



Vincotech

A0-VP12PMA150RA-LF18A80T

datasheet

VINcoPIM E3

1200 V / 150 A

Topology features

- Common Emitter configuration
- Converter+Brake+Inverter
- Temperature sensor

Component features

- Easy paralleling
- Low collector emitter saturation voltage
- Low turn-off losses

Housing features

- Base isolation: IMB
- SoLid Cover Technology
- Standard mid-power industry package
- Available with press-fit and solder-pin
- Reliable cold welding connection to PCB
- Press-fit terminals

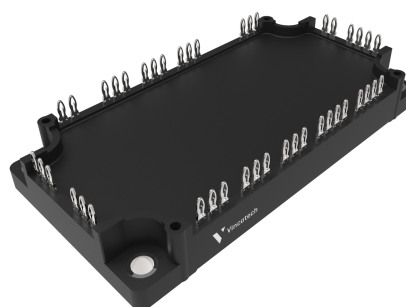
Target applications

- Elevator Drives
- General Purpose Drives
- Industrial Drives
- Servo Drives

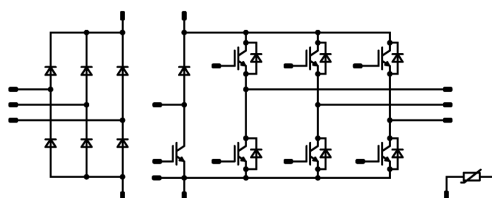
Types

- A0-VP12PMA150RA-LF18A80T

VINco E3 17 mm housing



Schematic





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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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	156	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	450	A
Turn off safe operating area		$T_j = 150\text{ °C}$, $V_{CE} = 1200\text{ V}$	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	347	W
Gate-emitter voltage	V_{GES}		± 30	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	8	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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	162	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	347	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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	121	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Turn off safe operating area		$T_j = 150\text{ °C}$, $V_{CE} = 1200\text{ V}$	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	278	W
Gate-emitter voltage	V_{GES}		± 30	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	8	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



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A0-VP12PMA150RA-LF18A80T
datasheet

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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	64	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	124	W
Maximum junction temperature	T_{jmax}		175	°C

Rectifier Diode

Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	181	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	1380	A
Surge current capability	I^2t		9522	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	275	W
Maximum junction temperature	T_{jmax}		175	°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
Creepage distance			>12,7	mm
Clearance			9	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production



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A0-VP12PMA150RA-LF18A80T

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	$V_{GE(th)}$			5	0,0177	25	5,5	6,3	7,1	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		150	25 125 150		1,64 1,99 2,1	1,95 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			10	µA
Gate-emitter leakage current	I_{GES}		30	0		25			500	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	$f = 1 \text{ Mhz}$	0	30		25		24935		pF
Output capacitance	C_{oes}							566		pF
Reverse transfer capacitance	C_{res}							209		pF
Gate charge	Q_g		0/15	600	150	25		906		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						0,27		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	± 15	600	150	25 125 150		122,7 127,01 127,75		ns
Rise time	t_r					25 125 150		18,45 23,68 25,18		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		171,98 201,74 210,68		ns
Fall time	t_f					25 125 150		106,17 141,39 148,83		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 10,5 \mu\text{C}$ $Q_{tFWD} = 19,69 \mu\text{C}$ $Q_{tFWD} = 22,97 \mu\text{C}$				25 125 150		6,95 11,26 12,63		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		13,02 17,01 18,51		mWs



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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				150	25 125 150		1,74 1,99 2,01	2,1 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1200$ V				25			10	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,27		K/W
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Dynamic

Peak recovery current	I_{RM}	$di/dt=7626$ A/µs $di/dt=5656$ A/µs $di/dt=5214$ A/µs	± 15	600	150	25 125 150		156,33 160,52 163,94		A
Reverse recovery time	t_{rr}					25 125 150		190,37 361,95 413,26		ns
Recovered charge	Q_r					25 125 150		10,5 19,69 22,97		µC
Reverse recovered energy	E_{rec}					25 125 150		3,9 7,79 9,14		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		4328,89 2043,13 1754,59		A/µs



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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	$V_{GE(th)}$			5	0,0117	25	5,5	6,3	7,1	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 125 150		1,58 1,9 2	1,95 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			10	µA
Gate-emitter leakage current	I_{GES}		30	0		25			500	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	$f = 1 \text{ Mhz}$	0	30		25		16720		pF
Output capacitance	C_{oes}							380		pF
Reverse transfer capacitance	C_{res}							140		pF
Gate charge	Q_g		0/15	600	100	25		605		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						0,34		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 16 \Omega$ $R_{goff} = 16 \Omega$	0/15	700	100	25 125 150		202,19 194,37 191,77		ns
Rise time	t_r					25 125 150		66,26 85,6 90,37		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		882,14 915,06 924,94		ns
Fall time	t_f					25 125 150		51,65 83,99 92,58		ns
Turn-on energy (per pulse)	E_{on}					25 125 150		12,46 16,51 17,88		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		10,59 14,2 15,18		mWs



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A0-VP12PMA150RA-LF18A80T

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				50	25 125 150		1,55 1,72 1,72	2,1 ⁽¹⁾		V
Reverse leakage current	I_R	$V_r = 1200$ V				25				10	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,77			K/W
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Dynamic

Peak recovery current	I_{RM}	$di/dt=1367$ A/µs $di/dt=1196$ A/µs $di/dt=1039$ A/µs	0/15	700	100	25 125 150		41,02 38,22 39,53			A
Reverse recovery time	t_{rr}					25 125 150		342,03 535,23 600,86			ns
Recovered charge	Q_r					25 125 150		4,96 8,14 9,58			µC
Reverse recovered energy	E_{rec}					25 125 150		1,79 3,29 3,96			mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		300,62 133,38 125,04			A/µs



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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				110	25 125 150		1,24 1,23 1,22	1,5 ⁽¹⁾		V
Reverse leakage current	I_R	$V_r = 1600$ V				25 150			50 2000		µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,35			K/W
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Thermistor

Static

Rated resistance	R					25		5			kΩ
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 493$ Ω				100	-5		5		%
Power dissipation	P							245			mW
Power dissipation constant	d					25		1,4			mW/K
B-value	$B_{(25/50)}$	Tol. ±2 %						3375			K
B-value	$B_{(25/100)}$	Tol. ±2 %						3437			K
Vincotech Thermistor Reference									K		

⁽¹⁾ Value at chip level

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



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Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

