30-F212PMA035M7-L887A79

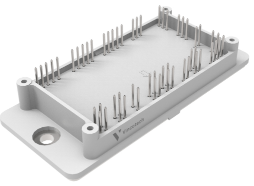
datasheet

***flow*PIM 2** **1200 V / 35 A**

Features

- IGBT M7 with low VCEsat and improved EMC behavior
- Open emitter configuration
- Compact and low inductive design
- Built-in NTC

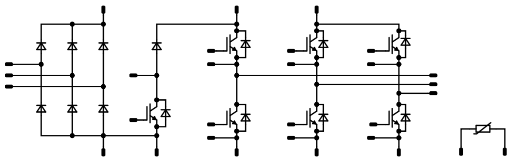
flow 2 17 mm housing



Target applications

- Industrial Drives

Schematic



Types

- 30-F212PMA035M7-L887A79

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	58	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		70	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	132	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	9,5	μs
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	42	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		70	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	80	W
Maximum junction temperature	T_{jmax}			175	°C
Brake Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	37	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		50	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	95	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	9,5	μs
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Brake Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	36	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		50	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	70	W
Maximum junction temperature	T_{jmax}			175	°C
Brake Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	13	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		10	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	34	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	83	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	490	A
Surge current capability	I^2t			1200	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	106	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Module Properties					
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				12,01	mm
Comparative Tracking Index	CTI			≥ 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0035	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		35	25 125 150		1,47 1,64 1,68	1,85(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			0,08	mA
Gate-emitter leakage current	I_{GES}		20	0		25			0,5	µA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}		0	10		25		7900		pF
Output capacitance	C_{oes}		0	10		25		270		pF
Reverse transfer capacitance	C_{res}		0	10		25		97		pF
Gate charge	Q_g	V_{CC} = 600 V	15		35	25		260		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,72		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	35	25 125 150		124,2 122,4 121,4		ns
Rise time	t_r	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	35	25 125 150		14,2 17 17,8		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	35	25 125 150		178,6 202,8 208,2		ns
Fall time	t_f	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	35	25 125 150		95,14 117,86 118,79		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=4,34 µC Q_{rFWD}=6,18 µC Q_{rFWD}=6,9 µC	±15	600	35	25 125 150		1,45 1,92 2,09		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	35	25 125 150		2,4 3,17 3,42		mWs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] / V_{GS} [V]	V_{CE} [V] / V_{DS} [V] / V_F [V]	I_C [A] / I_D [A] / I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Inverter Diode										
Static										
Forward voltage	V_F				35	25 125 150		1,66 1,76 1,75	2,1[1]	V
Reverse leakage current	I_R	V_r = 1200 V				25			40	µA
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,18		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=2681 A/µs di/dt=2670 A/µs di/dt=2690 A/µs	±15	600	35	25 125 150		77,33 75,64 76,58		A
Reverse recovery time	t_{rr}					25 125 150		157,26 283,67 310,8		ns
Recovered charge	Q_r					25 125 150		4,34 6,18 6,9		µC
Reverse recovered energy	E_{rec}					25 125 150		1,96 2,82 3,13		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2734 2205 2101		A/µs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Brake Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0025	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		25	25 125 150		1,64 1,89 1,95	2,15(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			70	µA
Gate-emitter leakage current	I_{GES}		0	0		25			500	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}		0	10		25		4800		pF
Output capacitance	C_{oes}							170		pF
Reverse transfer capacitance	C_{res}							57		pF
Gate charge	Q_g	V_{CC} = 600 V	15		25	25		180		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	600	25	25 125 150		147,2 149,2 145,2		ns
Rise time	t_r					25 125 150		28,6 33,4 34		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		170,6 191,4 195,6		ns
Fall time	t_f					25 125 150		95,03 109,96 114,76		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=2,54 µC Q_{rFWD}=3,88 µC Q_{rFWD}=4,28 µC				25 125 150		2,06 2,66 2,82		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,67 2,18 2,29		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	
Brake Diode										
Static										
Forward voltage	V_F				25	25 125 150		1,63 1,7 1,69	2,1[(1)]	V
Reverse leakage current	I_R	V_r = 1200 V				25			35	µA
Thermal										
Thermal resistance junction to sink [(2)]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,36		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=645 A/µs di/dt=673 A/µs di/dt=633 A/µs	±15	600	25	25 125 150		20,99 22,6 23,21		A
Reverse recovery time	t_{rr}					25 125 150		254,14 367,32 404,24		ns
Recovered charge	Q_r					25 125 150		2,54 3,88 4,28		µC
Reverse recovered energy	E_{rec}					25 125 150		0,884 1,45 1,61		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		217,37 134,32 132,01		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	
Brake Sw. Protection Diode										
Static										
Forward voltage	V_F				5	25 125 150		1,57 1,65 1,65	2,1(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			20	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,76		K/W
Rectifier Diode										
Static										
Forward voltage	V_F				25	25 125		1 0,915	1,21(1) 1,1(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25			50	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,66		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P							5		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

(1) Value at chip level

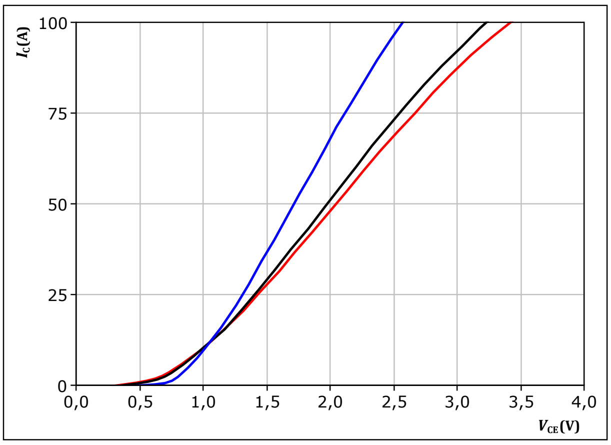
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

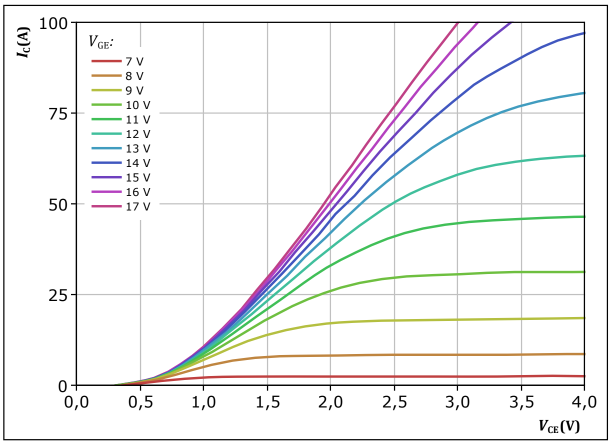


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



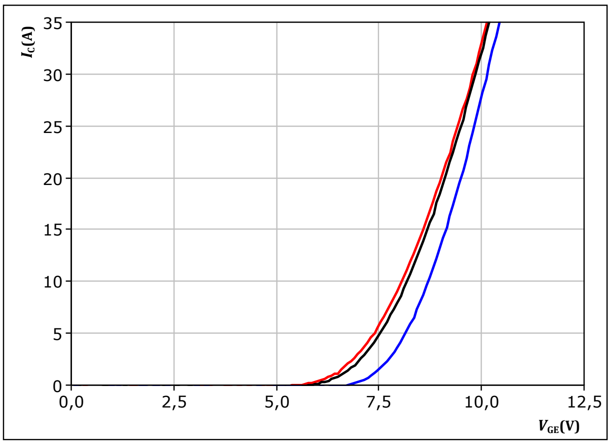
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

