



Vincotech

10-FY12PMA025M7-P588A78

datasheet

flowPIM 1

1200 V / 25 A

Topology features

- Kelvin Emitter for improved switching performance
- Open Emitter configuration
- Temperature sensor
- Converter+Brake+Inverter

Component features

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

Housing features

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

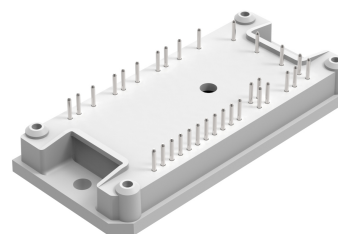
Target applications

- Industrial Drives

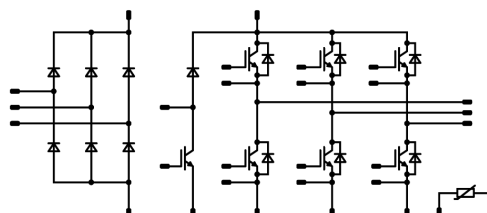
Types

- 10-FY12PMA025M7-P588A78

flow 1 12 mm housing



Schematic





Vincotech

10-FY12PMA025M7-P588A78
datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
-----------	--------	------------	-------	------

Inverter Switch

Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	34	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	50	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	82	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Inverter Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	33	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	50	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	62	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Brake Switch

Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	22	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	30	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	60	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



Vincotech

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Brake Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	19	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	20	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	44	W
Maximum junction temperature	T_{jmax}		175	°C

Rectifier Diode

Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	46	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	270	A
Surge current capability	I^2t		370	A²s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	56	W
Maximum junction temperature	T_{jmax}		150	°C

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{jop}		-40...+($T_{jmax} - 25$)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			7.91	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production



Vincotech

10-FY12PMA025M7-P588A78
datasheet

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	

Inverter Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0025	25	5,4	6	6,6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		25	25 125 150		1,64 1,89 1,95	2,1 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			70	µA
Gate-emitter leakage current	I_{GES}		0	0		25			200	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⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,16		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}					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



Vincotech

10-FY12PMA025M7-P588A78
datasheet

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	

Inverter Diode

Static

Forward voltage	V_F				25	25 125 150		1,63 1,7 1,69	2,1 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1200$ V				25			35	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,54		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	$(di_{rr}/dt)_{max}$					25 125 150		217,37 134,32 132,01		A/µs



Vincotech

10-FY12PMA025M7-P588A78
datasheet

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 Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		15	25 125 150		1,7 1,95 2,01	2,1 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			60	µA
Gate-emitter leakage current	I_{GES}		0	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	0	10		25			2900		pF
Output capacitance	C_{oes}							120		pF
Reverse transfer capacitance	C_{res}							34		pF
Gate charge	Q_g	$V_{CC} = 600$ V	15		15	25		110		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,6		K/W
--	---------------	---------------------------------------	--	--	--	--	--	-----	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 32$ Ω $R_{goff} = 32$ Ω	0/15	700	15	25 125 150		293,4 257,4 246,4		ns
Rise time	t_r					25 125 150		184,8 200 203,2		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		398,4 442,4 450,2		ns
Fall time	t_f					25 125 150		66,43 88,04 92,27		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 1,06$ µC $Q_{tFWD} = 1,72$ µC $Q_{tFWD} = 1,93$ µC				25 125 150		2,95 3,57 3,74		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,33 1,71 1,81		mWs



Vincotech

10-FY12PMA025M7-P588A78
datasheet

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				10	25 125 150		1,61 1,69 1,7	1,9 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1200$ V				25			25	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						2,16		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RRM}	$di/dt=69$ A/µs $di/dt=67$ A/µs	0/15	700	15	25 125 150		5,96 6,77 7,07		A
Reverse recovery time	t_{rr}					25 125 150		292,53 437,95 483,88		ns
Recovered charge	Q_r					25 125 150		1,06 1,72 1,93		µC
Reverse recovered energy	E_{rec}					25 125 150		0,367 0,666 0,764		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		43,6 29,32 25,47		A/µs



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	

Rectifier Diode

Static

Forward voltage	V_F				13	25 125		0,988 0,899	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⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,25		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1484$ Ω				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ± 1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ± 1 %						4000		K
Vincotech Thermistor Reference									I	

⁽¹⁾ Value at chip level

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



Vincotech

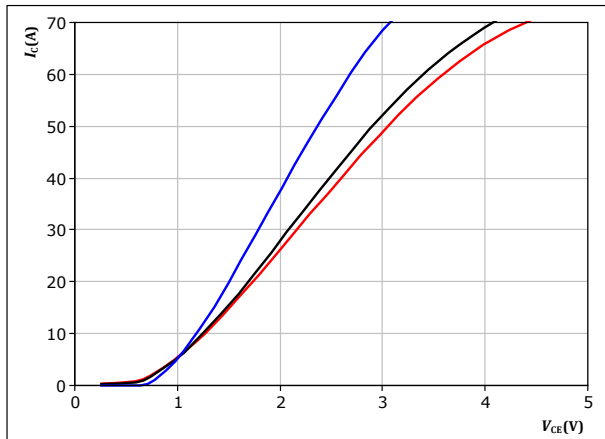
10-FY12PMA025M7-P588A78
datasheet

Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

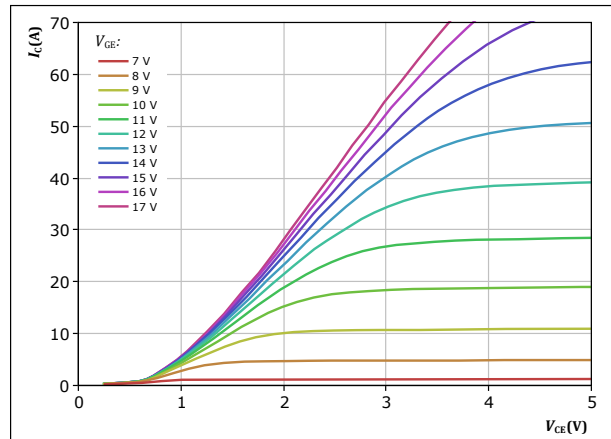


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25 ^\circ C, 125 ^\circ C, 150 ^\circ C$

figure 2. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

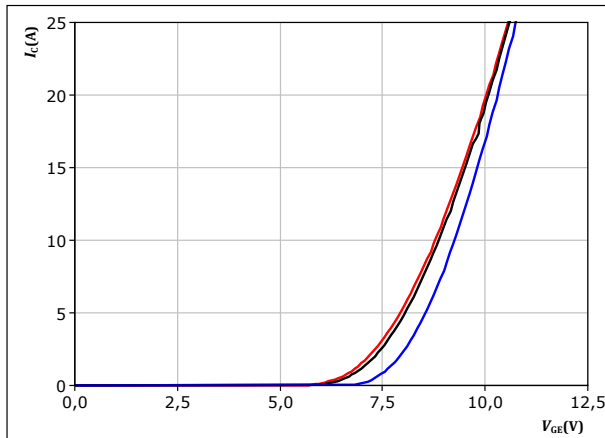


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

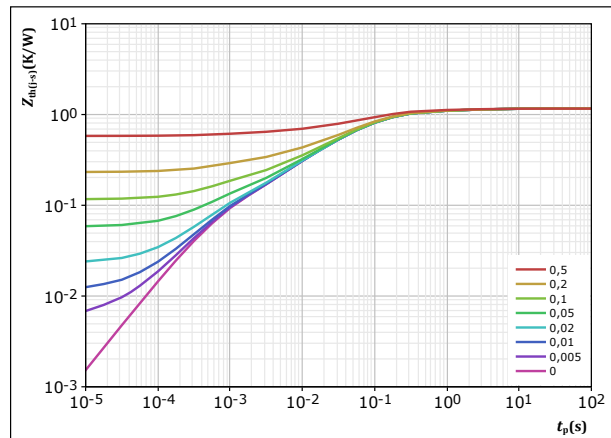


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25 ^\circ C, 125 ^\circ C, 150 ^\circ C$