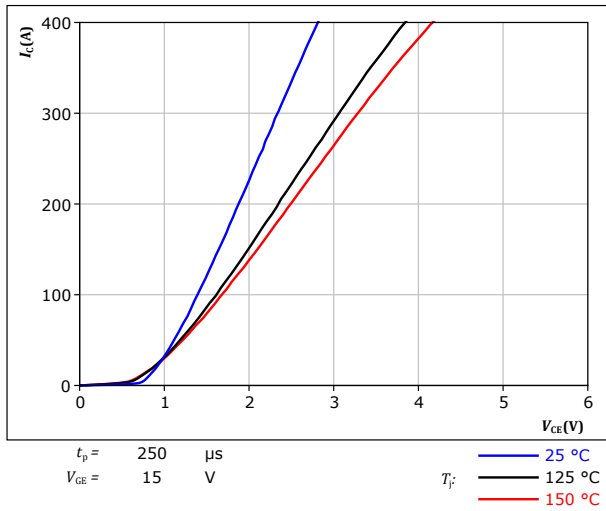


figure 2. IGBT

Typical output characteristics

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

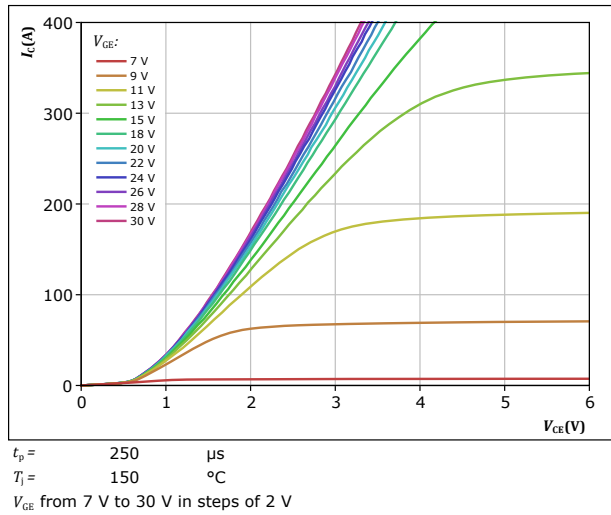


figure 3. IGBT

Typical transfer characteristics

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

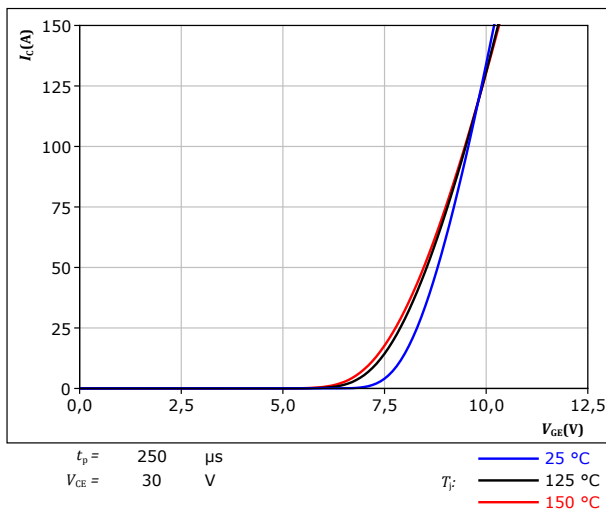
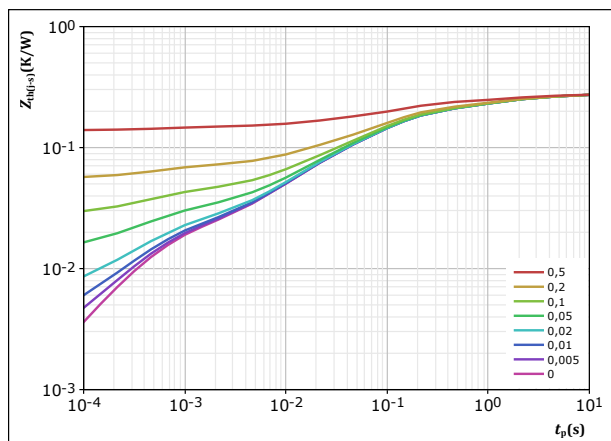


figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



IGBT thermal model values	
R (K/W)	τ (s)
2,96E-02	5,29E+00
6,20E-02	9,45E-01
1,28E-01	1,01E-01
4,03E-02	1,41E-02
1,71E-02	4,82E-04



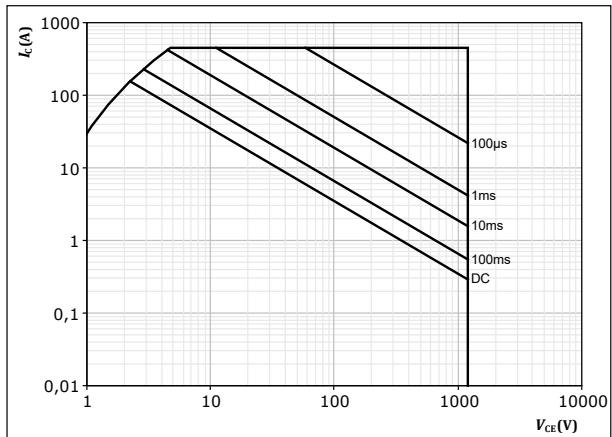
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Inverter Switch Characteristics

figure 5. IGBT

Safe operating area

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



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$
 $T_j = T_{jmax}$



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Inverter Diode Characteristics

figure 6. FWD

Typical forward characteristics

$I_F = f(V_F)$

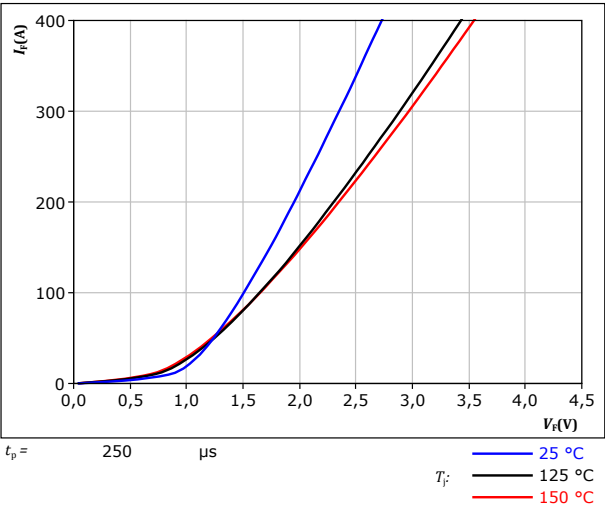
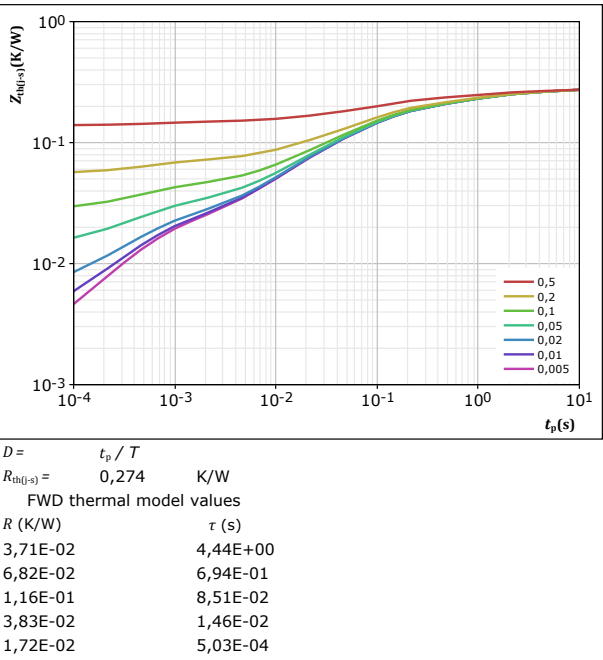


figure 7. FWD

Transient thermal impedance as a function of pulse width

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





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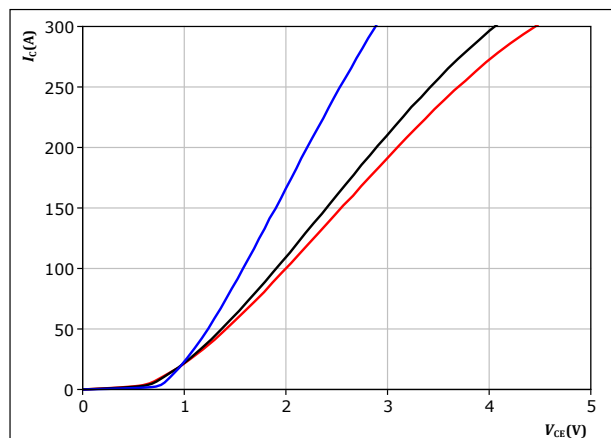
Brake Switch Characteristics

figure 8.

IGBT

Typical output characteristics

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



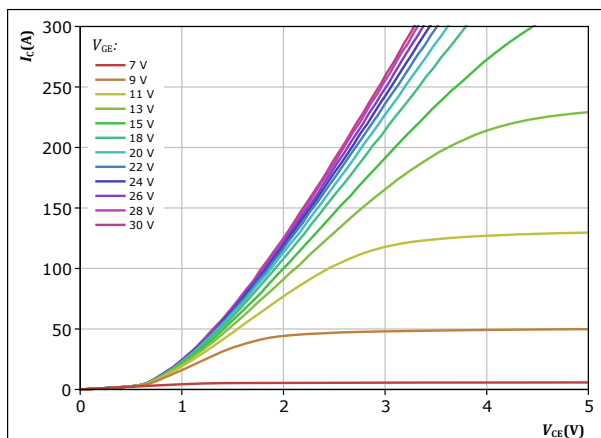
$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 9.