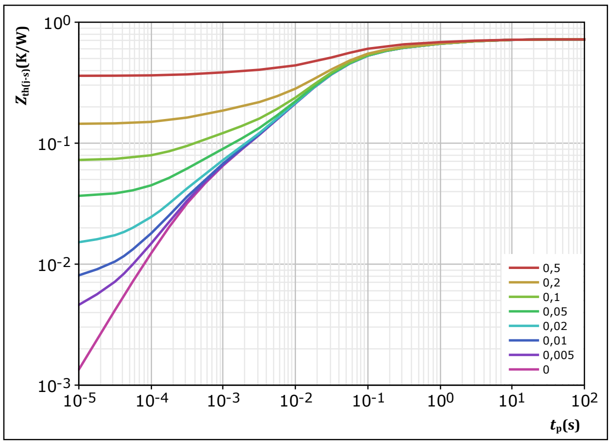


t_p =	250	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,721	K/W

IGBT thermal model values

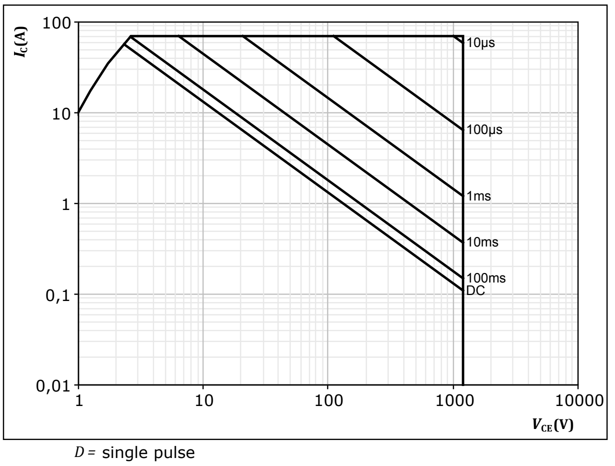
R (K/W)	τ (s)
3,93E-02	5,07E+00
7,23E-02	9,25E-01
1,28E-01	1,58E-01
3,10E-01	3,68E-02
1,08E-01	1,02E-02
3,17E-02	1,41E-03
3,18E-02	3,39E-04

Inverter Switch Characteristics

figure 5.	IGBT

Safe operating area

I_C = f(V_{CE})



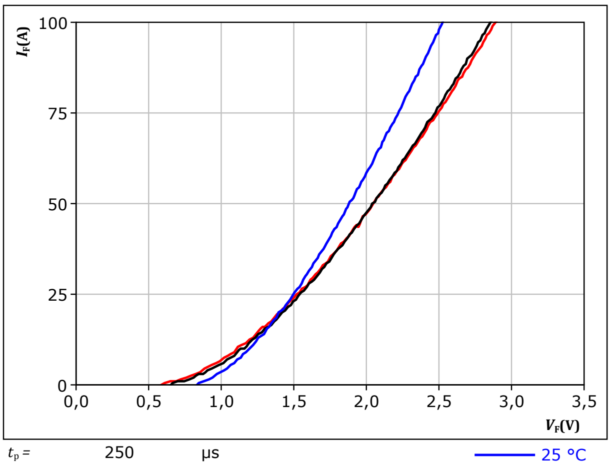
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Inverter Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

I_F = f(V_F)



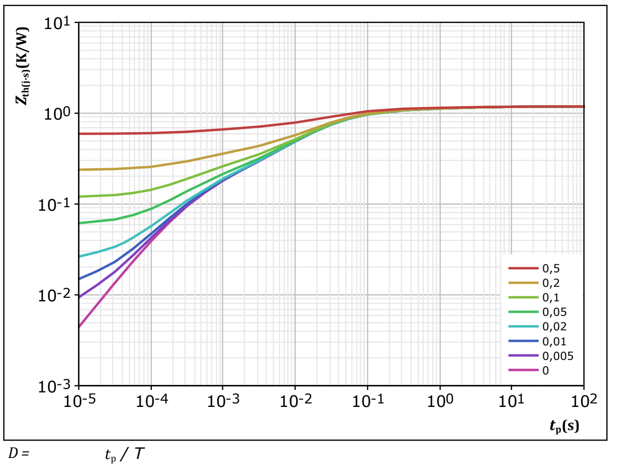
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,185 K/W

FWD thermal model values

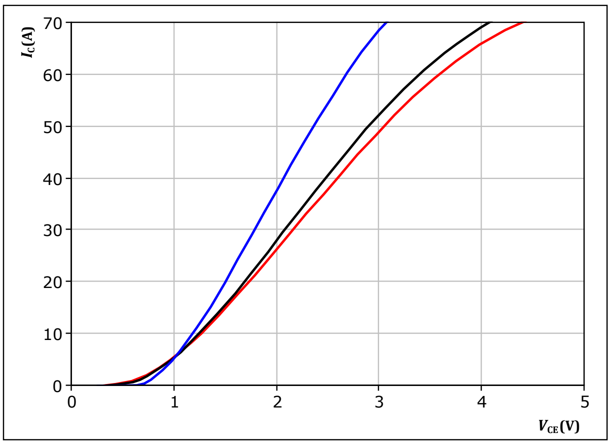
R (K/W)	τ (s)
4,51E-02	5,63E+00
8,94E-02	6,99E-01
2,50E-01	9,25E-02
4,74E-01	2,37E-02
1,69E-01	5,51E-03
1,06E-01	7,12E-04
5,12E-02	2,07E-04

Brake Switch Characteristics

figure 8. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

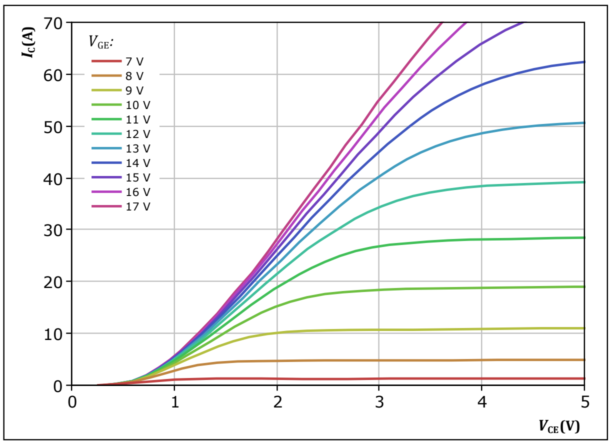


t_p =	250	μs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 9. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



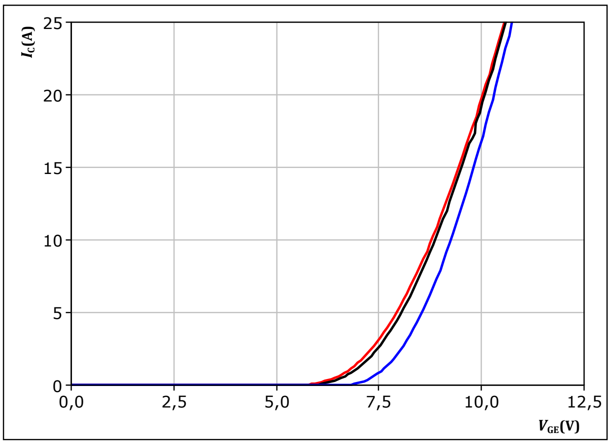
t_p =	250	μs
T_j =	150	°C

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

figure 10. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

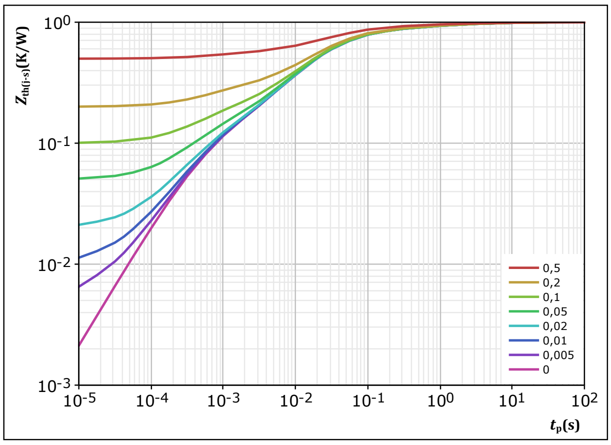


t_p =	250	μs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 11. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,998	K/W