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,162 K/W$
IGBT thermal model values

$R (K/W)$	$\tau (s)$
5,33E-02	3,54E+00
1,07E-01	5,75E-01
5,05E-01	1,04E-01
2,68E-01	3,30E-02
1,51E-01	7,35E-03
7,80E-02	6,52E-04



Vincotech

10-FY12PMA025M7-P588A78
datasheet

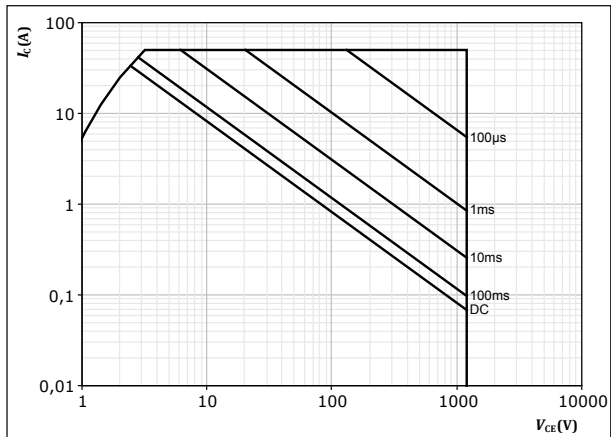
Inverter Switch Characteristics

figure 5.

IGBT

Safe operating area

$$I_C = f(V_{CE})$$



$D =$ single pulse

$T_s = 80$ °C

$V_{GE} = 15$ V

$T_j = T_{jmax}$



Vincotech

10-FY12PMA025M7-P588A78
datasheet

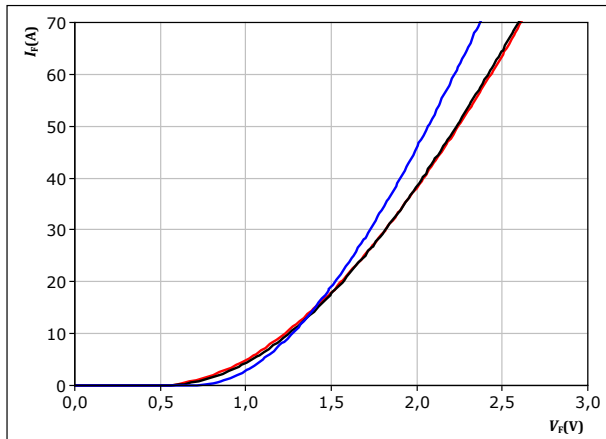
Inverter Diode Characteristics

figure 6.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$



$t_p = 250 \mu s$

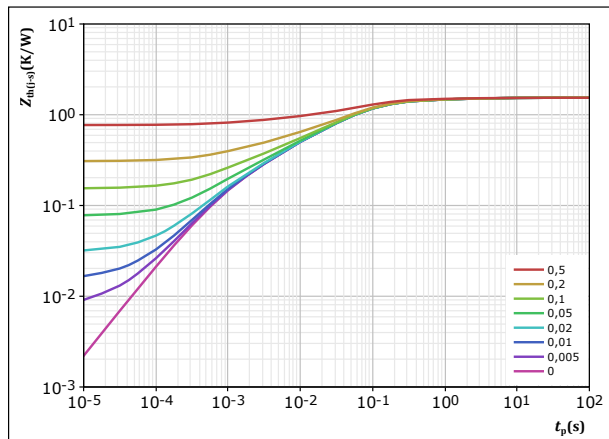
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 7.

FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,539 \text{ K/W}$

FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
4,69E-02	5,05E+00
1,06E-01	7,09E-01
5,57E-01	1,01E-01
4,68E-01	3,22E-02
2,35E-01	5,52E-03
8,77E-02	1,01E-03
4,01E-02	5,52E-04



Vincotech

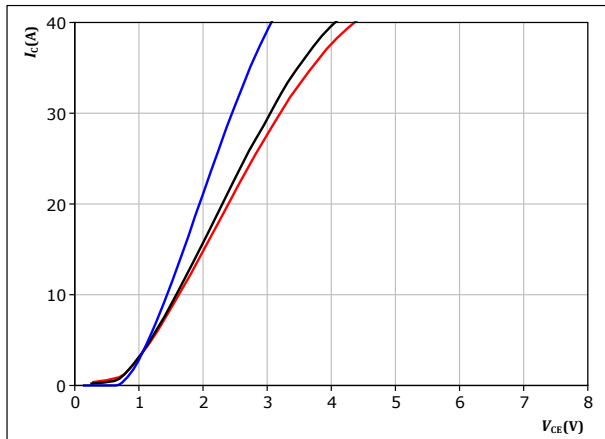
10-FY12PMA025M7-P588A78 datasheet

Brake Switch Characteristics

figure 8. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

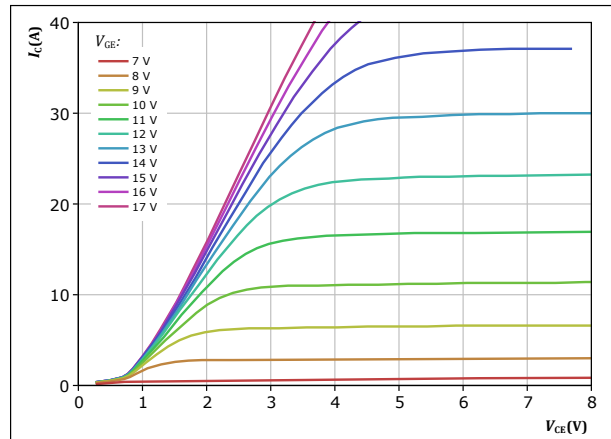


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25^\circ C, 125^\circ C, 150^\circ C$

figure 9. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

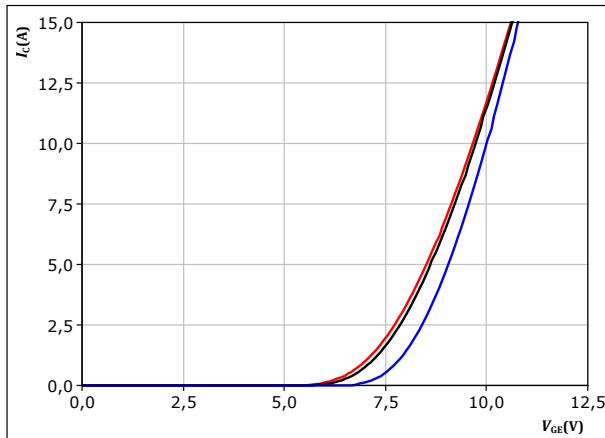


$t_p = 250 \mu s$
 $T_j = 150^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