IGBT

Typical output characteristics

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



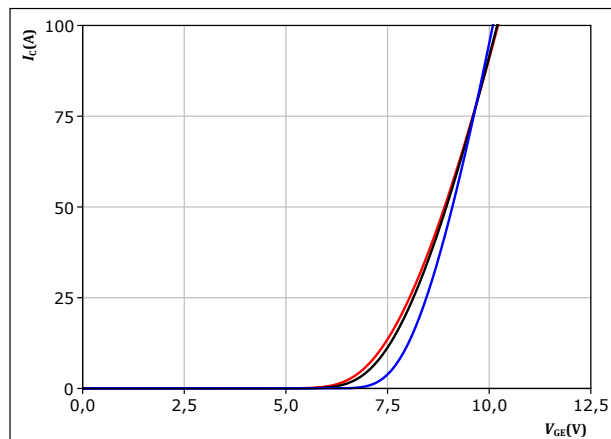
$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GE} from 7 V to 30 V in steps of 2 V

figure 10.

IGBT

Typical transfer characteristics

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



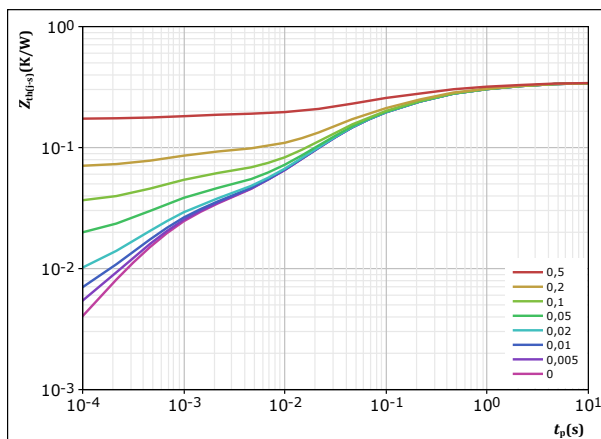
$t_p = 250 \mu s$
 $V_{CE} = 30 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 11.

IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T = 0.341 \text{ K/W}$
IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
1,28E-02	9,65E+00
5,94E-02	1,34E+00
1,29E-01	1,91E-01
1,18E-01	3,13E-02
2,62E-02	6,75E-04



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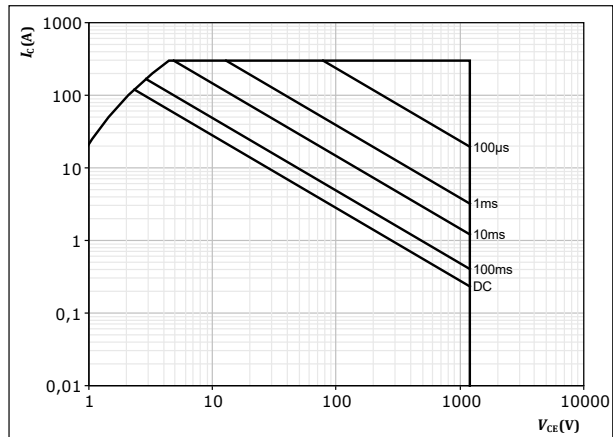
Brake Switch Characteristics

figure 12.

IGBT

Safe operating area

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



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$
 $T_j = T_{jmax}$



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Brake Diode Characteristics

figure 13.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

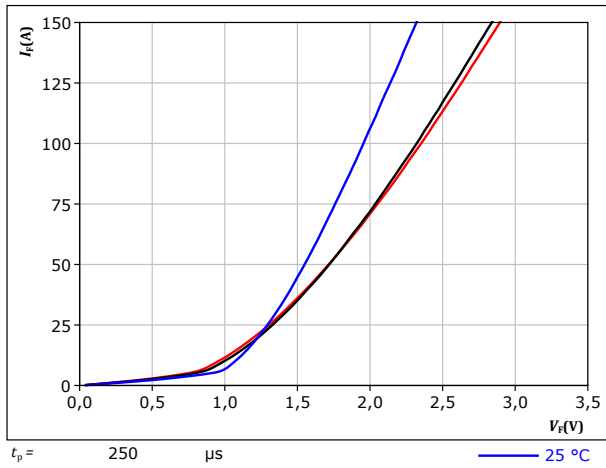
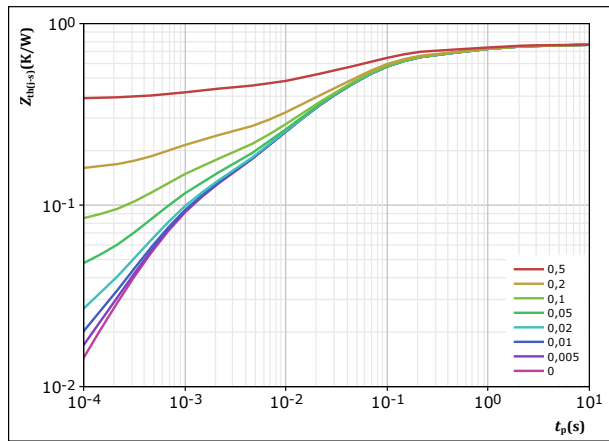


figure 14.

FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T	
$R_{th(j-s)} =$	0,765	K/W
FWD thermal model values		
R (K/W)	τ (s)	
2,36E-02	5,92E+00	
1,19E-01	6,12E-01	
3,74E-01	5,70E-02	
1,62E-01	1,02E-02	
9,08E-02	6,96E-04	



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datasheet

Rectifier Diode Characteristics

figure 15.

Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

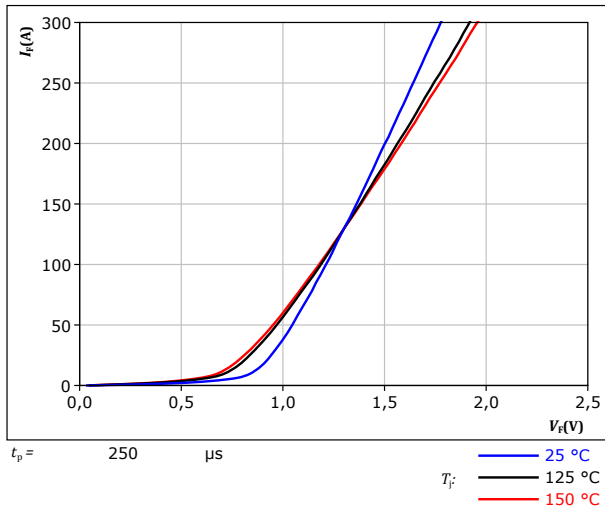
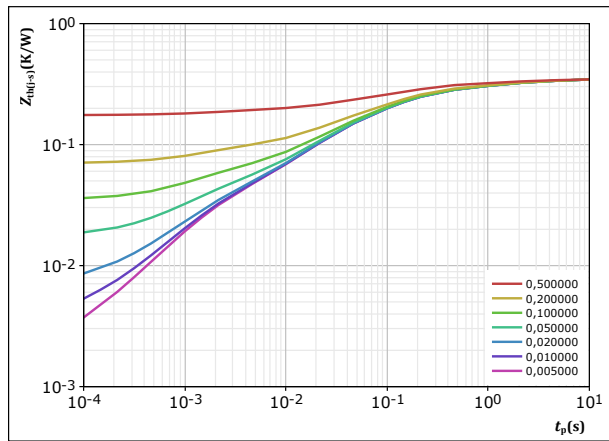


figure 16.