IGBT thermal model values

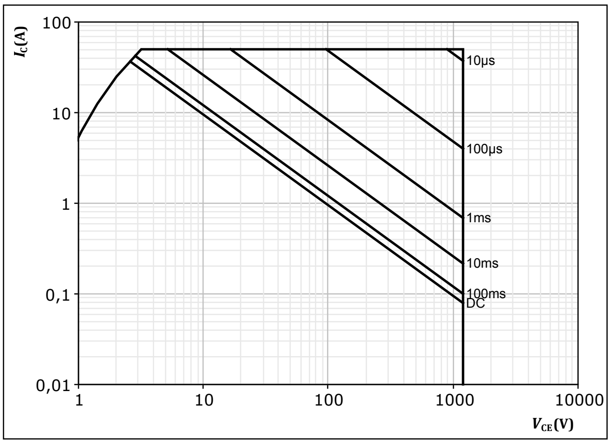
R (K/W)	τ (s)
3,14E-02	8,62E+00
6,50E-02	1,51E+00
1,01E-01	2,72E-01
3,13E-01	5,31E-02
3,44E-01	1,52E-02
6,82E-02	3,04E-03
7,71E-02	4,74E-04

Brake Switch Characteristics

figure 12. **IGBT**

Safe operating area

I_C = f(V_{CE})



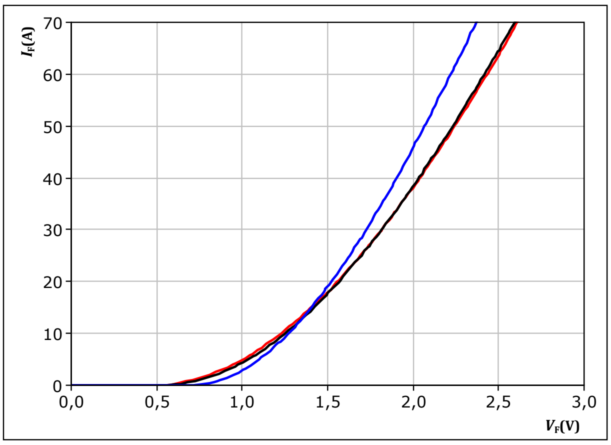
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Brake Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



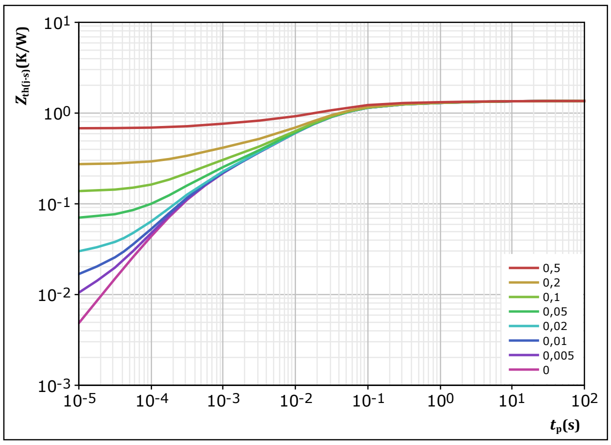
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 14. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,359 K/W

FWD thermal model values

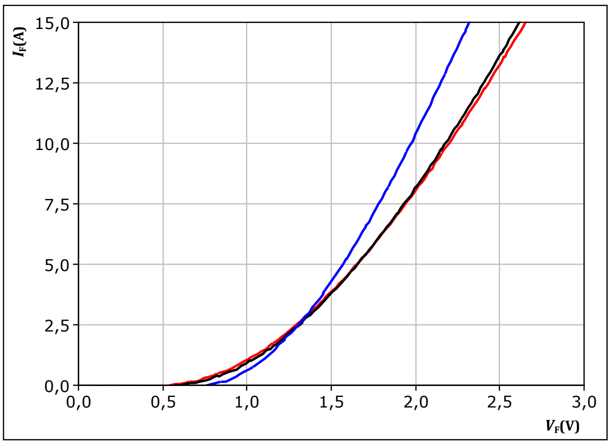
R (K/W)	τ (s)
4,30E-02	6,93E+00
7,33E-02	1,01E+00
1,84E-01	1,33E-01
5,52E-01	2,95E-02
2,85E-01	7,43E-03
1,16E-01	1,34E-03
1,06E-01	3,07E-04

Brake Sw. Protection Diode Characteristics

figure 15. FWD

Typical forward characteristics

$I_F = f(V_F)$



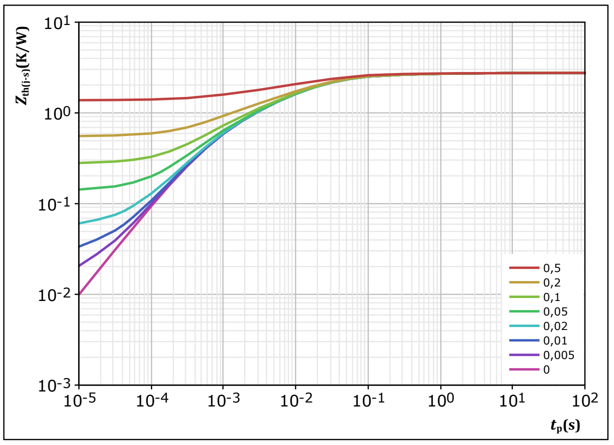
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 16. FWD

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,759 K/W

FWD thermal model values

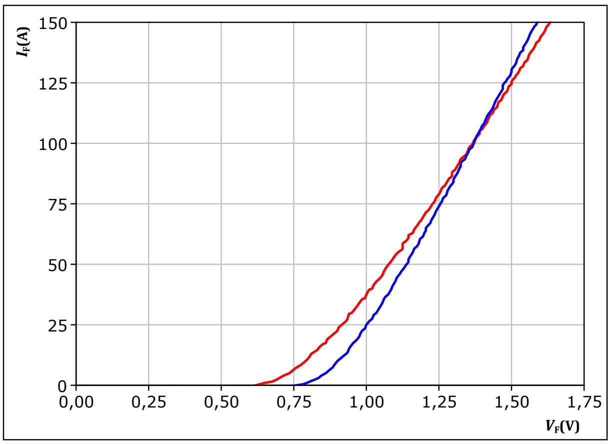
R (K/W)	τ (s)
6,58E-02	4,81E+00
1,43E-01	3,47E-01
6,08E-01	4,61E-02
8,65E-01	1,40E-02
7,08E-01	2,91E-03
3,69E-01	5,42E-04

Rectifier Diode Characteristics

figure 17. **Rectifier**

Typical forward characteristics

$I_F = f(V_F)$



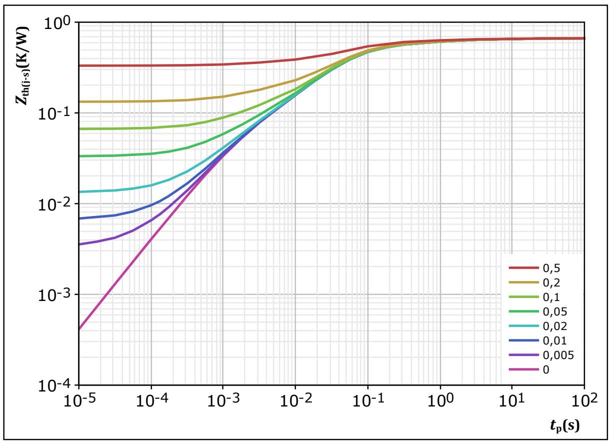
t_p = 250 µs

T_j: 25 °C, 125 °C

figure 18. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,664 K/W

Rectifier thermal model values

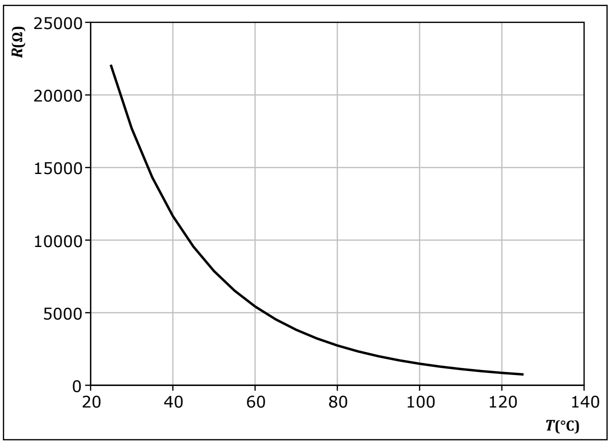
R (K/W)	τ (s)
2,64E-02	1,18E+01
6,63E-02	1,18E+00
1,36E-01	1,65E-01
3,29E-01	4,29E-02
6,63E-02	1,04E-02
3,95E-02	1,49E-03

