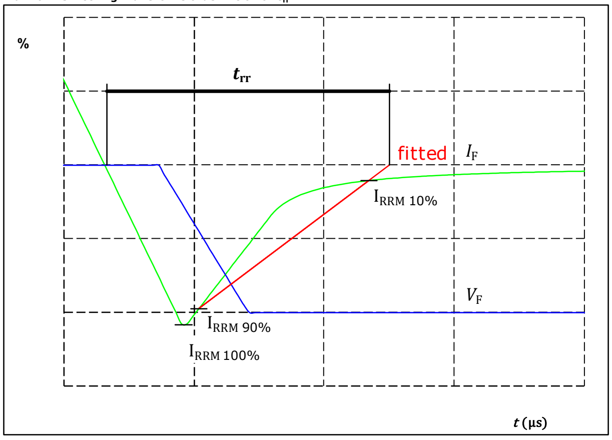


$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_r =	37	ns

Inverter Switching Characteristics

figure 5.	FWD

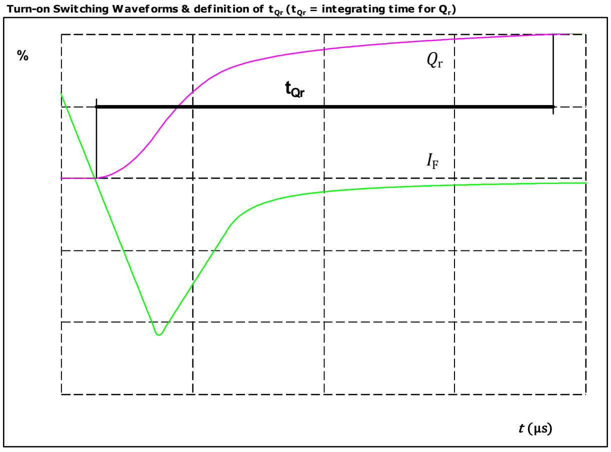
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	850	V
I_F (100%) =	30	A
I_{RRM} (100%) =	48	A
t_{rr} =	401	ns

figure 6.	FWD

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



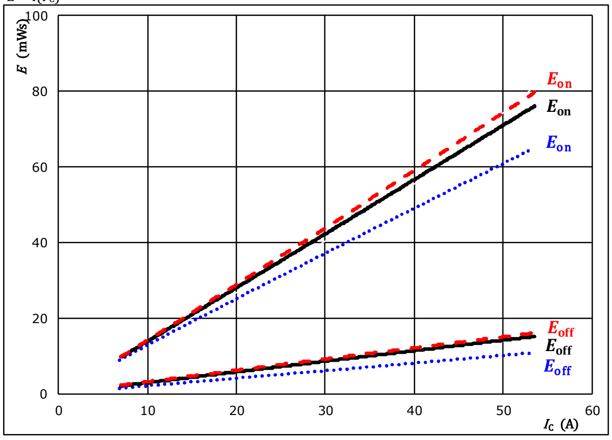
I_F (100%) =	30	A
Q_r (100%) =	7,07	µC

Brake Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



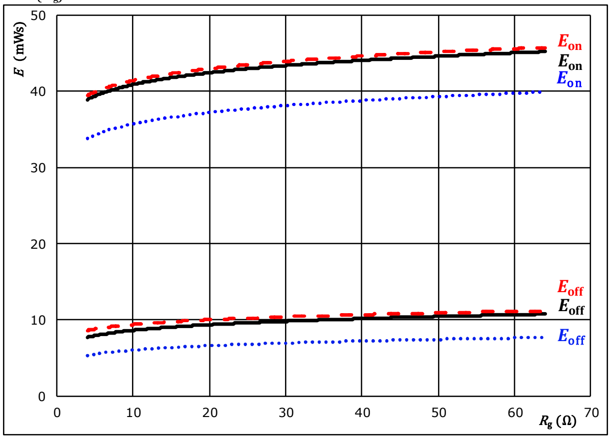
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	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