Rectifier

Transient thermal impedance as a function of pulse width

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





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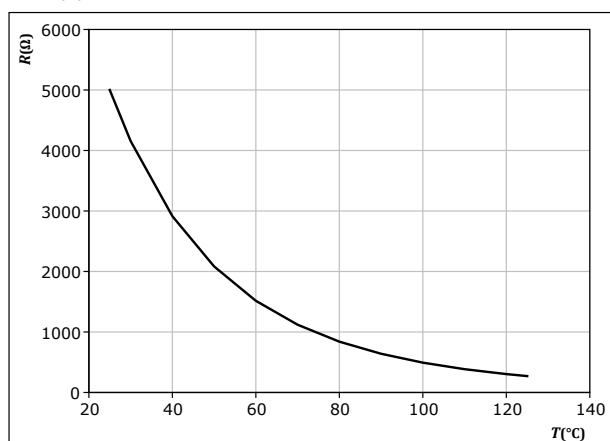
Thermistor Characteristics

figure 17.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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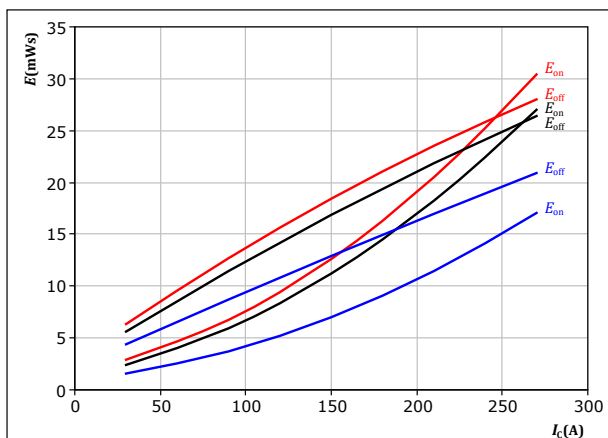
Inverter Switching Characteristics

figure 18.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$
 $R_{goff} = 2 \text{ } \Omega$

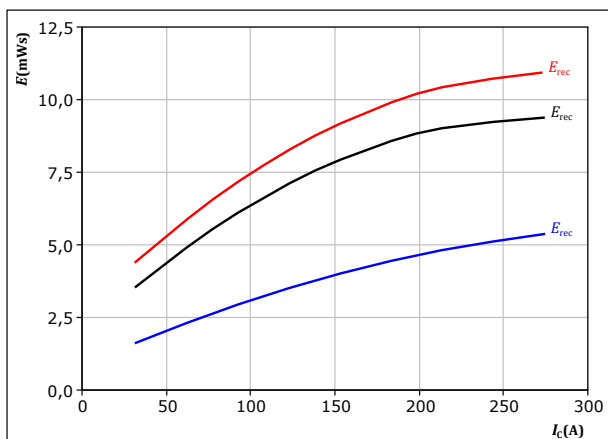
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 20.

FWD

Typical reverse recovered energy loss as a function of collector current

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



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$

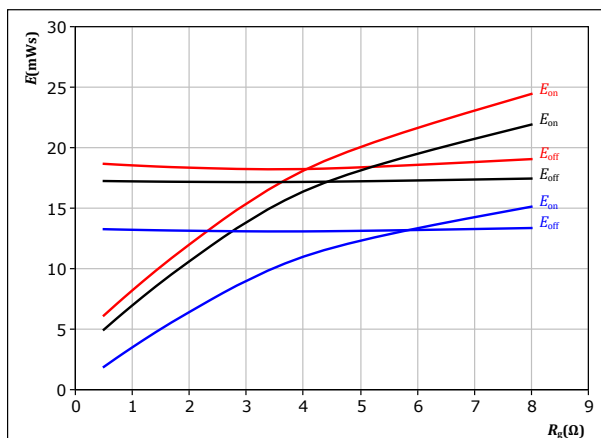
T_j :
— 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 150 \text{ A}$

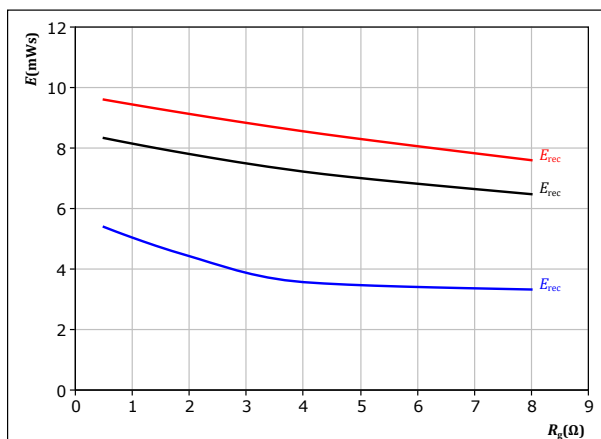
T_j :
— 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 150 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



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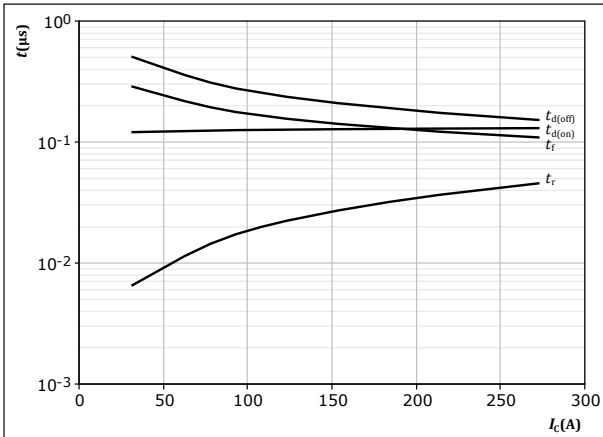
datasheet

Inverter Switching Characteristics

figure 22.

IGBT

Typical switching times as a function of collector current
 $t = f(I_C)$

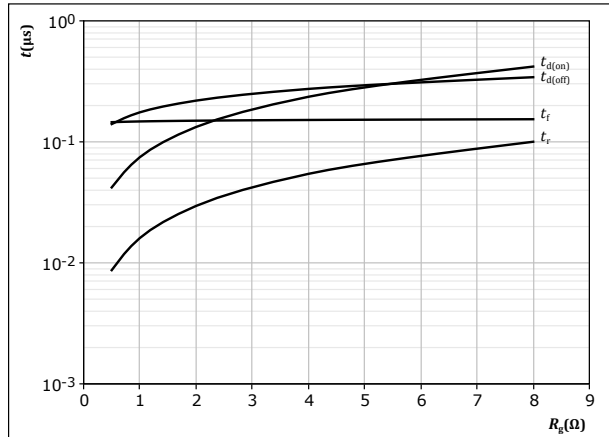


With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

figure 23.

IGBT

Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$

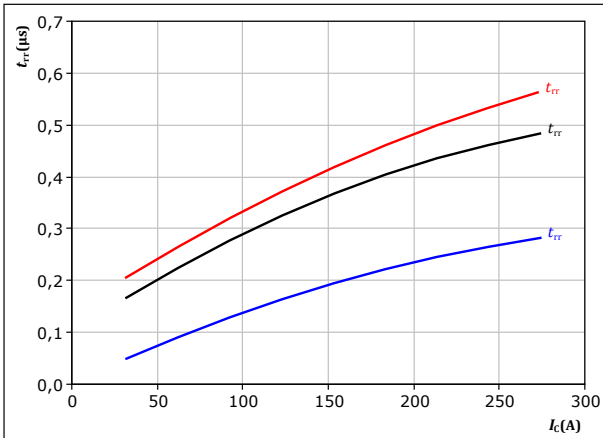


With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 150$ A

figure 24.