Thermistor Characteristics

figure 19. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

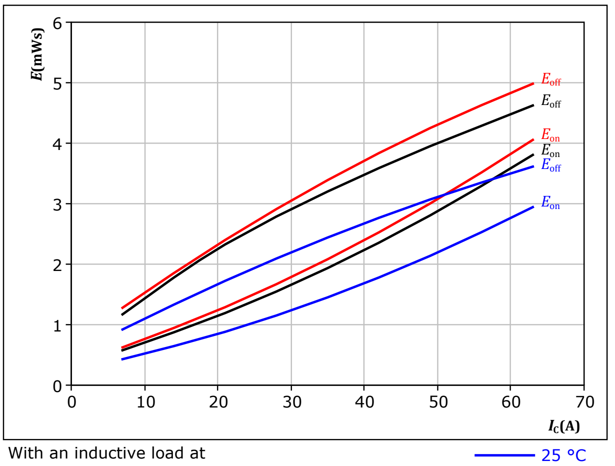


Inverter Switching Characteristics

figure 20. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



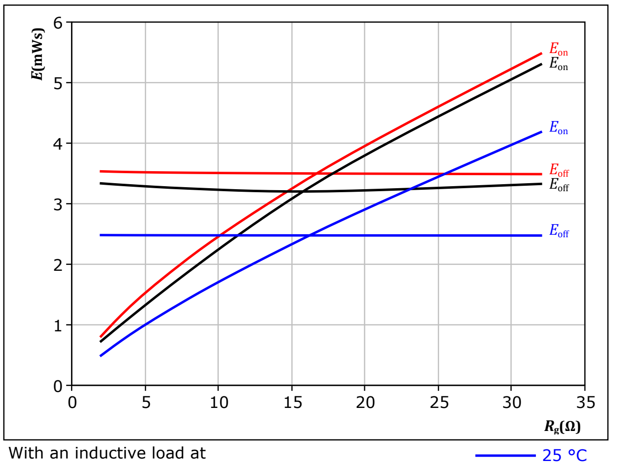
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C
R_{goff} =	8	Ω		

figure 21. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



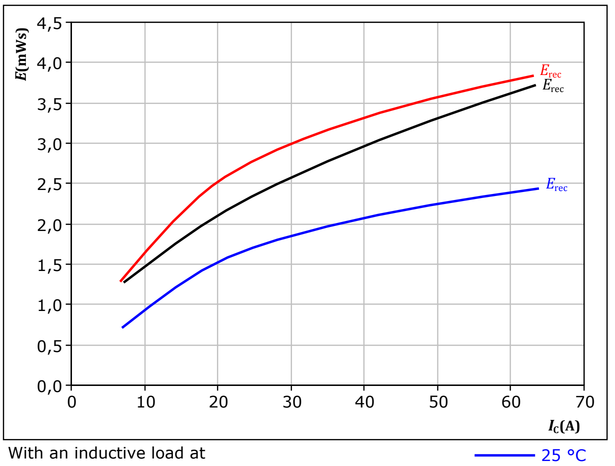
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	35	A		150 °C

figure 22. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



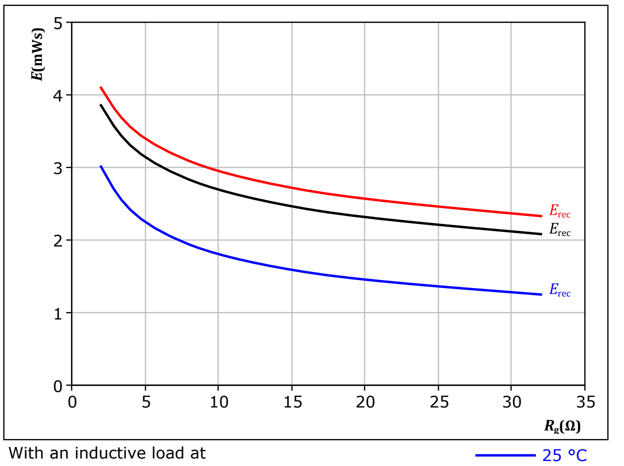
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 23. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

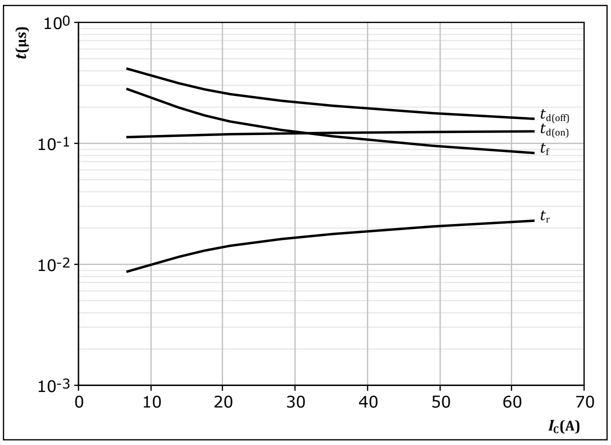
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	35	A		150 °C

Inverter Switching Characteristics

figure 24. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



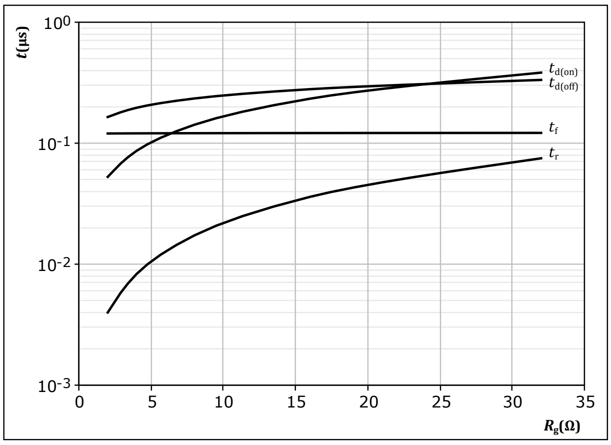
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 25. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



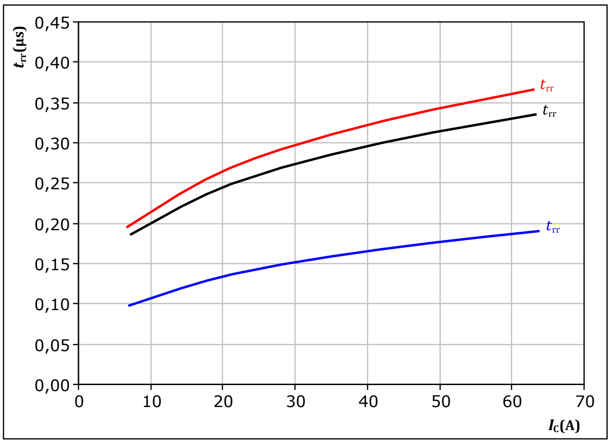
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	35	A

figure 26. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

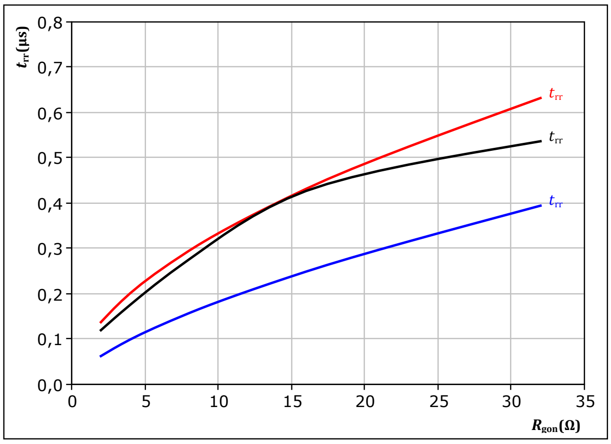
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 27. **FWD**