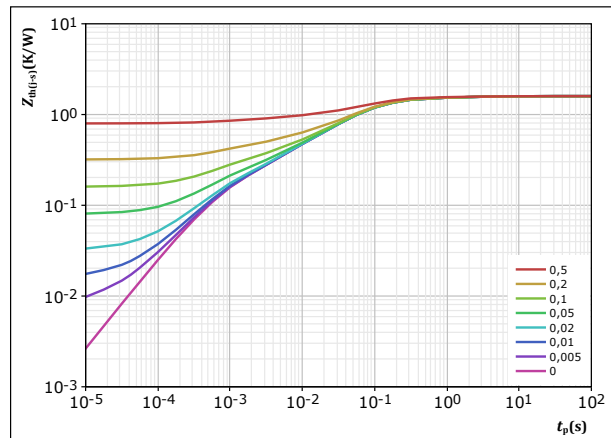


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25^\circ C, 125^\circ C, 150^\circ C$

figure 11. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1.595 K/W$
IGBT thermal model values

$R (K/W)$	$\tau (s)$
4,90E-02	4,40E+00
1,40E-01	5,34E-01
8,04E-01	8,02E-02
2,98E-01	2,57E-02
1,69E-01	5,09E-03
1,35E-01	6,41E-04



Vincotech

10-FY12PMA025M7-P588A78
datasheet

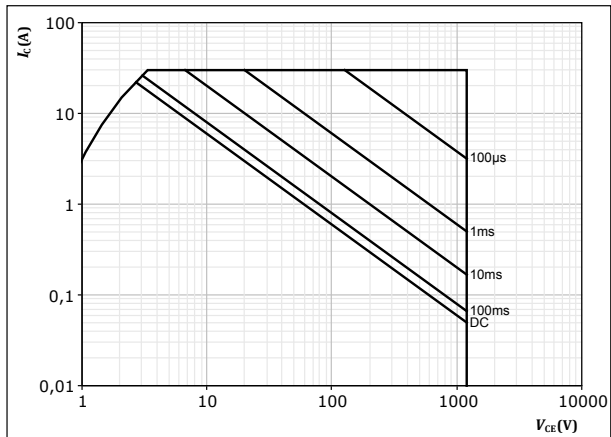
Brake Switch Characteristics

figure 12.

IGBT

Safe operating area

$$I_C = f(V_{CE})$$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GE} = 15 \text{ V}$

$T_j = T_{jmax}$



Vincotech

10-FY12PMA025M7-P588A78
datasheet

Brake Diode Characteristics

figure 13.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

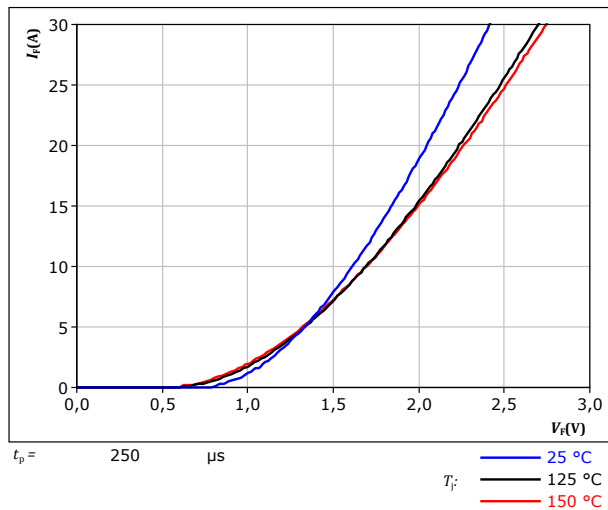
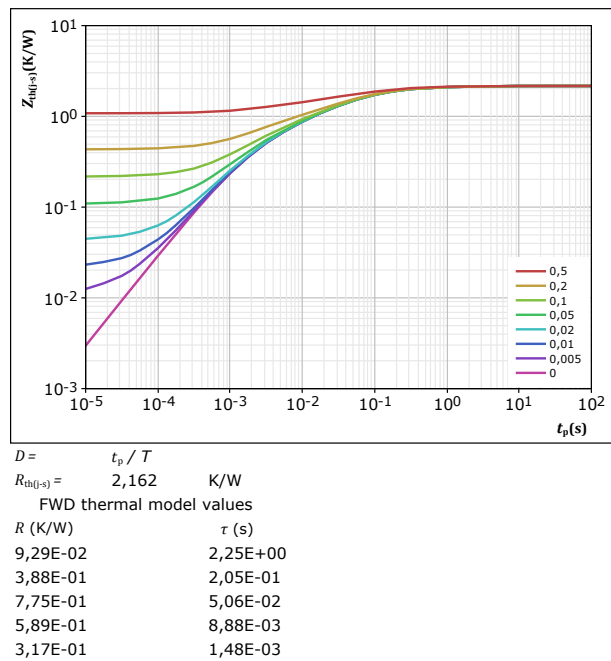


figure 14.

FWD

Transient thermal impedance as a function of pulse width

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





Vincotech

Rectifier Diode Characteristics

figure 15.

Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

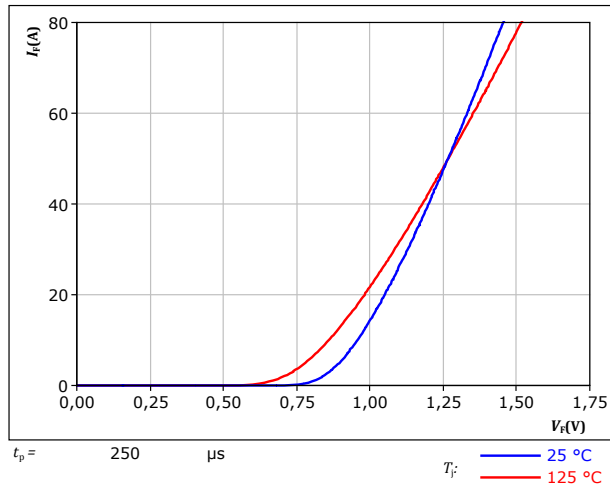
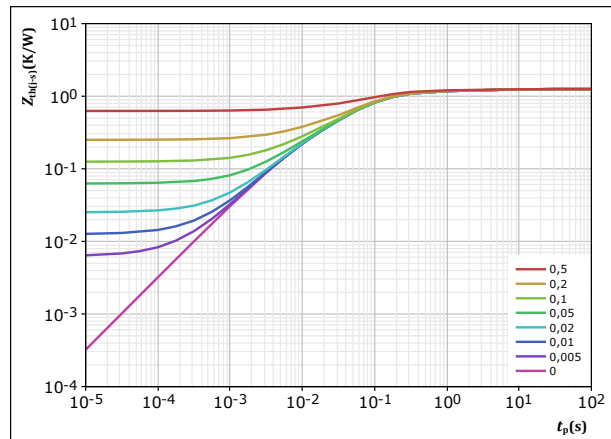


figure 16.