FWD

Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_C)$



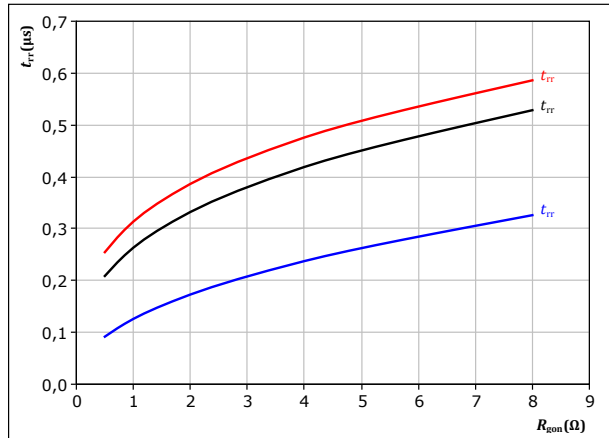
With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

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
 $I_C = 150$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



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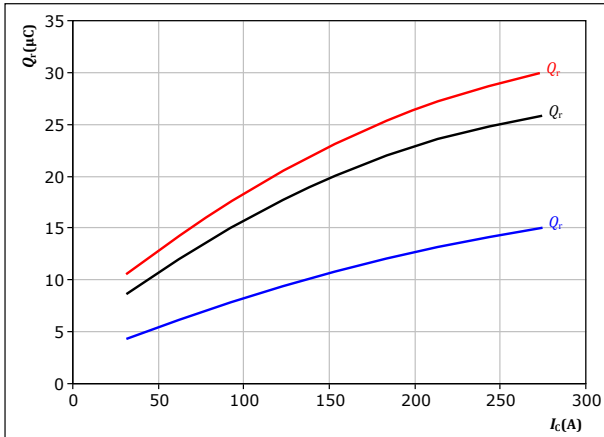
Inverter Switching Characteristics

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
 $R_{gon} = 2$ Ω

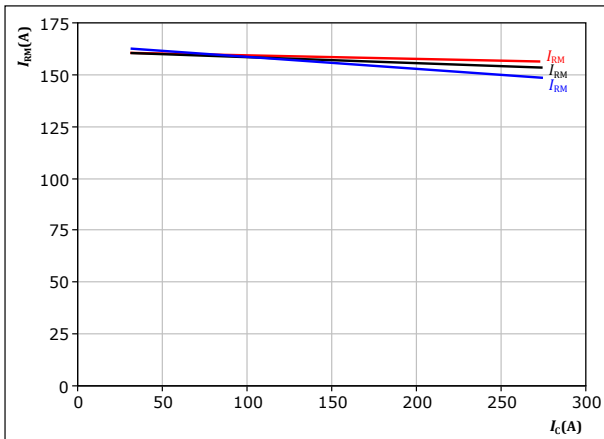
T_j :
— 25 °C
— 125 °C
— 150 °C

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
 $R_{gon} = 2$ Ω

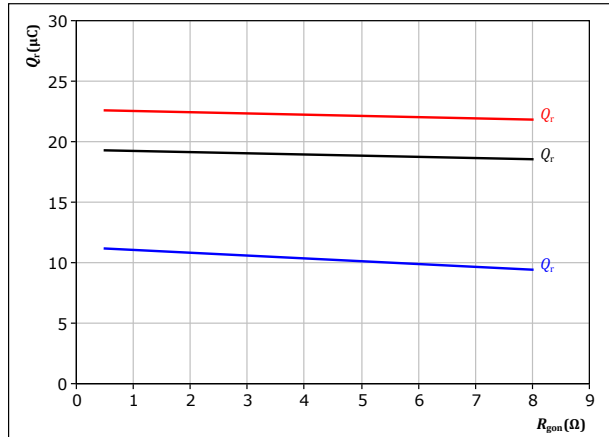
T_j :
— 25 °C
— 125 °C
— 150 °C

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
 $I_c = 150$ A

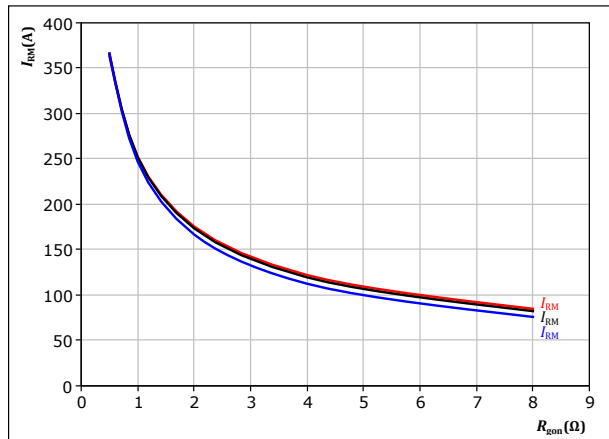
T_j :
— 25 °C
— 125 °C
— 150 °C

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
 $I_c = 150$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



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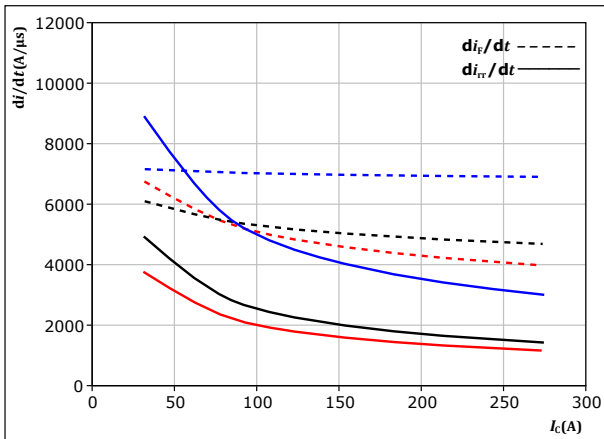
A0-VP12PMA150RA-LF18A80T

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

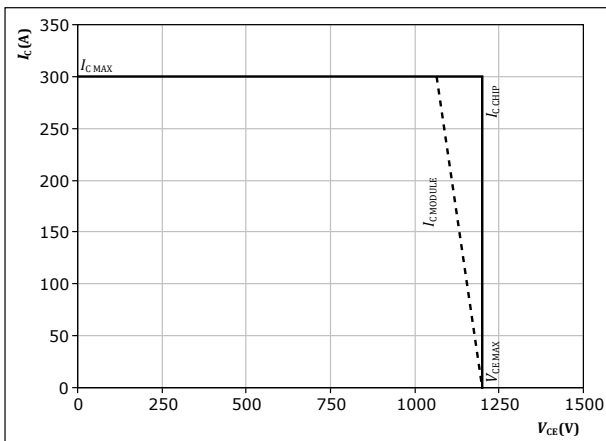
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

T_j :
 — 25 °C
 — 125 °C
 — 150 °C

figure 32. IGBT

Reverse bias safe operating area

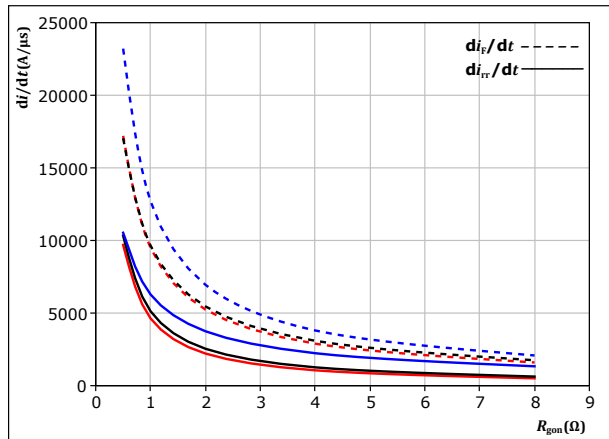
$I_c = f(V_{CE})$



At $T_j = 150$ °C
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

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
 $I_c = 150$ A

T_j :
 — 25 °C
 — 125 °C
 — 150 °C



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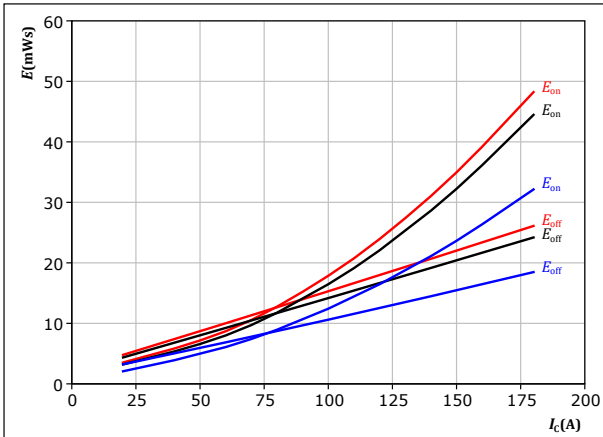
Brake Switching Characteristics

figure 33.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$



With an inductive load at

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$
 $R_{goff} = 16 \text{ } \Omega$

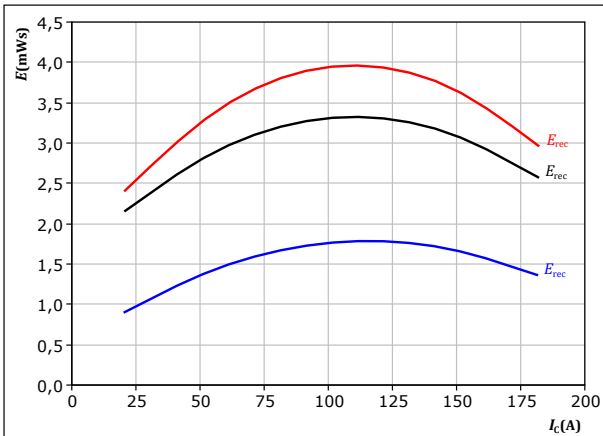
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 35.