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

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



With an inductive load at

V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	35	A

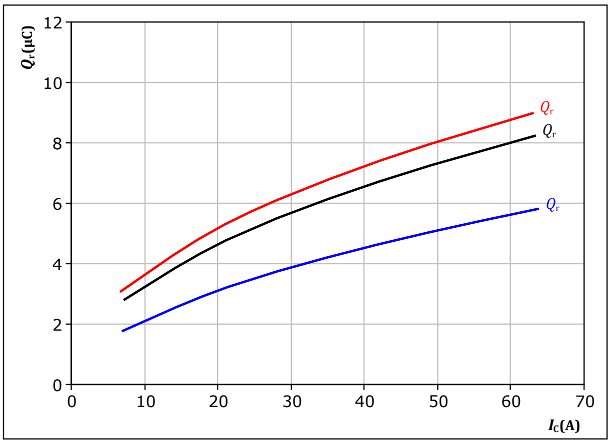
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 28. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



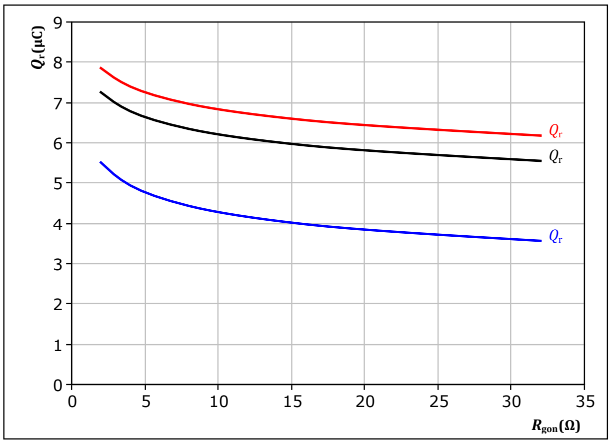
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 29. **FWD**

Typical recovered charge as a function of turn on gate resistor

Q_r = f(R_{gon})



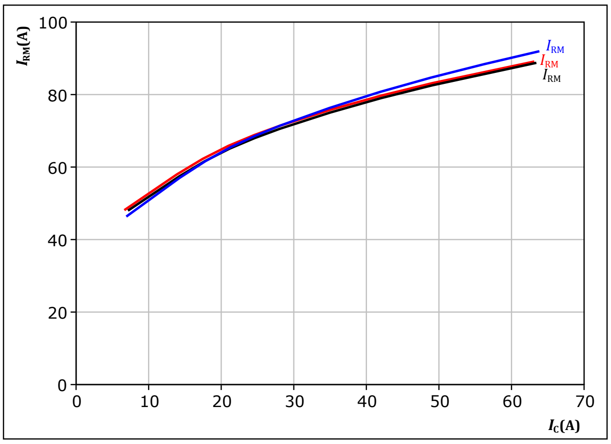
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	35	A		150 °C

figure 30. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



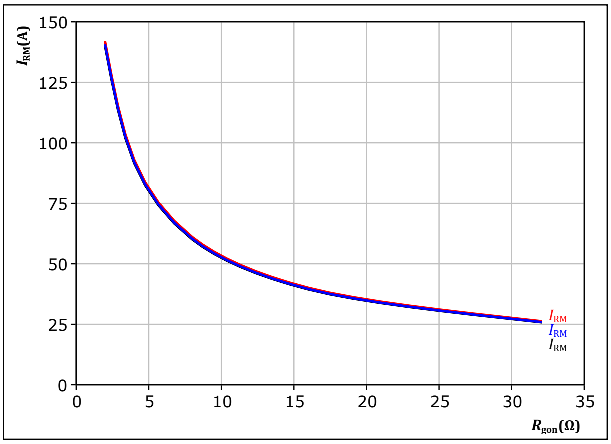
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 31. **FWD**

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

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



With an inductive load at

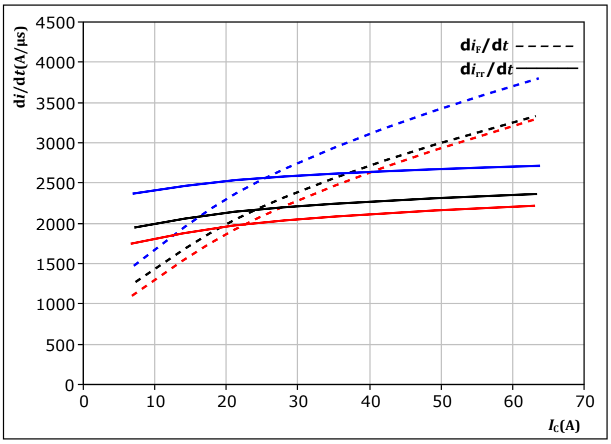
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	35	A		150 °C

Inverter Switching Characteristics

figure 32. **FWD**

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

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



With an inductive load at

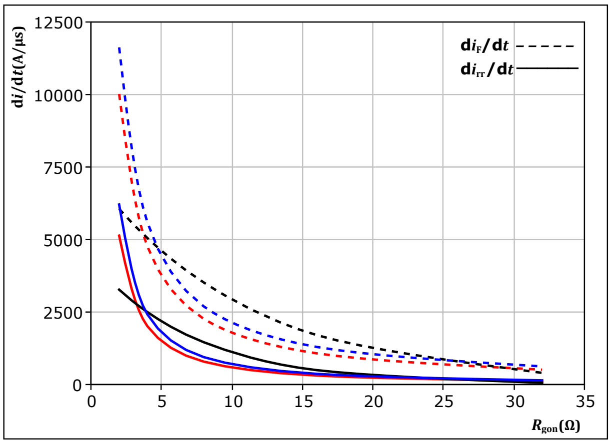
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 8 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 33. **FWD**

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

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



With an inductive load at

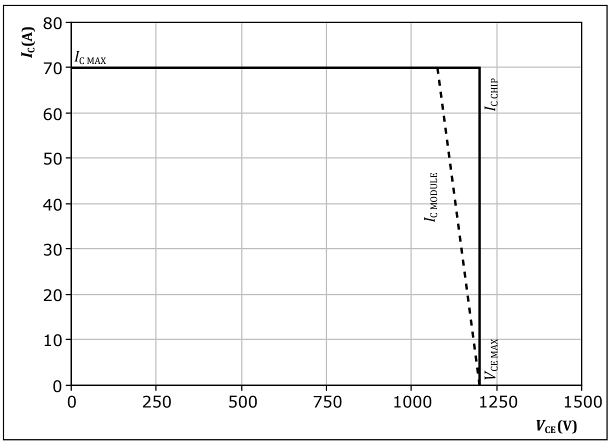
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 35 A

T_j: 25 °C, 125 °C, 150 °C

figure 34. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



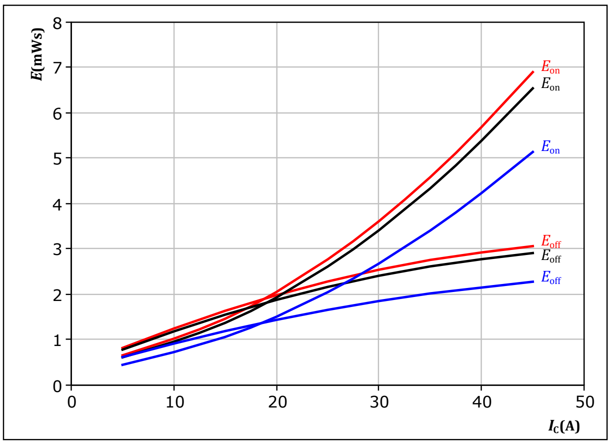
At
T_j = 150 °C
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Brake Switching Characteristics

figure 35. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



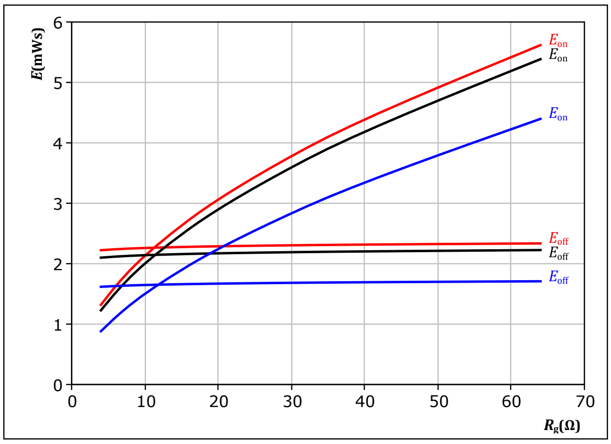
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C
R_{goff} =	16	Ω		

figure 36. **IGBT**

Typical switching energy losses as a function of gate resistor

E = f(R_g)