$E = f(R_g)$



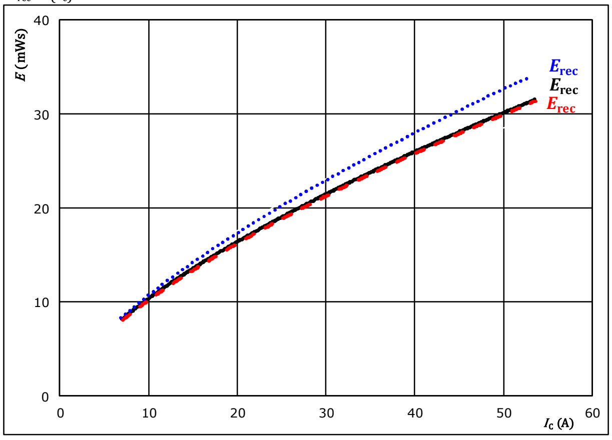
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C =	30	A		150 °C

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



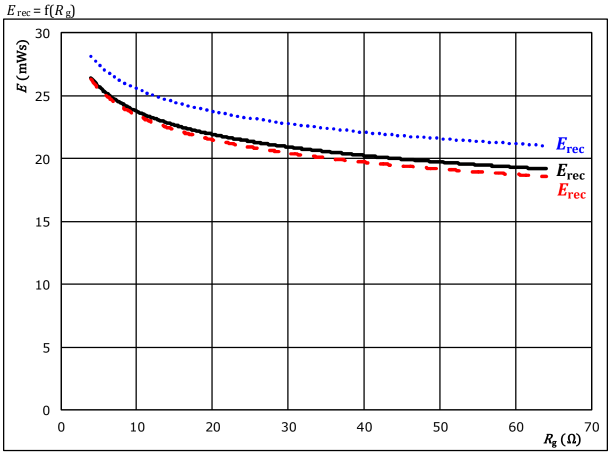
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

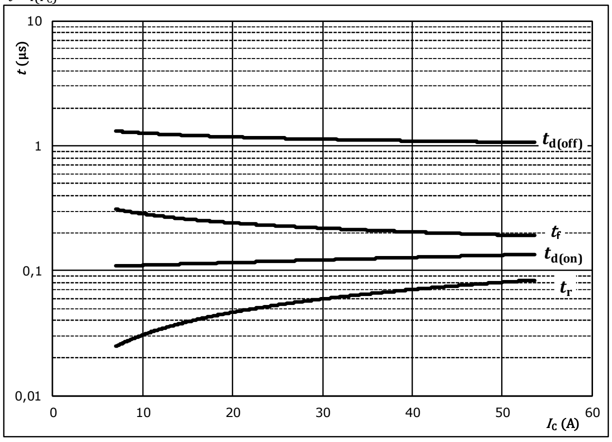
V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C =	30	A		150 °C

Brake Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



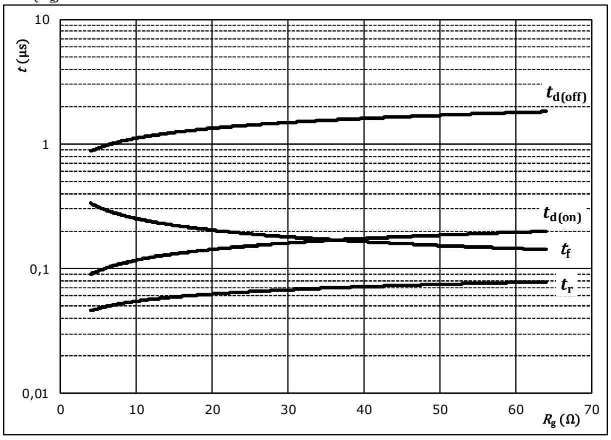
With an inductive load at

T_j =	150	°C
V_{CE} =	850	V
V_{GE} =	0 / 15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