FWD

Typical reverse recovered energy loss as a function of collector current

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



With an inductive load at

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $R_{gon} = 16 \text{ } \Omega$

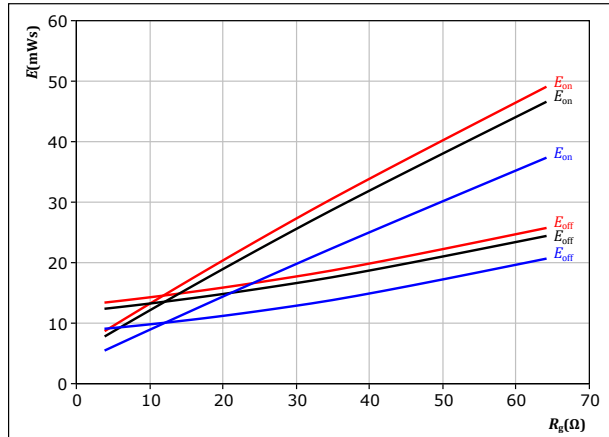
T_j :
— 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $I_c = 100 \text{ A}$

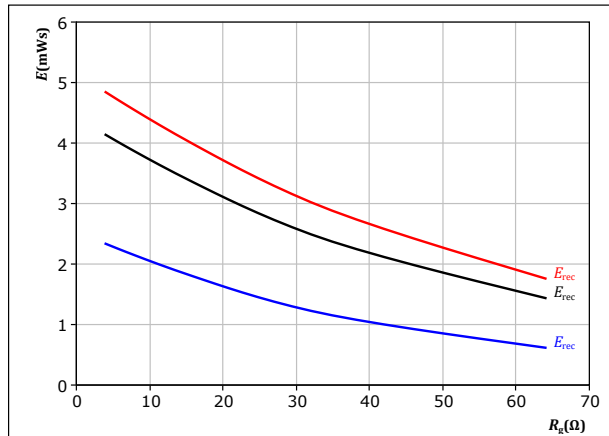
T_j :
— 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 700 \text{ V}$
 $V_{GE} = 0/15 \text{ V}$
 $I_c = 100 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



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datasheet

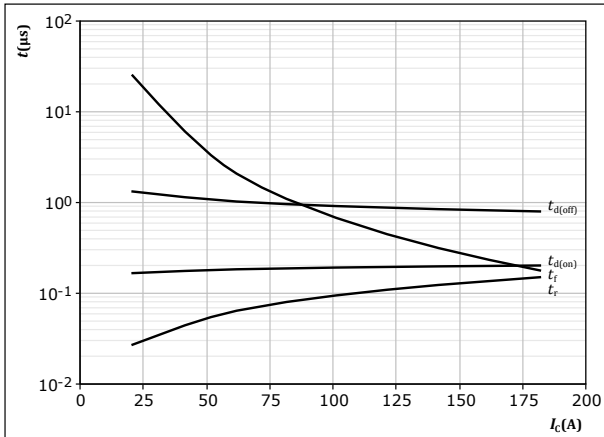
Brake Switching Characteristics

figure 37.

IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



With an inductive load at

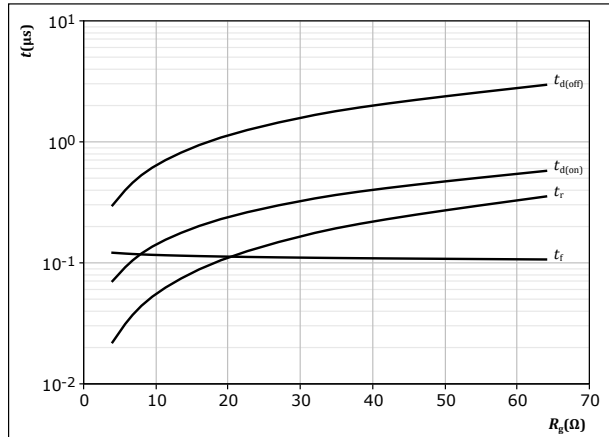
$T_j = 150$ °C
 $V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 16$ Ω
 $R_{goff} = 16$ Ω

figure 38.

IGBT

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

$$t = f(R_g)$$



With an inductive load at

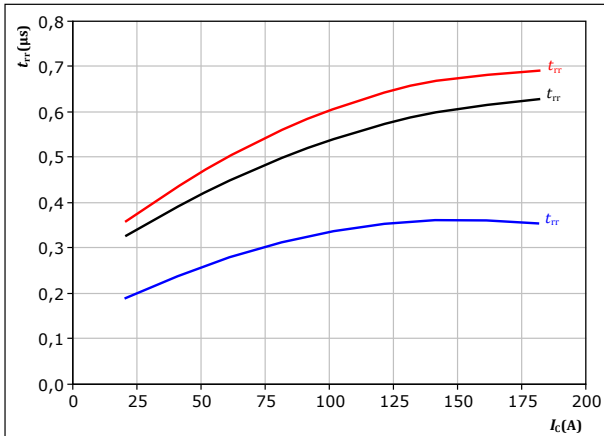
$T_j = 150$ °C
 $V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $I_C = 100$ A

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
 $R_{gon} = 16$ Ω

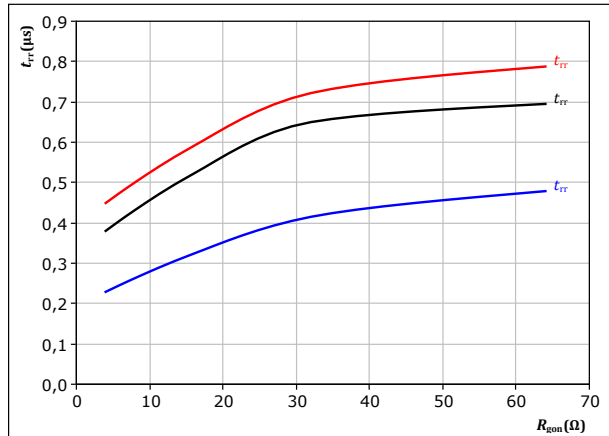
T_j : 25 °C
125 °C
150 °C

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
 $I_C = 100$ A

T_j : 25 °C
125 °C
150 °C



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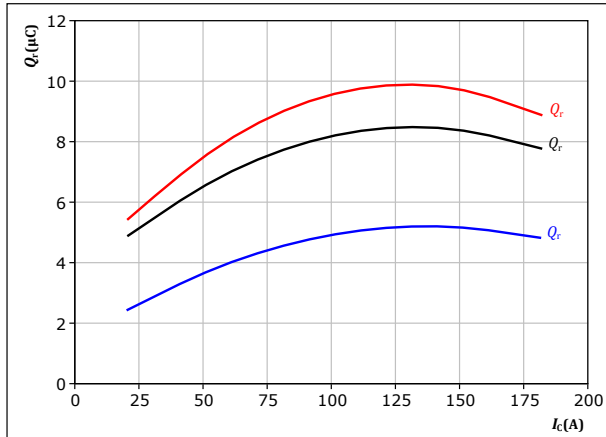
datasheet