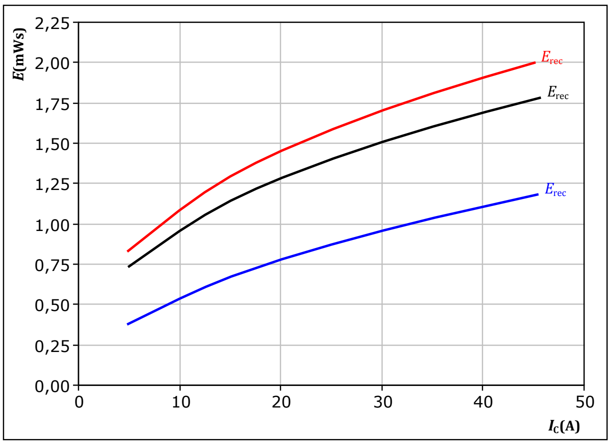
With an inductive load at

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

figure 37. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



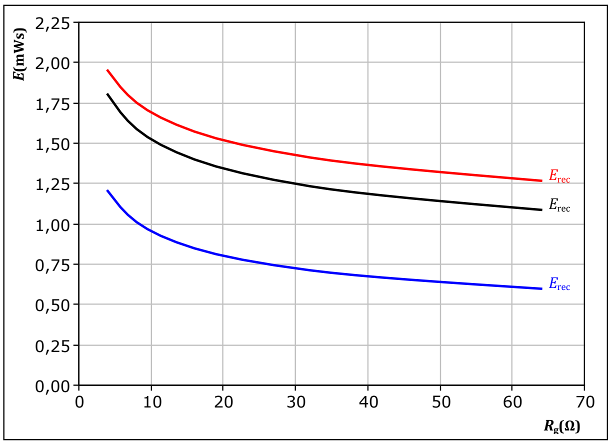
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 38. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

E_{rec} = f(R_g)



With an inductive load at

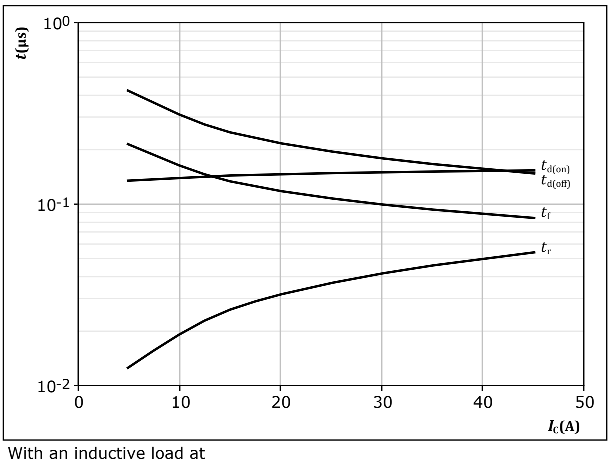
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	25	A		150 °C

Brake Switching Characteristics

figure 39. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



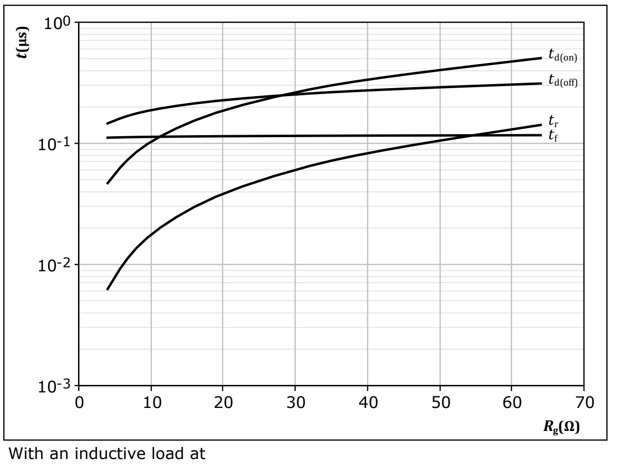
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 40. **IGBT**

Typical switching times as a function of gate resistor

t = f(R_g)



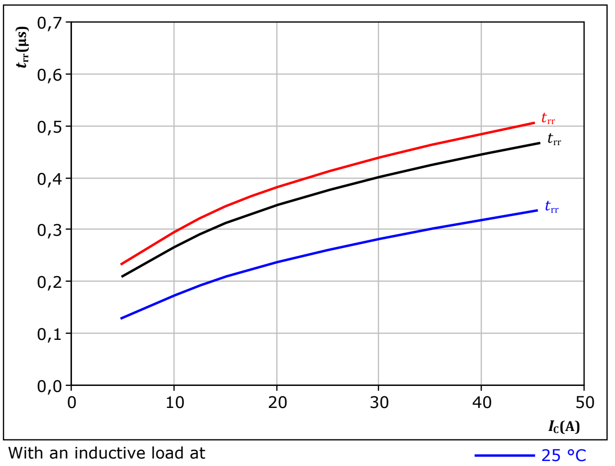
With an inductive load at

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

figure 41. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

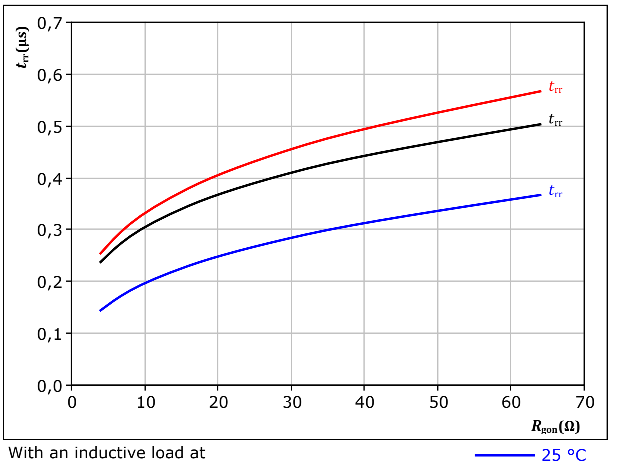
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 42. **FWD**

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

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



With an inductive load at

V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	25	A

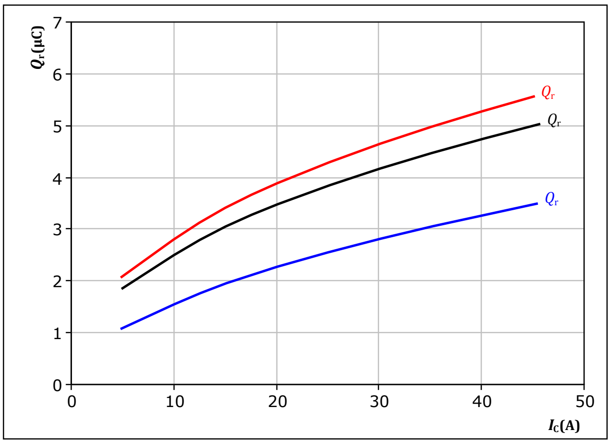
T_j: 25 °C, 125 °C, 150 °C

Brake Switching Characteristics

figure 43. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



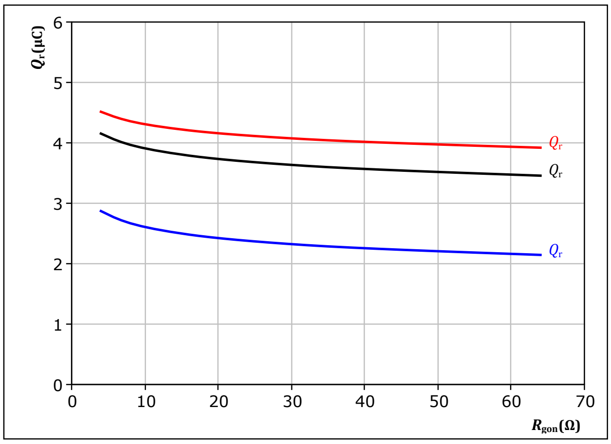
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 44. **FWD**