Rectifier

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T	
$R_{th(j-s)} =$	1,254	K/W
Rectifier thermal model values		
R (K/W)	τ (s)	
8,00E-02	5,22E+00	
1,56E-01	4,18E-01	
6,95E-01	8,82E-02	
2,23E-01	3,07E-02	
9,97E-02	5,99E-03	



Vincotech

10-FY12PMA025M7-P588A78
datasheet

Thermistor Characteristics

figure 17.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





Vincotech

10-FY12PMA025M7-P588A78
datasheet

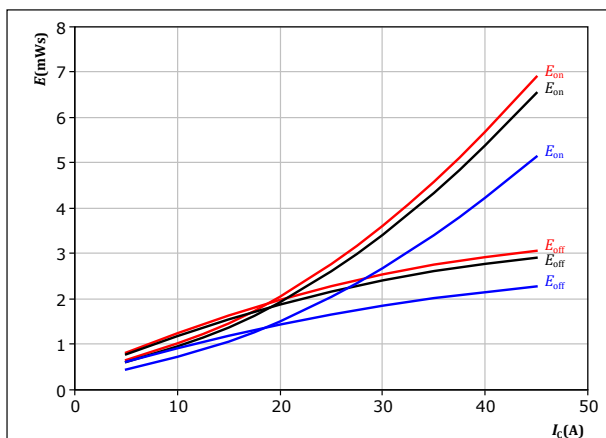
Inverter Switching Characteristics

figure 18.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$
 $R_{goff} = 16 \text{ } \Omega$

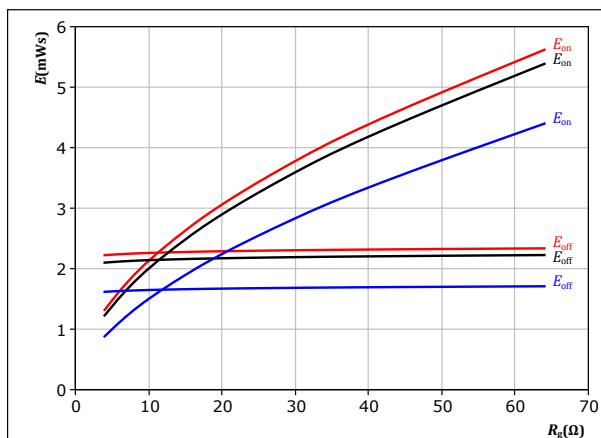
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 19.

IGBT

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

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 25 \text{ A}$

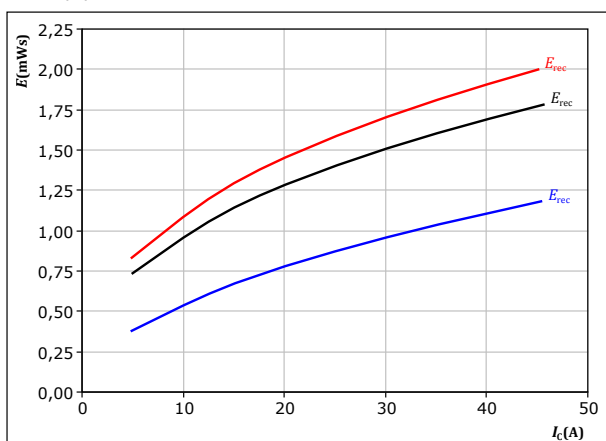
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 20.

FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_c)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$

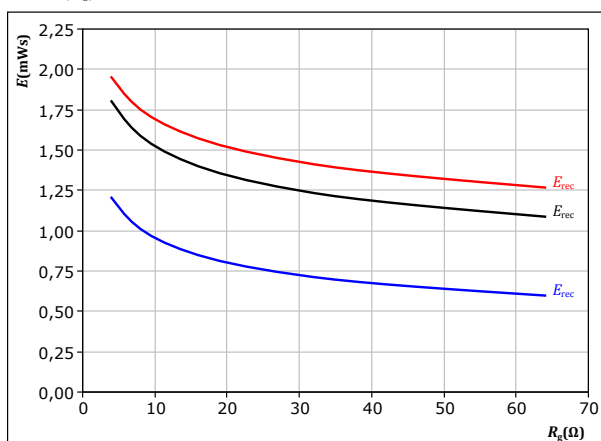
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 21.

FWD

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

$$E_{rec} = f(R_g)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 25 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



Vincotech

10-FY12PMA025M7-P588A78
datasheet

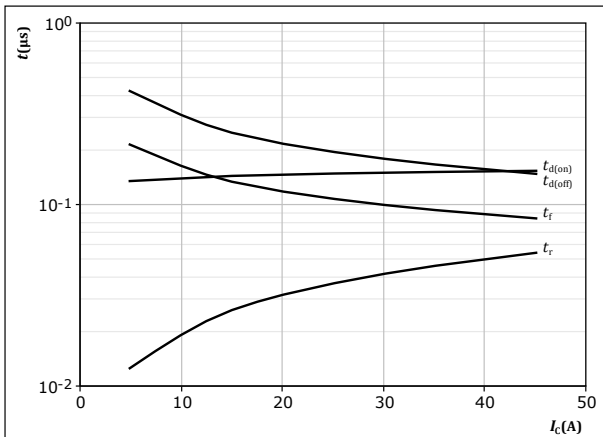
Inverter Switching Characteristics

figure 22.

IGBT

Typical switching times as a function of collector current

$$t = f(I_c)$$



With an inductive load at

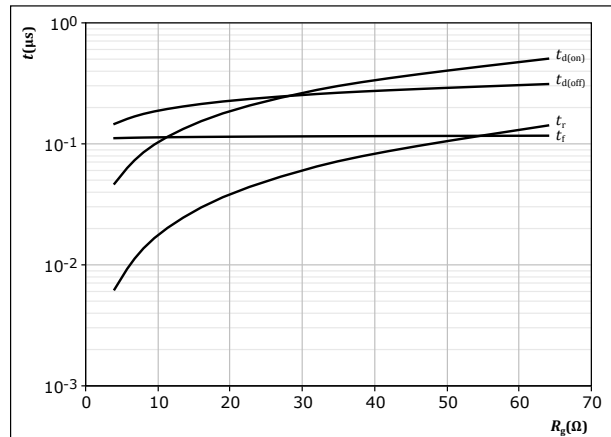
$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 16$ Ω
 $R_{goff} = 16$ Ω

figure 23.

IGBT

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

$$t = f(R_g)$$



With an inductive load at

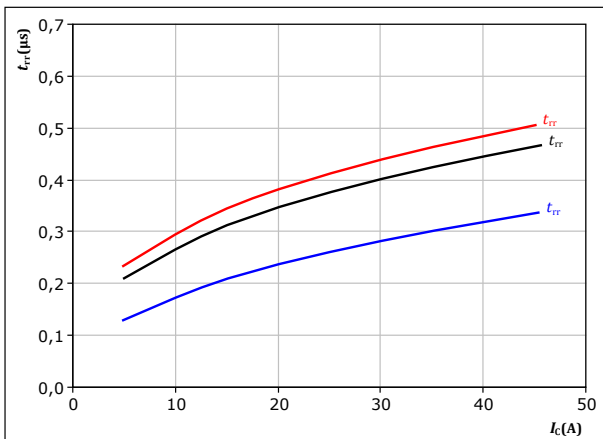
$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 25$ A

figure 24.

FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_c)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 16$ Ω

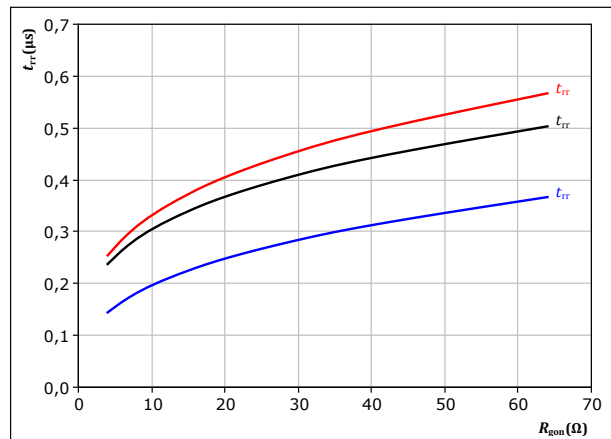
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 25.

FWD

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

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 25$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



Vincotech

10-FY12PMA025M7-P588A78
datasheet

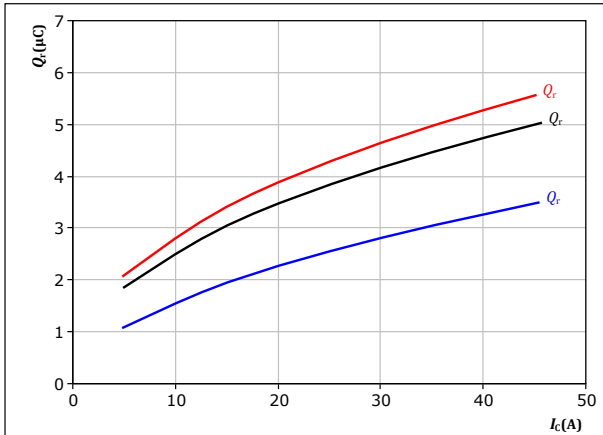
Inverter Switching Characteristics

figure 26.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 16$ Ω

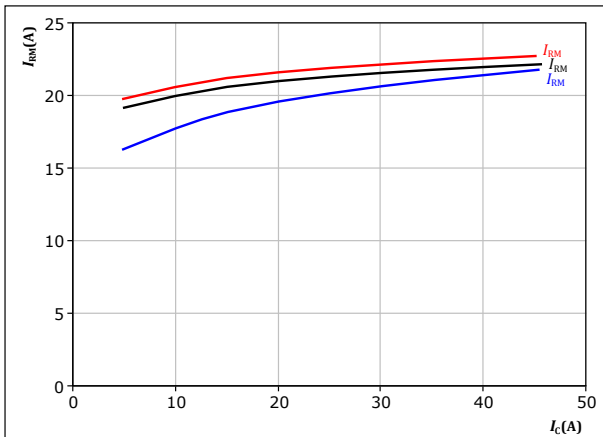
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 28.

FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_C)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 16$ Ω

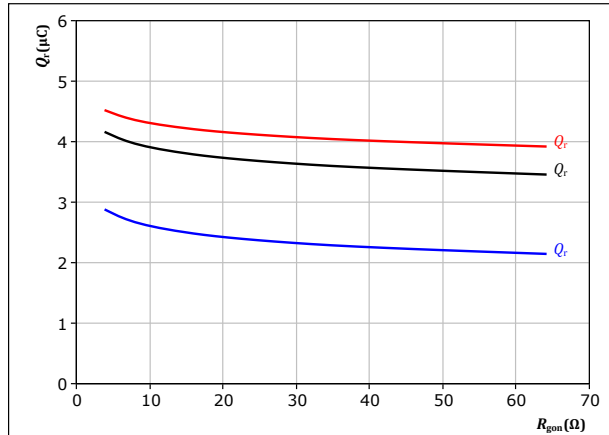
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 27.

FWD

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

$$Q_r = f(R_{gon})$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 25$ A

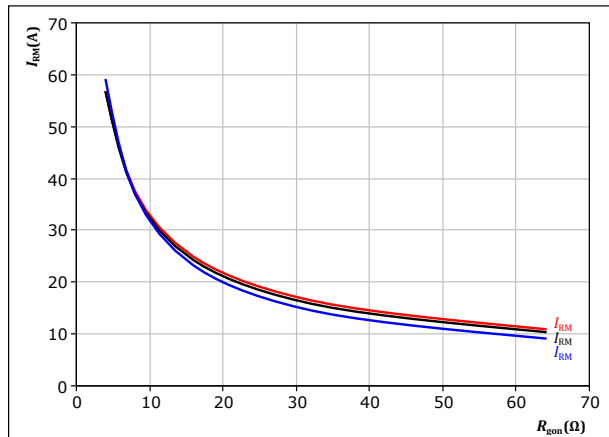
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 29.

FWD

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

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 25$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



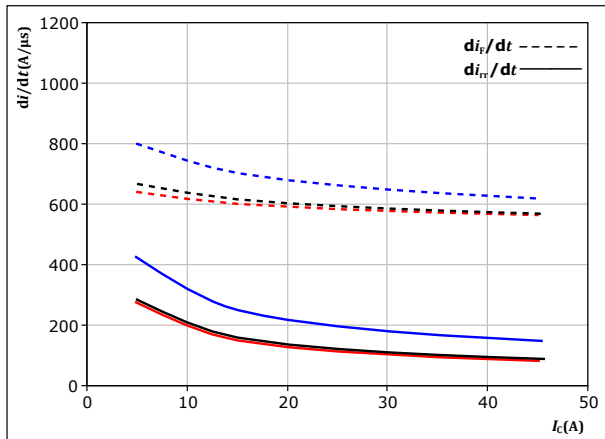
Vincotech

10-FY12PMA025M7-P588A78
datasheet

Inverter Switching Characteristics

figure 30. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_r/dt = f(I_C)$



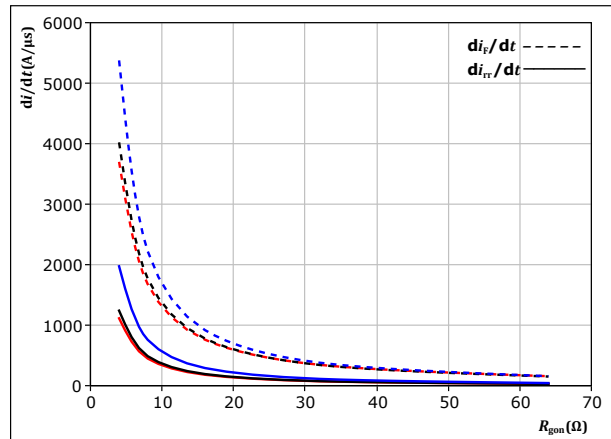
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 16$ Ω

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 31. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