Brake Switching Characteristics

figure 41. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



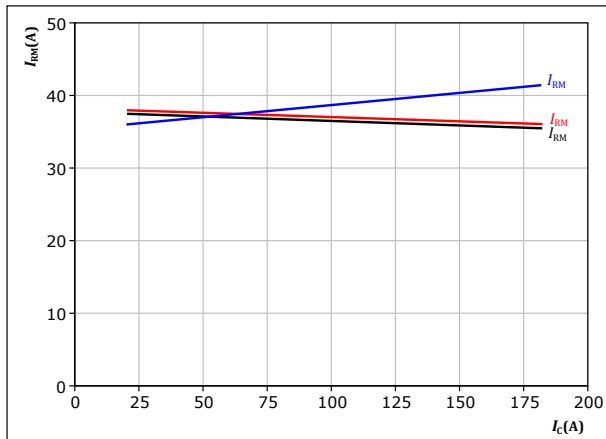
With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 16$ Ω
 T_j : 25 °C, 125 °C, 150 °C

figure 43. FWD

Typical peak reverse recovery current as a function of collector current

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



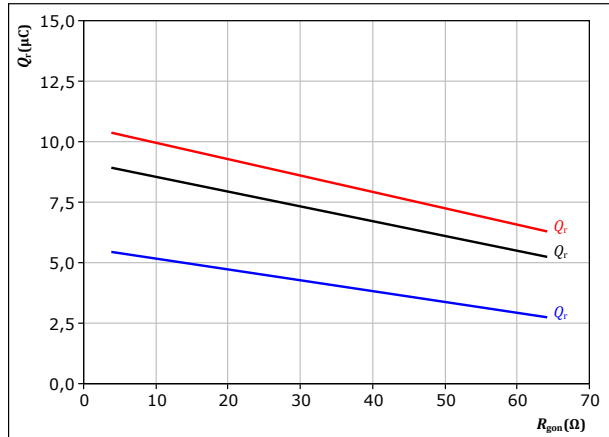
With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 16$ Ω
 T_j : 25 °C, 125 °C, 150 °C

figure 42. FWD

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

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



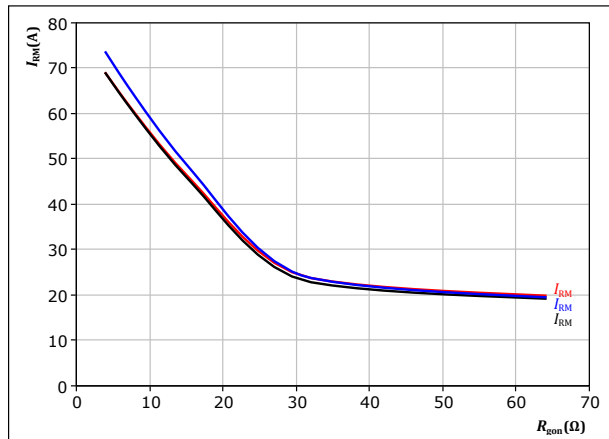
With an inductive load at

$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $I_c = 100$ 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
 $I_c = 100$ A
 T_j : 25 °C, 125 °C, 150 °C



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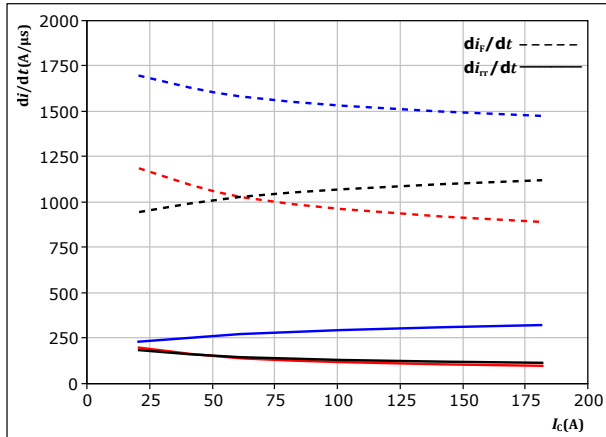
A0-VP12PMA150RA-LF18A80T

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

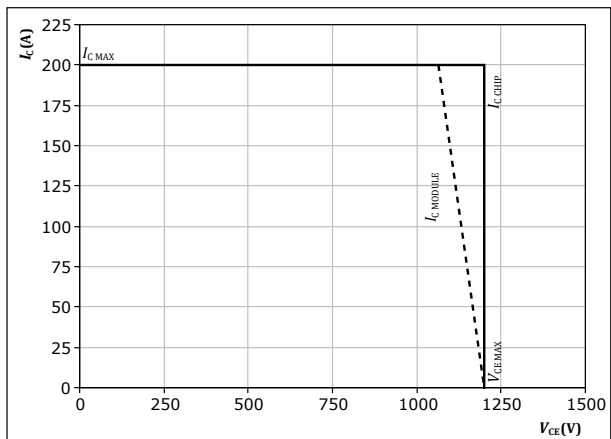
$V_{CE} = 700$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 16$ Ω

$T_j = 25$ °C
125 °C
150 °C

figure 47. IGBT

Reverse bias safe operating area

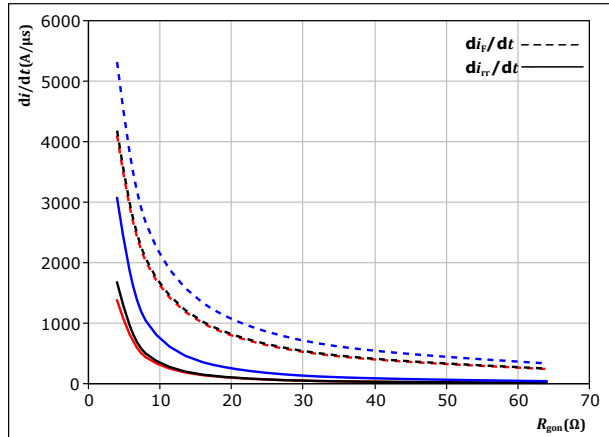
$I_C = f(V_{CE})$



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

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
 $I_C = 100$ A

$T_j = 25$ °C
125 °C
150 °C



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A0-VP12PMA150RA-LF18A80T datasheet