Typical recovered charge as a function of turn on gate resistor

Q_r = f(R_{gon})



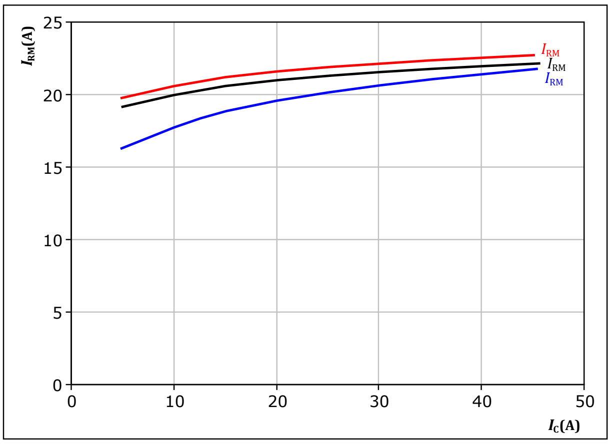
With an inductive load at

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

figure 45. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



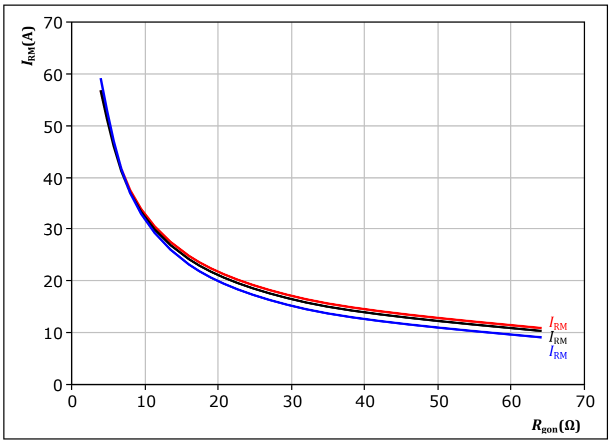
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 46. **FWD**

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

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



With an inductive load at

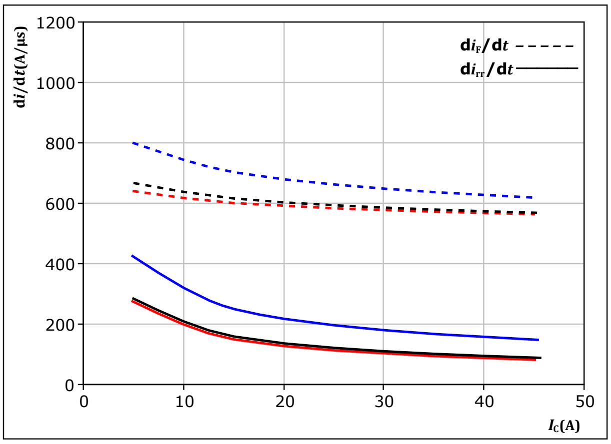
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	25	A		150 °C

Brake Switching Characteristics

figure 47. **FWD**

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

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



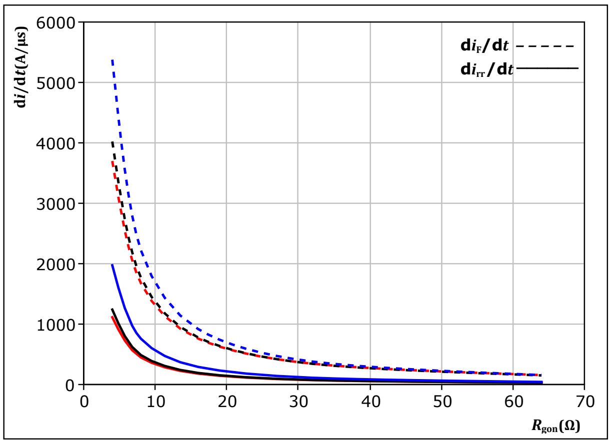
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 48. **FWD**

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

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



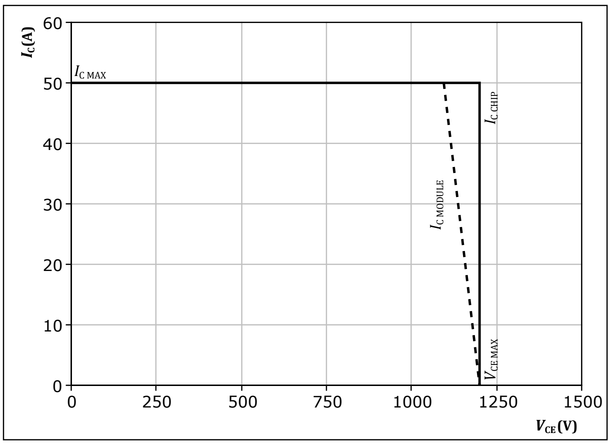
With an inductive load at

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

figure 49. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



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

Switching Definitions

figure 50. **IGBT**

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

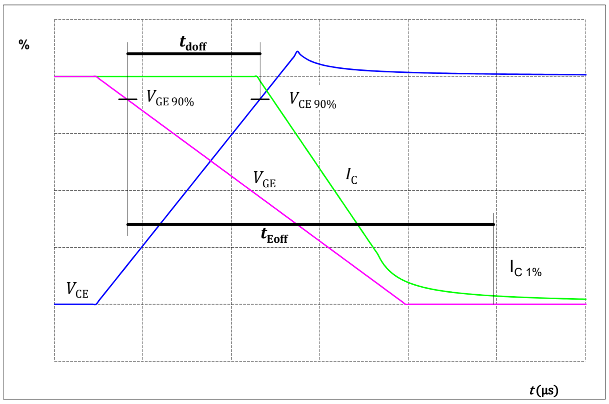


figure 51. **IGBT**

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

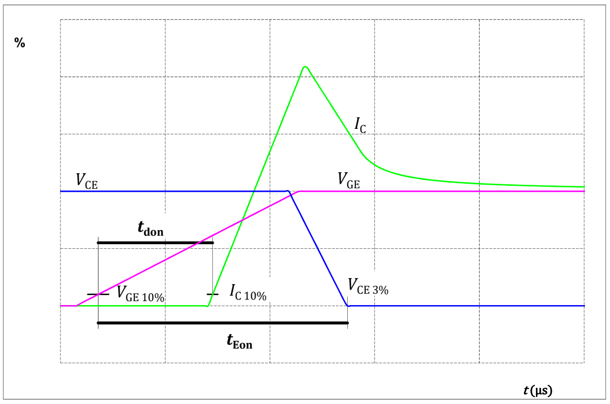


figure 52. **IGBT**

Turn-off Switching Waveforms & definition of t_f

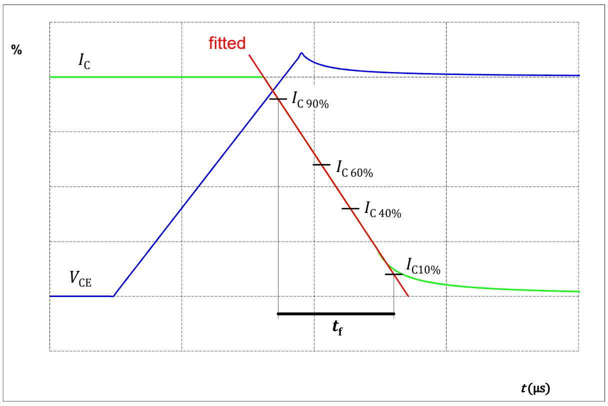
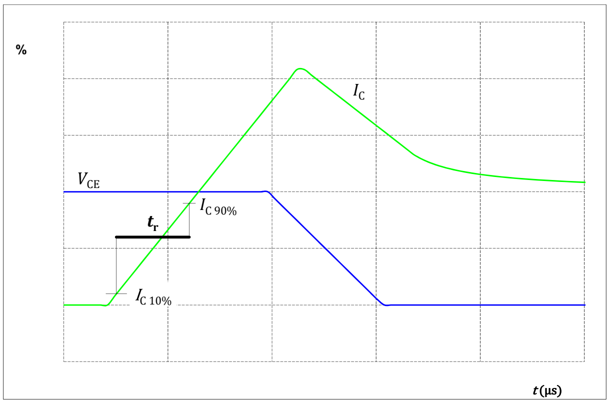