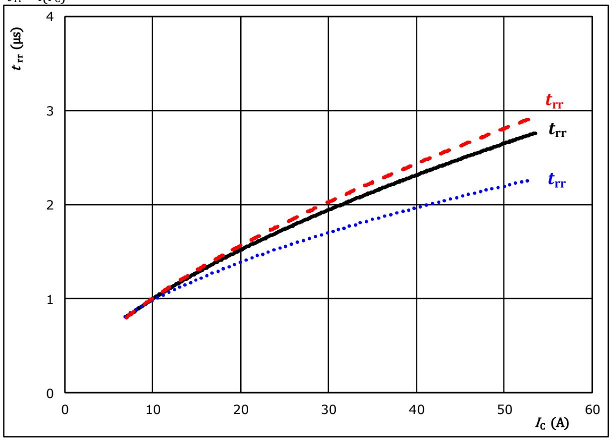
With an inductive load at

T_j =	150	°C
V_{CE} =	850	V
V_{GE} =	0 / 15	V
I_C =	30	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



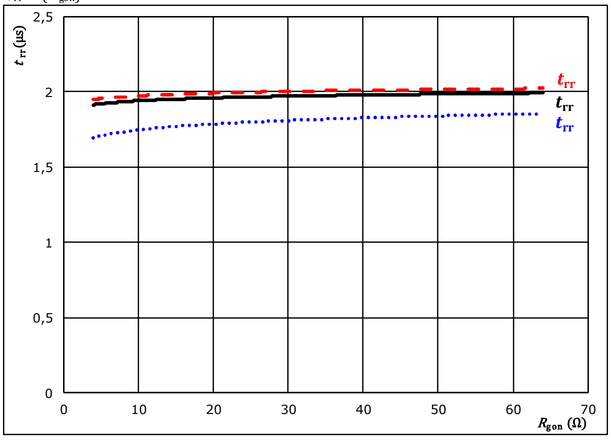
With an inductive load at

V_{CE}=	850	V	T_j:	25 °C
V_{GE}=	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 8. **FWD**

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

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



With an inductive load at

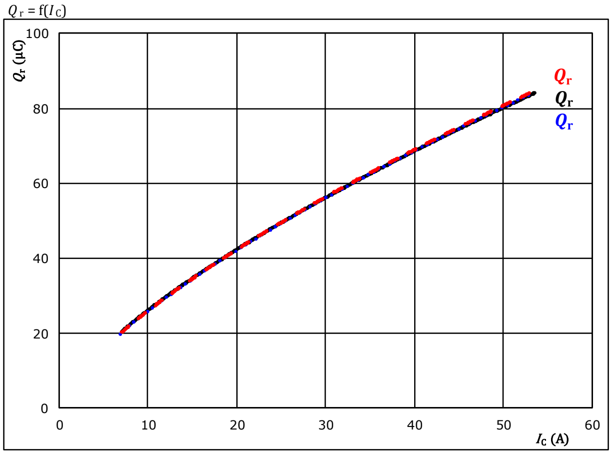
V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C =	30	A		150 °C

Brake Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

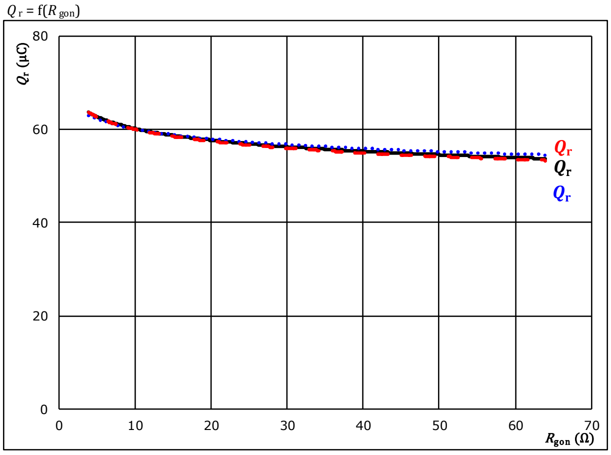


With an inductive load at				
V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

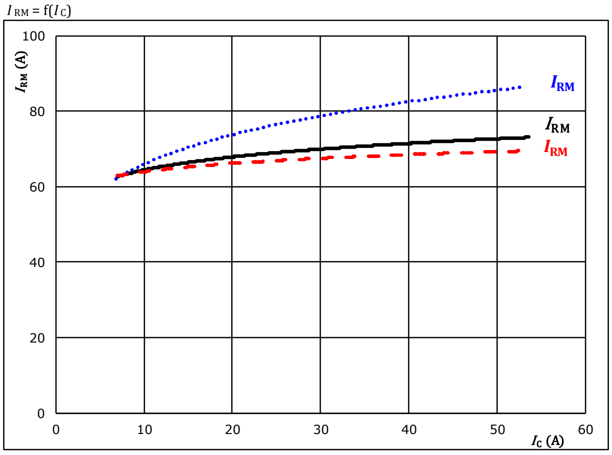


With an inductive load at				
V_{CE}=	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C=	30	A		150 °C