Switching Definitions

figure 48. IGBT

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

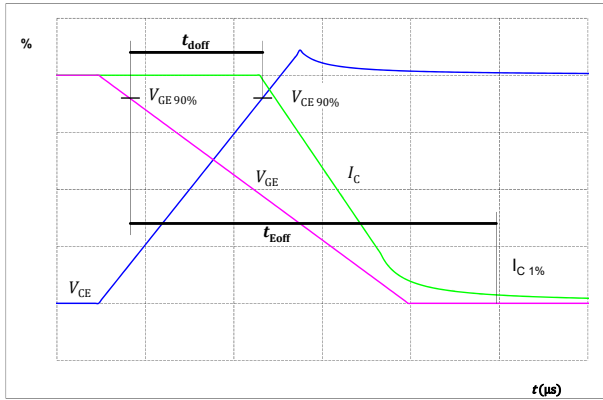


figure 49. IGBT

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

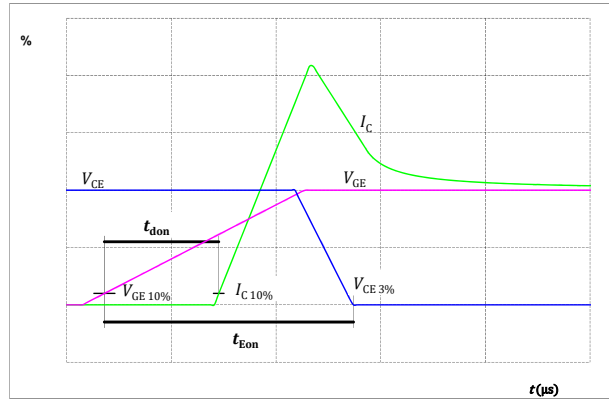


figure 50. IGBT

Turn-off Switching Waveforms & definition of t_f

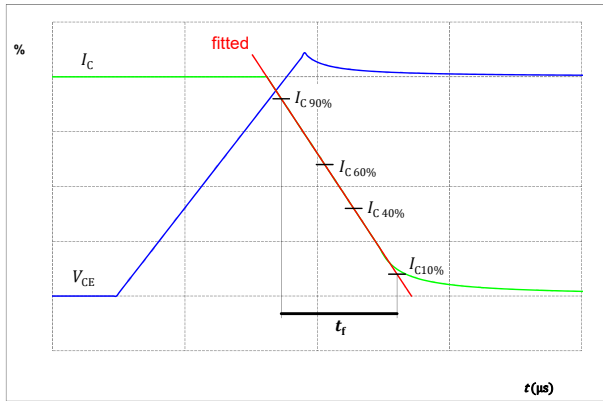
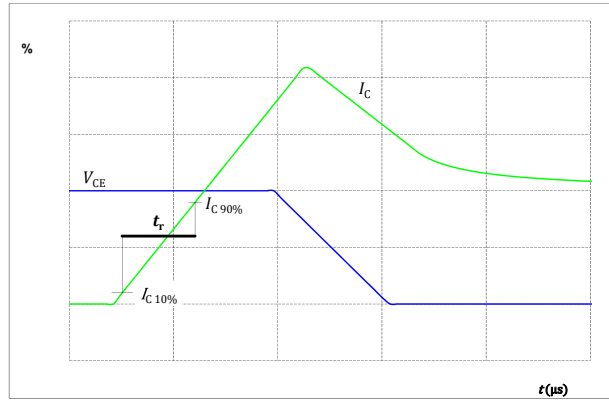


figure 51. IGBT

Turn-on Switching Waveforms & definition of t_r





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Switching Definitions

figure 52.

FWD

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

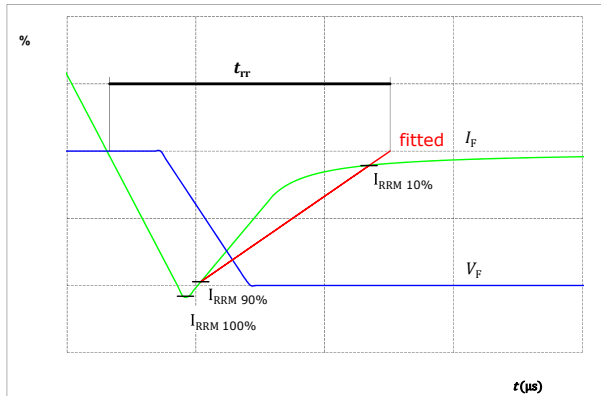
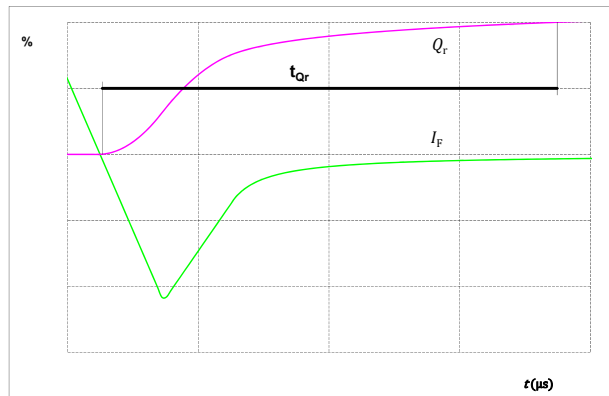


figure 53.

FWD

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





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A0-VP12PMA150RA-LF18A80T

datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	A0-VP12PMA150RA-LF18A80T
With thermal paste (5,2 W/mK, PTM6000HV)	A0-VP12PMA150RA-LF18A80T-/7/

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

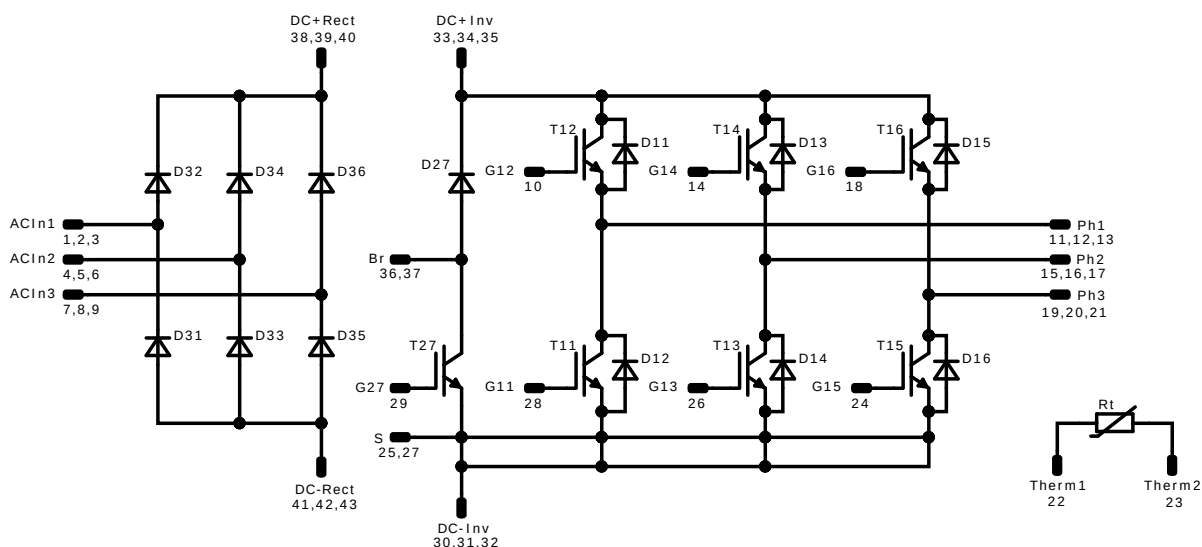
Outline			
Pin table [mm]			
Pin	X	Y	Function
1	19,05	0	ACIn1
2	22,86	0	ACIn1
3	26,66	0	ACIn1
4	34,29	0	ACIn2
5	38,1	0	ACIn2
6	41,91	0	ACIn2
7	49,53	0	ACIn3
8	53,34	0	ACIn3
9	57,16	0	ACIn3
10	64,77	0	G12
11	68,58	0	Ph1
12	72,36	0	Ph1
13	76,16	0	Ph1
14	83,82	0	G14
15	87,56	0	Ph2
16	91,45	0	Ph2
17	95,26	0	Ph2
18	118,11	15,865	G16
19	118,11	19,675	Ph3
20	118,11	23,485	Ph3
21	118,11	27,235	Ph3
22	118,11	34,915	Therm1
23	118,11	38,725	Therm2
24	100,965	58,4	G15
25	97,155	58,4	S
26	93,305	58,4	G13
27	70,505	58,4	S
28	66,655	58,4	G11
29	62,855	58,4	G27
30	55,205	58,4	DC-Inv
31	51,395	58,4	DC-Inv
32	47,585	58,4	DC-Inv
33	39,995	58,4	DC+Inv
34	36,195	58,4	DC+Inv
35	32,385	58,4	DC+Inv
36	20,975	58,4	Br
37	17,175	58,4	Br
38	0	42,535	DC+Rect
39	0	38,725	DC+Rect
40	0	34,915	DC+Rect
41	0	23,485	DC-Rect
42	0	19,675	DC-Rect
43	0	15,865	DC-Rect



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A0-VP12PMA150RA-LF18A80T
datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	150 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	150 A	Inverter Diode	
T27	IGBT	1200 V	100 A	Brake Switch	
D27	FWD	1200 V	50 A	Brake Diode	
D31, D32, D33, D34, D35, D36	Rectifier	1600 V	110 A	Rectifier Diode	
Rt	Thermistor			Thermistor	



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A0-VP12PMA150RA-LF18A80T
datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 24	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for VINco E3s packages see vincotech.com website.				
Package data				
Package data for VINco E3s packages see vincotech.com website.				
Vincotech thermistor reference				
See Vincotech thermistor reference table at vincotech.com website.				
UL recognition and file number				
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,sp}=150^{\circ}\text{C}$ and up to 2500VAC/1min isolation voltage. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
A0-VP12PMA150RA-LF18A80T-D2-14	29 Sep. 2026	Add UL listing	

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