figure 53. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 54.	FWD

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

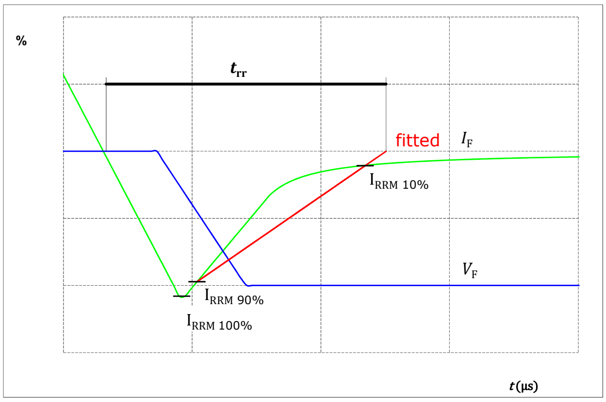
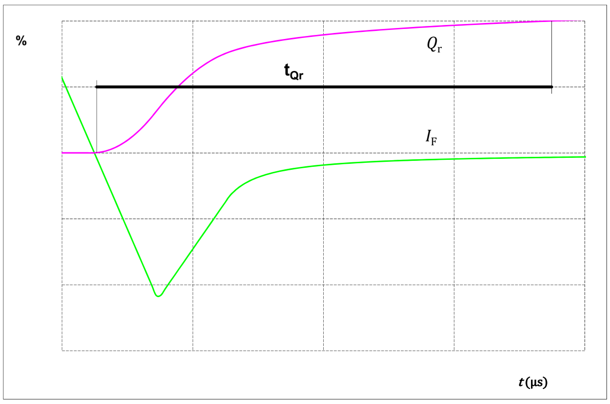


figure 55.	FWD

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



Ordering Code

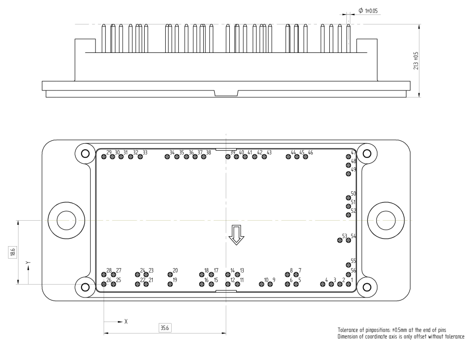
Version	Ordering Code
Without thermal paste	30-F212PMA035M7-L887A79
With thermal paste	30-F212PMA035M7-L887A79-/3/

Marking

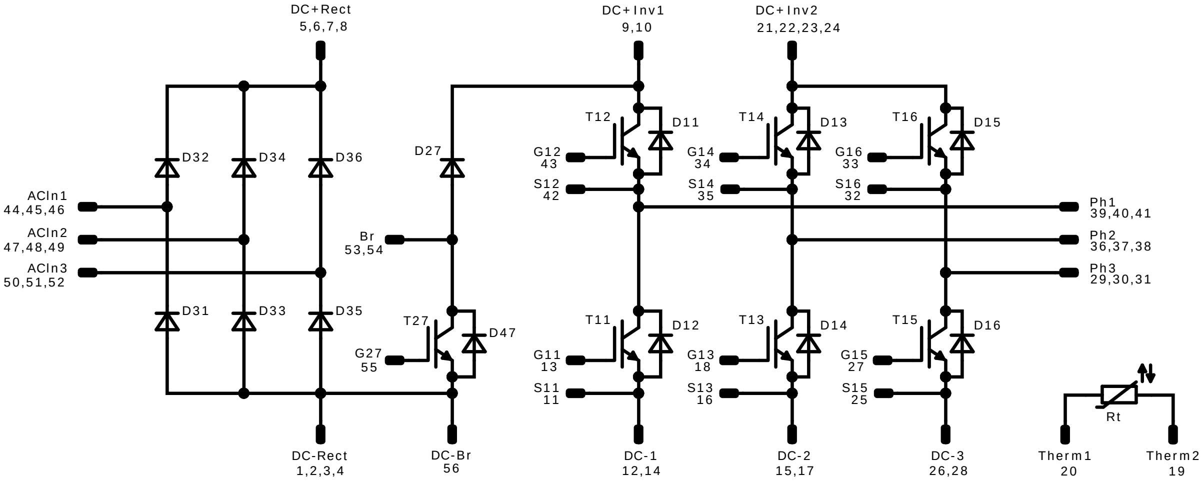
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]							
Pin	X	Y	Function	29	0	37,2	Ph3
1	71,2	0	DC-Rect	30	2,5	37,2	Ph3
2	68,7	0	DC-Rect	31	5	37,2	Ph3
3	66,2	0	DC-Rect	32	7,8	37,2	S16
4	63,7	0	DC-Rect	33	10,6	37,2	G16
5	55,95	0	DC+Rect	34	18,45	37,2	G14
6	53,45	0	DC+Rect	35	21,25	37,2	S14
7	55,95	2,8	DC+Rect	36	24,05	37,2	Ph2
8	53,45	2,8	DC+Rect	37	26,55	37,2	Ph2
9	48,4	0	DC+Inv1	38	29,05	37,2	Ph2
10	45,9	0	DC+Inv1	39	36,1	37,2	Ph1
11	38,9	0	S11	40	38,6	37,2	Ph1
12	36,1	0	DC-1	41	41,1	37,2	Ph1
13	38,9	2,8	G11	42	43,9	37,2	S12
14	36,1	2,8	DC-1	43	46,7	37,2	G12
15	31,3	0	DC-2	44	53,7	37,2	ACIn1
16	28,5	0	S13	45	56,2	37,2	ACIn1
17	31,3	2,8	DC-2	46	58,7	37,2	ACIn1
18	28,5	2,8	G13	47	71,2	37,2	ACIn2
19	19,3	0	Therm2	48	71,2	34,7	ACIn2
20	19,3	2,8	Therm1	49	71,2	32,2	ACIn2
21	12,3	0	DC+Inv2	50	71,2	25,2	ACIn3
22	9,8	0	DC+Inv2	51	71,2	22,7	ACIn3
23	12,3	2,8	DC+Inv2	52	71,2	20,2	ACIn3
24	9,8	2,8	DC+Inv2	53	68,7	12,8	Br
25	2,8	0	S15	54	71,2	12,8	Br
26	0	0	DC-3	55	71,2	5,6	G27
27	2,8	2,8	G15	56	71,2	2,8	DC-Br
28	0	2,8	DC-3				



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	35 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	35 A	Inverter Diode	
T27	IGBT	1200 V	25 A	Brake Switch	
D27	FWD	1200 V	25 A	Brake Diode	
D47	FWD	1200 V	5 A	Brake Sw. Protection Diode	
D31, D32, D33, D34, D35, D36	Rectifier	1600 V	50 A	Rectifier Diode	
Rt	NTC			Thermistor	

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

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

Package data
Package data for *flow* 2 packages see vincotech.com website.

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

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-F212PMA035M7-L887A79-D3-14	25 Mar. 2021	New Datasheet format Display different Rg in the dynamic characteristic of Brake	