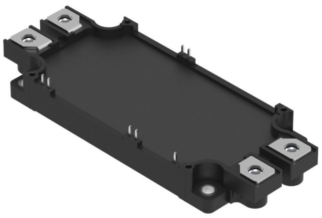
A0-VS122PA200M7-L756F70
A0-VP122PA200M7-L756F70T
datasheet

VINcoDUAL E3 **1200 V / 200 A**

Features

- IGBT Mitsubishi gen 7 technology with low V_{CEsat} and improved EMC behavior
- New SoLid Cover Technology for higher reliability
- Industry standard housing
- Press-fit pin and pre-applied phase-change
- Thermal Interface Material available

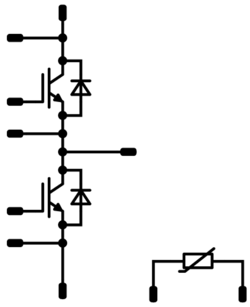
VINco E3 housing



Target applications

- Industrial Drives
- Power Supply
- UPS

Schematic



Types

- A0-VS122PA200M7-L756F70
- A0-VP122PA200M7-L756F70T

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Half-Bridge Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	231	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	449	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Half-Bridge Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	182	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	343	W
Maximum junction temperature	T_{jmax}			175	°C

Module Properties

Thermal Properties

Parameter	Symbol	Condition		Value	Unit
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…(T_{jmax} - 25)	°C

Isolation Properties

Parameter	Symbol	Condition		Value	Unit
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				18,1	mm
Clearance				16,2	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Half-Bridge Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,02	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,53 1,70 1,75	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25			1000	nA
Input capacitance	C_{ies}		0	10		25		42000		pF
Output capacitance	C_{oes}							1400		
Reverse transfer capacitance	C_{res}							560		
Gate charge	Q_g		15	600	200	25		1400		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,21		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	200	25 125 150		353 353 350		ns
Rise time	t_r					25 125 150		48 55 57		
Turn-off delay time	$t_{d(off)}$					25 125 150		293 324 326		
Fall time	t_f					25 125 150		61 97 110		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 21,9 µC Q_{rFWD} = 31,1 µC Q_{rFWD} = 35,2 µC				25 125 150		15,915 21,048 23,273		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		12,400 16,874 18,546		

Characteristic Values

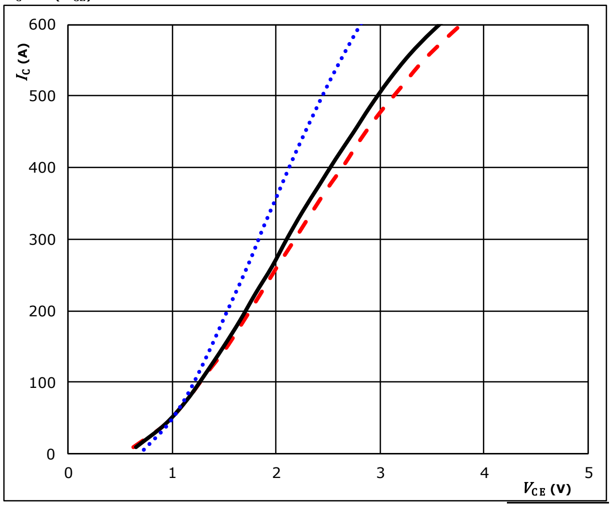
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Half-Bridge Diode										
Static										
Forward voltage	V_F				200	25 125 150		1,82 1,96 1,97	2,1	V
Reverse leakage current	I_R			1200		25			80	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,28		K/W
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		151 164 169		A
Reverse recovery time	t_{rr}					25 125 150		383 439 471		ns
Recovered charge	Q_r	di/dt = 3709 A/µs di/dt = 3860 A/µs di/dt = 3690 A/µs	±15	600	200	25 125 150		21,860 31,146 35,186		µC
Reverse recovered energy	E_{rec}					25 125 150		8,262 11,802 13,432		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		880 848 995		A/µs
Thermistor										
Rated resistance	R					25		5		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 493 Ω				100	-5		+5	%
Power dissipation	P					25		245		mW
Power dissipation constant						25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. ±2 %				25		3375		K
B-value	$B_{(25/100)}$	Tol. ±2 %				25		3437		K
Vincotech NTC Reference									K	