figure 11. **FWD**

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

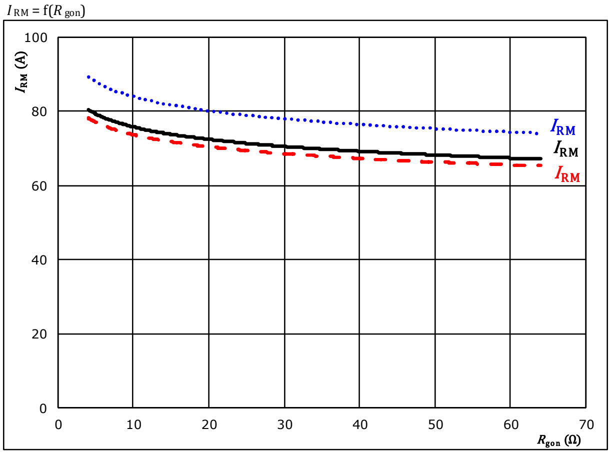


With an inductive load at				
V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 12. **FWD**

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

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



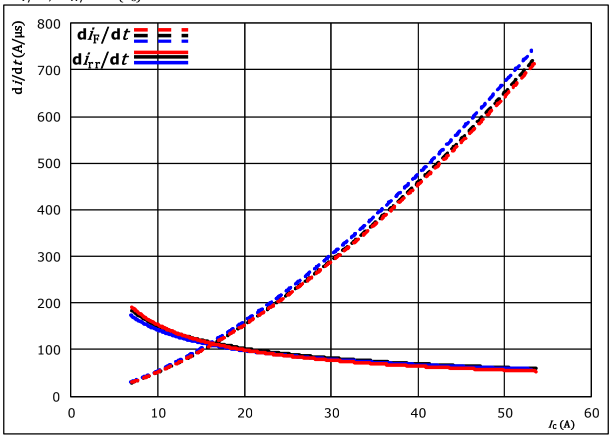
With an inductive load at				
V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C =	30	A		150 °C

Brake Switching Characteristics

figure 13. **FWD**

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

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



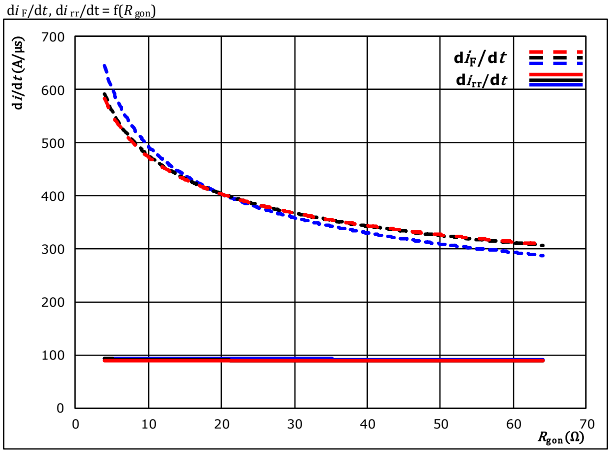
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 14. **FWD**

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

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



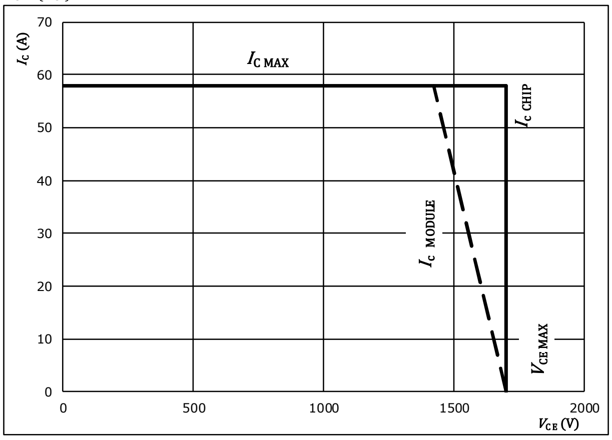
With an inductive load at

V_{CE} =	850	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C=	30	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