With an inductive load at

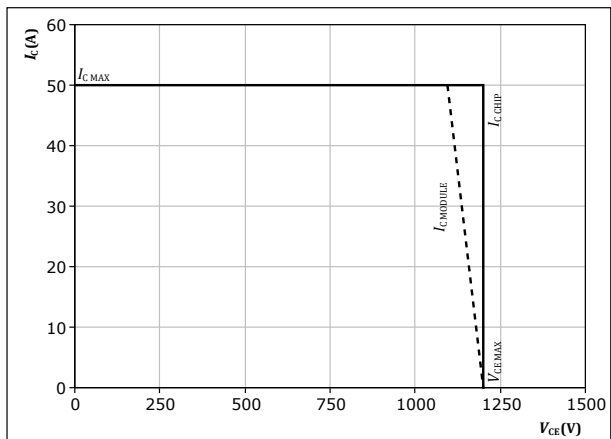
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 25$ A

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 32. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



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



Vincotech

10-FY12PMA025M7-P588A78
datasheet

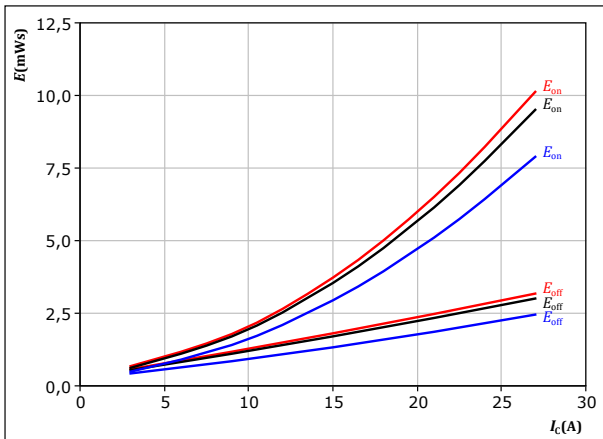
Brake Switching Characteristics

figure 33.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $R_{gon} = 32 \text{ } \Omega$
 $R_{goff} = 32 \text{ } \Omega$

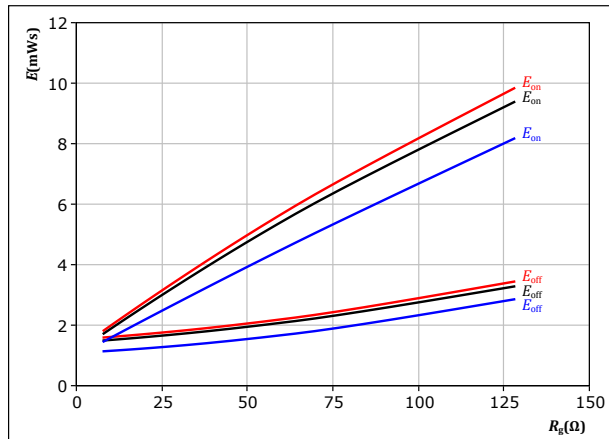
T_j : — 25 °C
— 125 °C
— 150 °C

figure 34.

IGBT

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

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $I_C = 15 \text{ A}$

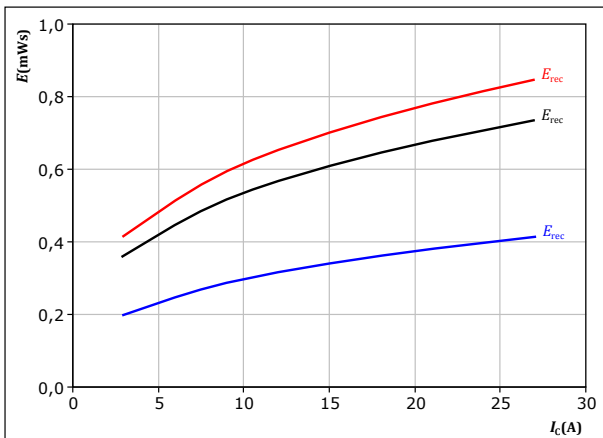
T_j : — 25 °C
— 125 °C
— 150 °C

figure 35.

FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



With an inductive load at

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $R_{gon} = 32 \text{ } \Omega$

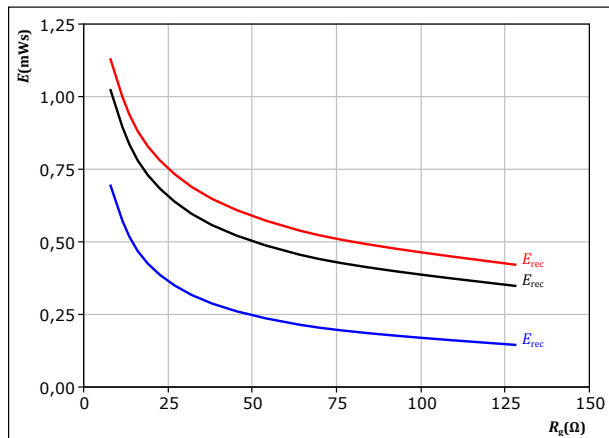
T_j : — 25 °C
— 125 °C
— 150 °C

figure 36.

FWD

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

$$E_{rec} = f(R_g)$$



With an inductive load at

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $I_C = 15 \text{ A}$

T_j : — 25 °C
— 125 °C
— 150 °C



Vincotech

10-FY12PMA025M7-P588A78
datasheet

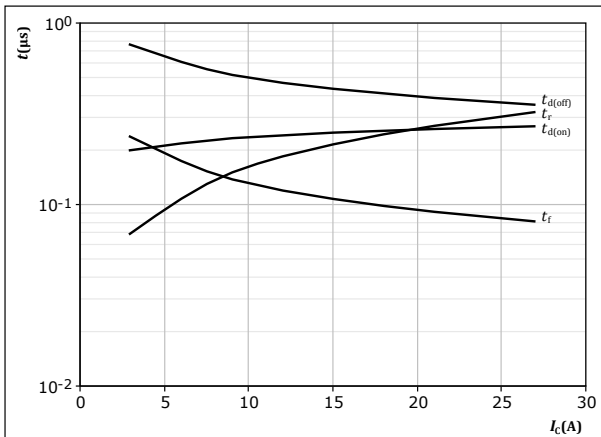
Brake Switching Characteristics

figure 37.

IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



With an inductive load at

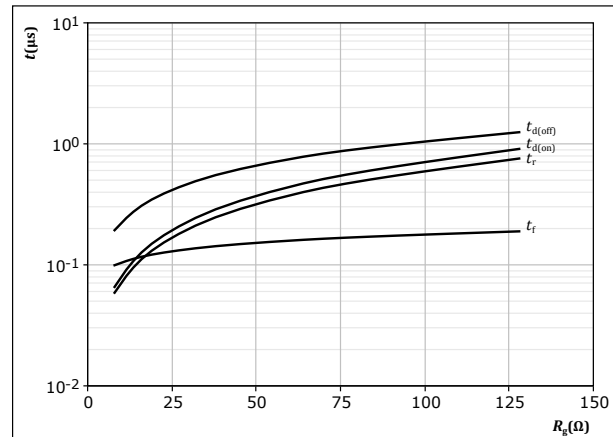
$T_j = 150$ °C
 $V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω

figure 38.