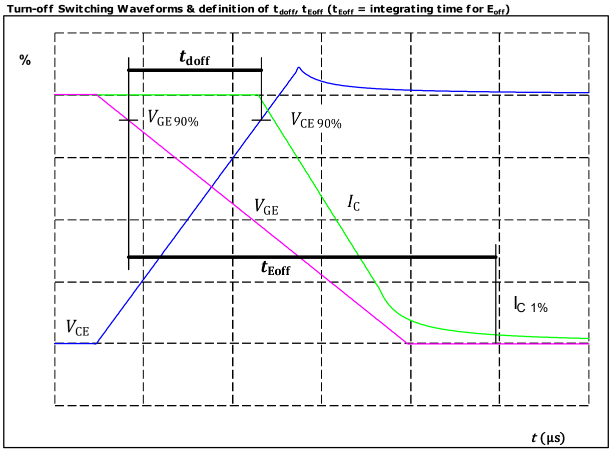
T_j =	125	°C
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Brake Switching Definitions

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

figure 1. **IGBT**

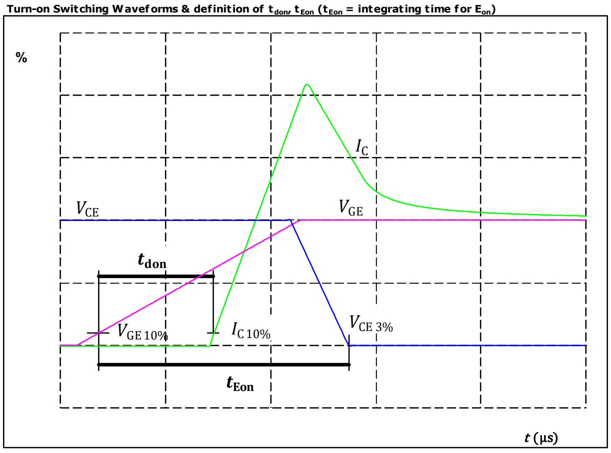
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_{doff} =	1120	ns

figure 2. **IGBT**

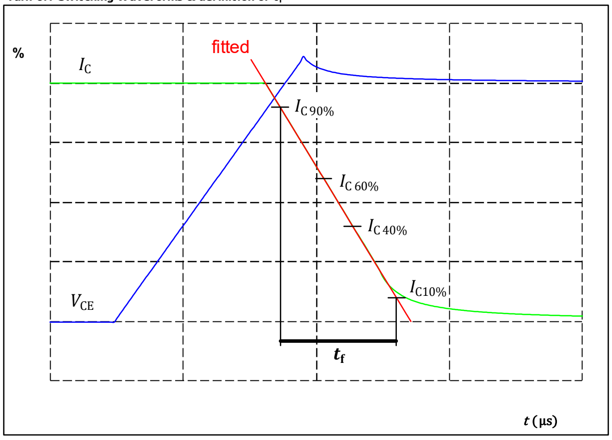
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_{don} =	124	ns

figure 3. **IGBT**

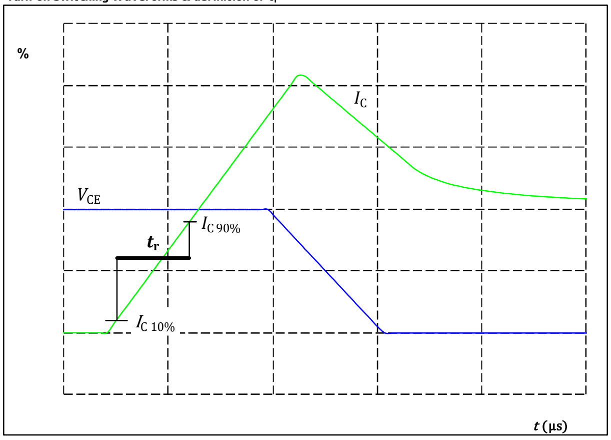
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_f =	222	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

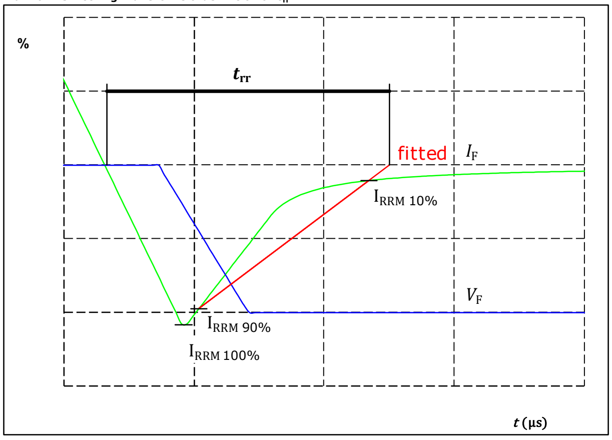


$V_C(100\%)$ =	850	V
$I_C(100\%)$ =	30	A
t_r =	54	ns

Brake Switching Characteristics

figure 5. **FWD**

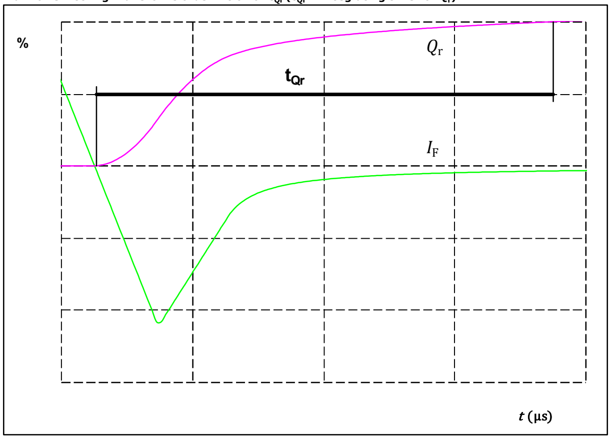
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	850	V
I_F (100%) =	30	A
I_{RRM} (100%) =	76	A
t_{rr} =	1947	ns