IGBT

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

$$t = f(R_g)$$



With an inductive load at

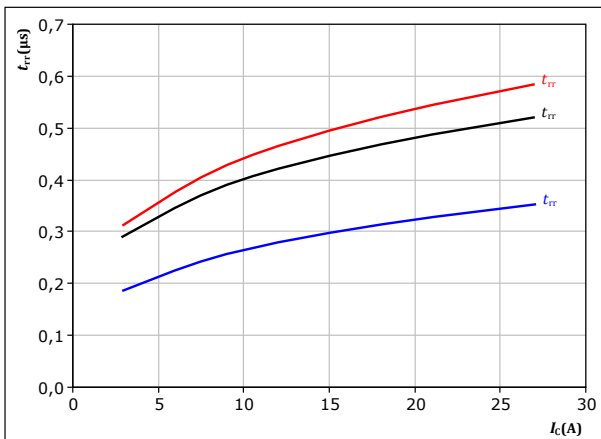
$T_j = 150$ °C
 $V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $I_C = 15$ A

figure 39.

FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$



With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 32$ Ω

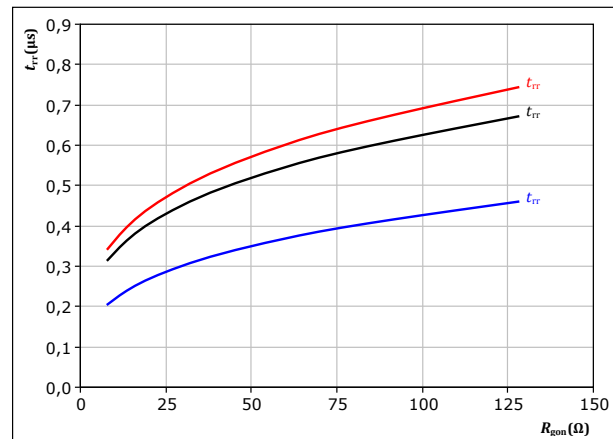
T_j : 25 °C
125 °C
150 °C

figure 40.

FWD

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

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



With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $I_C = 15$ A

T_j : 25 °C
125 °C
150 °C



Vincotech

10-FY12PMA025M7-P588A78
datasheet

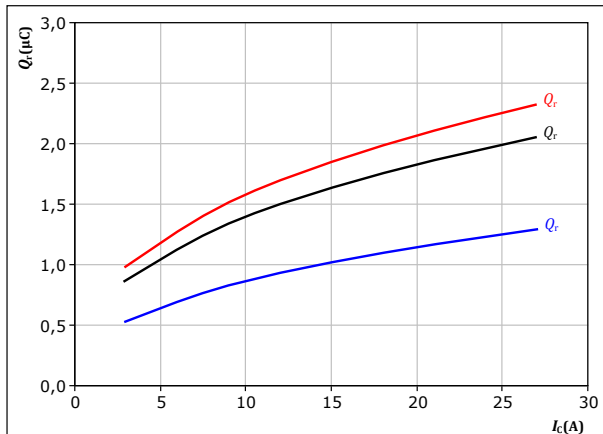
Brake Switching Characteristics

figure 41.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 32$ Ω

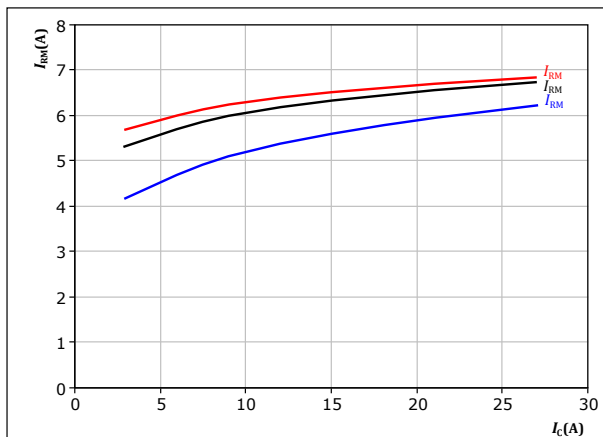
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 43.

FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 32$ Ω

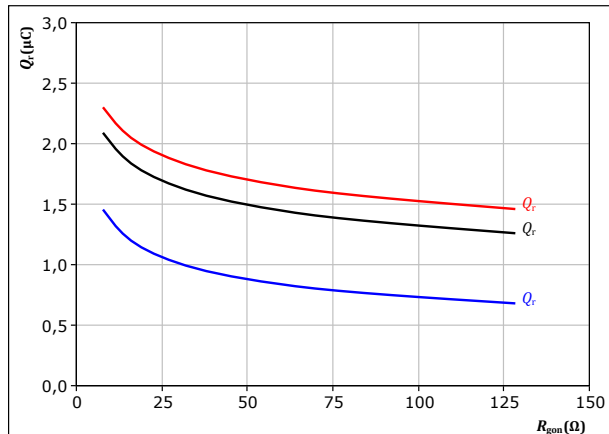
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 42.

FWD

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

$$Q_r = f(R_{gon})$$



With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $I_c = 15$ A

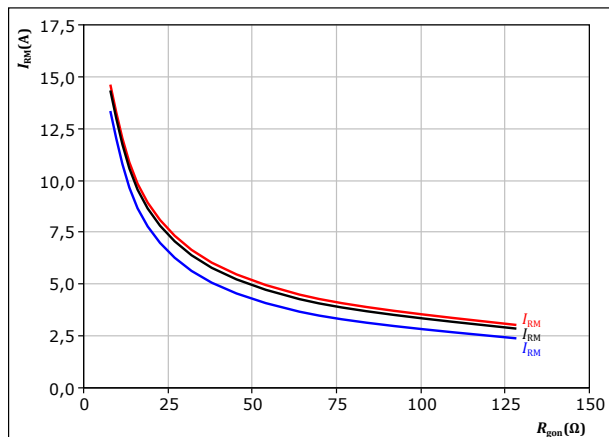
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 44.

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

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $I_c = 15$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



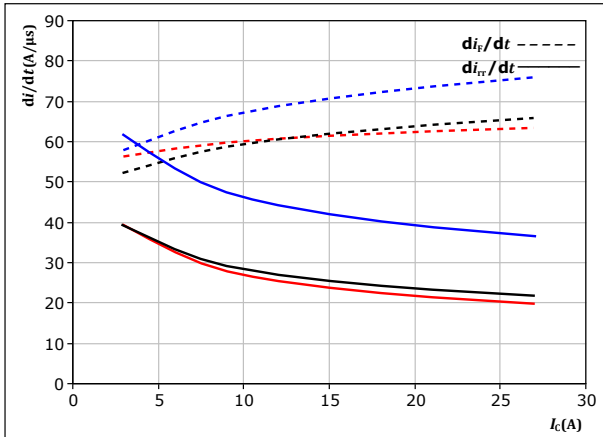
Vincotech

10-FY12PMA025M7-P588A78
datasheet

Brake Switching Characteristics

figure 45. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_r/dt = f(I_c)$



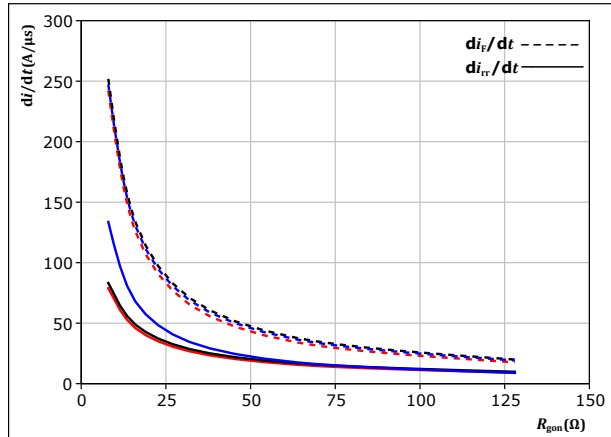
With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 32$ Ω