figure 6. **FWD**

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



I_F (100%) =	30	A
Q_r (100%) =	59,44	µC

10-F117PMA029SA01-LF00A34
datasheet

Vincotech

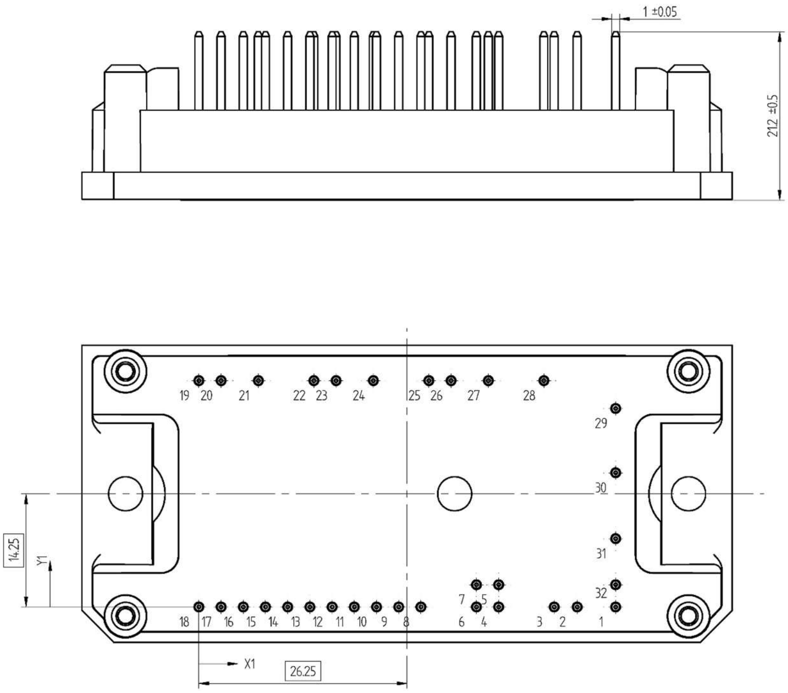
Ordering Code & Marking

Version	Ordering Code
without thermal paste	10-F117PMA029SA01-LF00A34

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

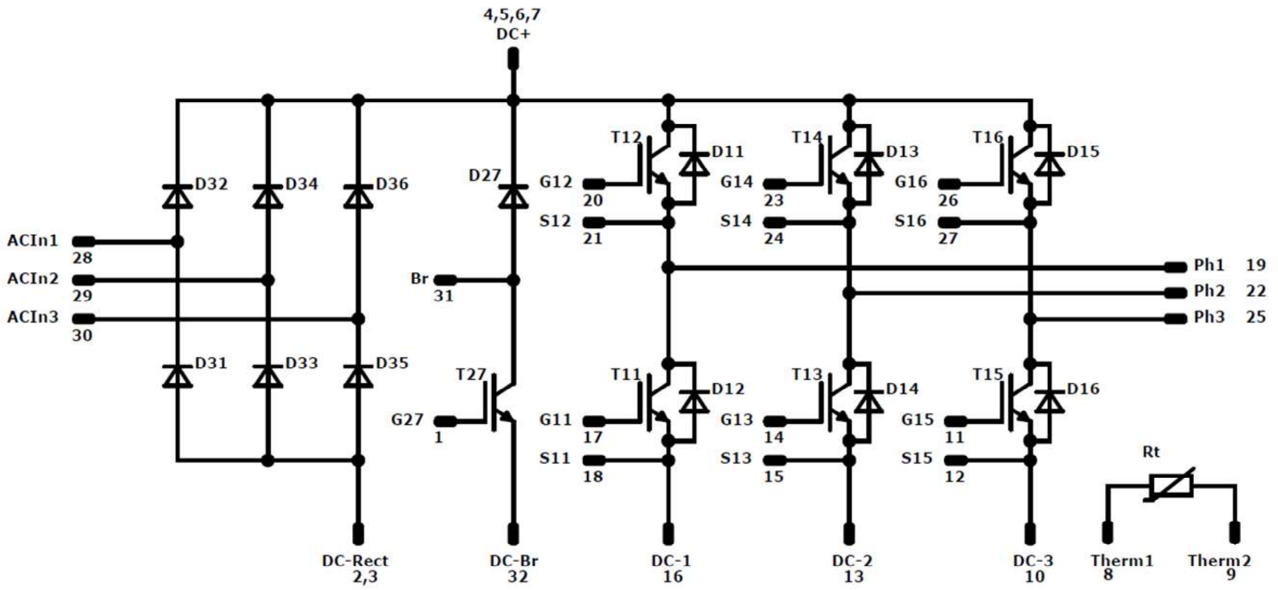
Outline

Pin table			
Pin	X	Y	Function
1	52,55	0	G27
2	47,7	0	DC-Rect
3	44,8	0	DC-Rect
4	37,8	0	DC+
5	37,8	2,8	DC+
6	35	0	DC+
7	35	2,8	DC+
8	28	0	Therm1
9	25,2	0	Therm2
10	22,4	0	DC-3
11	19,6	0	G15
12	16,8	0	S15
13	14	0	DC-2
14	11,2	0	G13
15	8,4	0	S13
16	5,6	0	DC-1
17	2,8	0	G11
18	0	0	S11
19	0	28,5	Ph1
20	2,8	28,5	G12
21	7,5	28,5	S12
22	14,5	28,5	Ph2
23	17,3	28,5	G14
24	22	28,5	S14
25	29	28,5	Ph3
26	31,8	28,5	G16
27	36,5	28,5	S16
28	43,5	28,5	ACIn1
29	52,55	25	ACIn2
30	52,55	16,9	ACIn3
31	52,55	8,6	BrE
32	52,55	2,8	DC-Br



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
D31, D32, D33, D34, D35, D36	Rectifier	1800 V	20 A	Rectifier Diode	
T11, T12, T13, T14, T15, T16	IGBT	1700 V	29 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1800 V	20 A	Inverter Diode	
T27	IGBT	1700 V	29 A	Brake Switch	
D27	FWD	1800 V	20 A	Brake Diode	
Rt	NTC			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.

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-F117PMA029SA01-LF00A34-D2-14	23 Apr. 2019	Correction of I_c/I_f values	1,2