T_j : 25 °C
125 °C
150 °C

figure 46. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



With an inductive load at

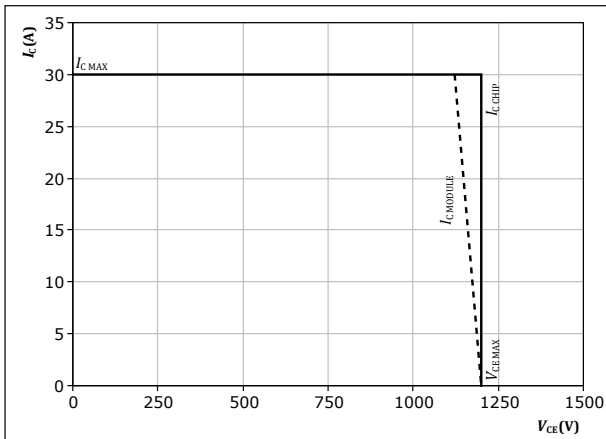
$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $I_c = 15$ A

T_j : 25 °C
125 °C
150 °C

figure 47. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



At $T_j = 150$ °C
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω



Vincotech

Switching Definitions

figure 48. IGBT

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



figure 49. IGBT

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



figure 50. IGBT

Turn-off Switching Waveforms & definition of t_f

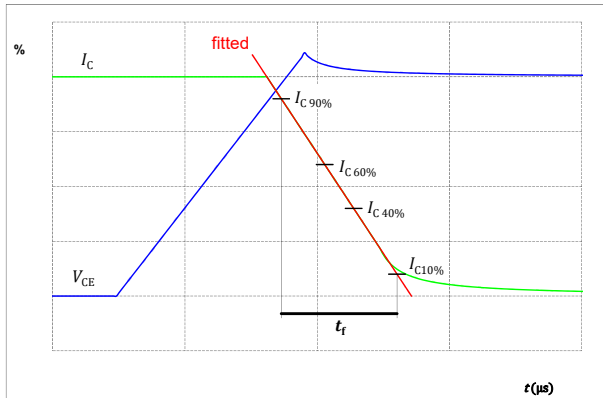
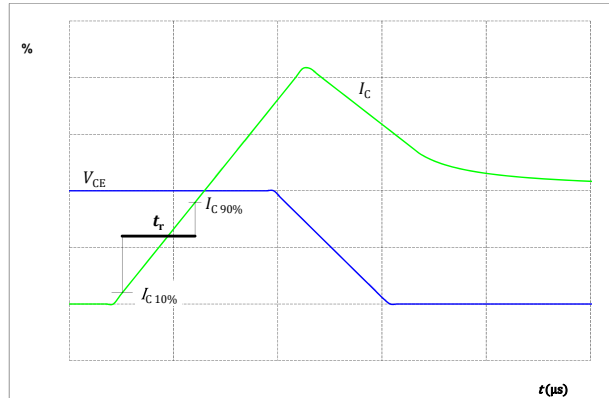


figure 51. IGBT

Turn-on Switching Waveforms & definition of t_r





Vincotech

Switching Definitions

figure 52.

FWD

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



figure 53.


FWD

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





datasheet

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

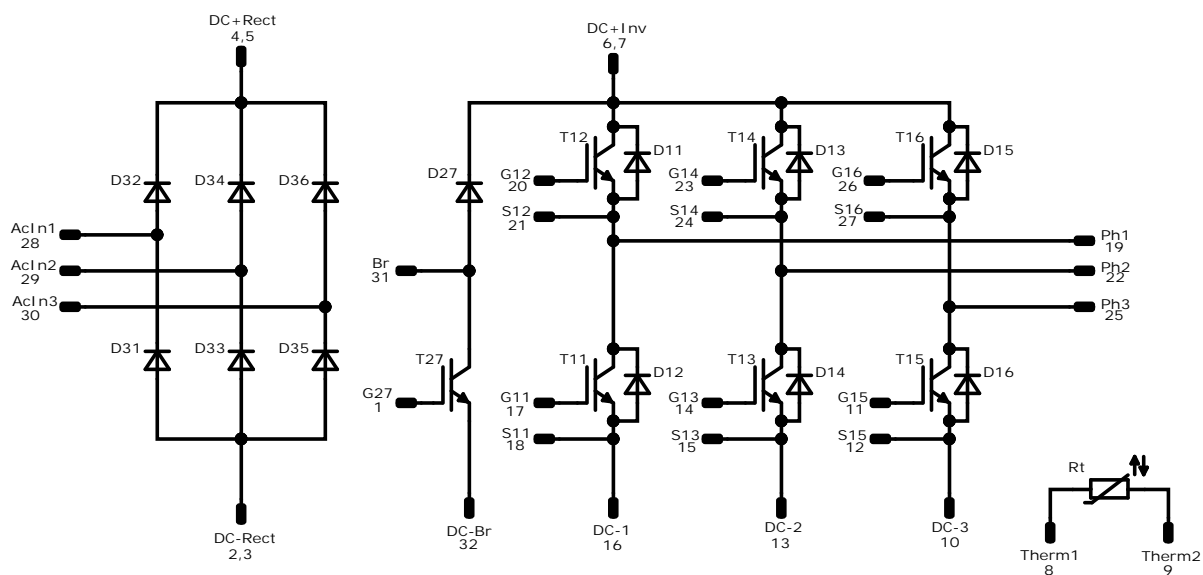
Tolerance of pinpositions: $\pm 0.5\text{mm}$ at the end of pins
Dimension of coordinate axis is only offset without tolerance



Vincotech

10-FY12PMA025M7-P588A78
datasheet

Pinout




Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	25 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	25 A	Inverter Diode	
T27	IGBT	1200 V	15 A	Brake Switch	
D27	FWD	1200 V	10 A	Brake Diode	
D31, D32, D33, D34, D35, D36	Rectifier	1600 V	35 A	Rectifier Diode	
Rt	NTC			Thermistor	



Vincotech

10-FY12PMA025M7-P588A78
datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for <i>flow 1</i> packages see vincotech.com website.				
Package data				
Package data for <i>flow 1</i> packages see vincotech.com website.				
Vincotech thermistor reference				
See Vincotech thermistor reference table at vincotech.com website.				
UL recognition and file number				
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
10-FY12PMA025M7-P588A78-D5-14	22 Sep. 2021	Rectifier forward voltage parameters is updated CTI value is updated Brake diode Rth is updated Separated datasheet for 12 mm solder pin version New datasheet format, module is unchanged	
10-FY12PMA025M7-P588A78-D6-14	1 Apr. 2022	Correct Erec of Brake Diode	

DISCLAIMER

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

LIFE SUPPORT POLICY

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.