Half-Bridge Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

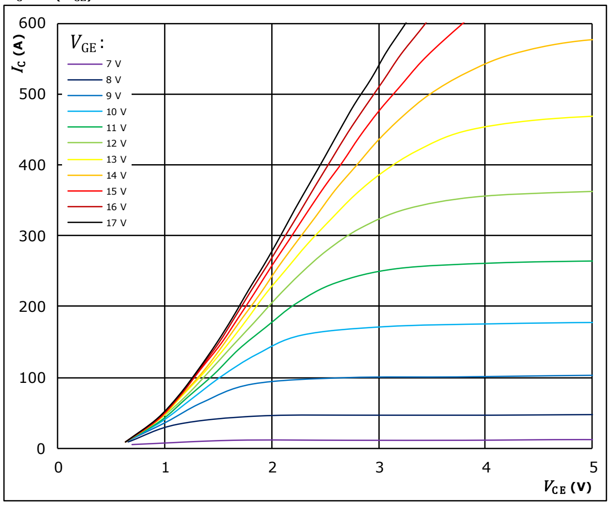


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

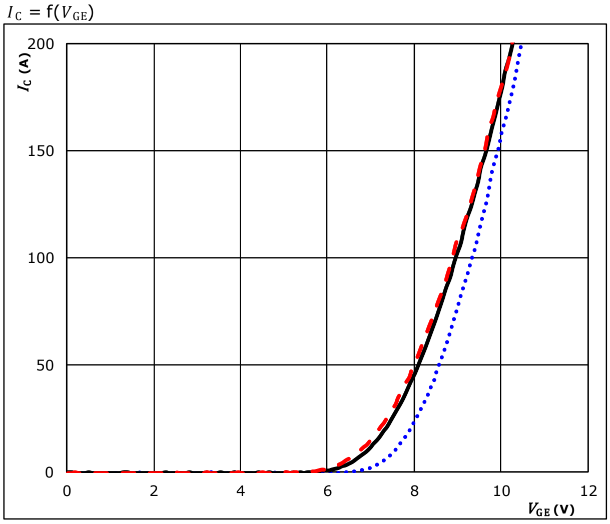


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

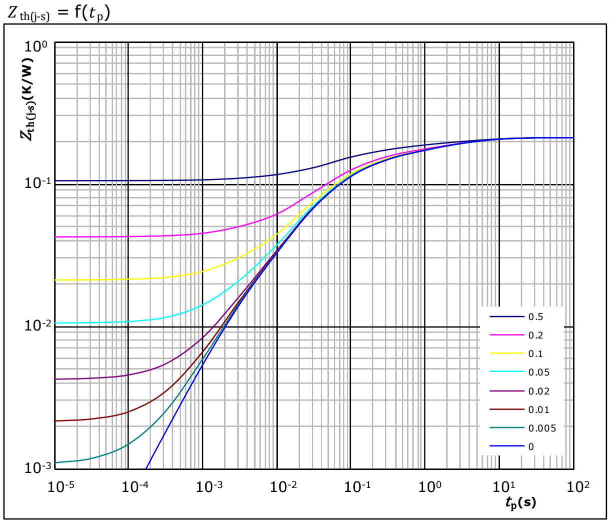


t_p = 250 µs
V_{CE} = 10 V
T_j: 25 °C, 125 °C, 150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T
$R_{th(j-s)}$ = 0,21 K/W

IGBT thermal model values

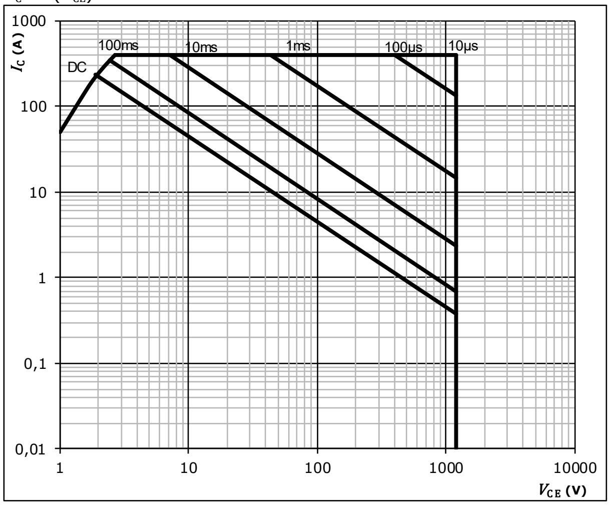
R (K/W)	τ (s)
2,33E-02	6,08E+00
3,66E-02	1,45E+00
6,73E-02	1,71E-01
7,56E-02	3,15E-02
8,67E-03	2,71E-03

Half-Bridge Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



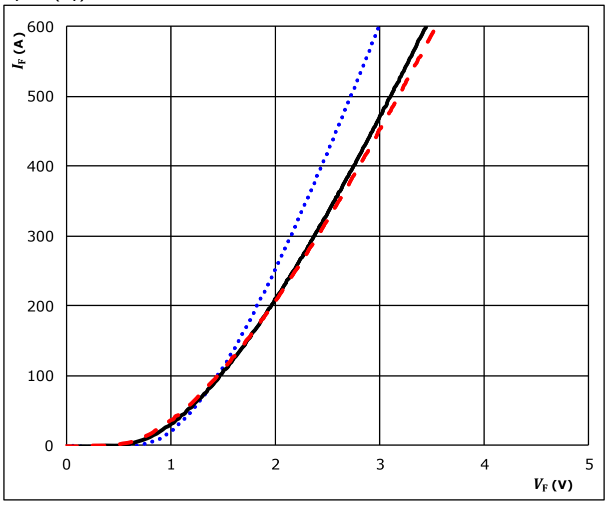
D =	single pulse	
T_s =	80	ºC
V_{GE} =	0	V
T_j =	T_{jmax}	

Half-Bridge Diode Characteristics

figure 1.	FWD

Typical forward characteristics

$I_F = f(V_F)$



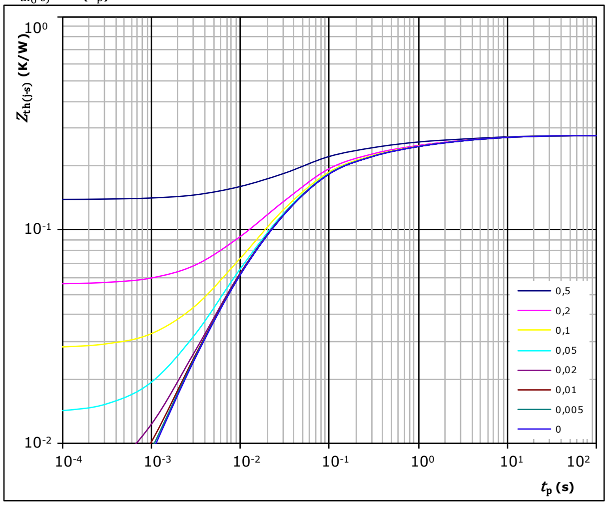
t_p = 250 µs

T_j: 25 °C · · · · ·; 125 °C ———; 150 °C – – –

figure 2.	FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,28 K/W

FWD thermal model values

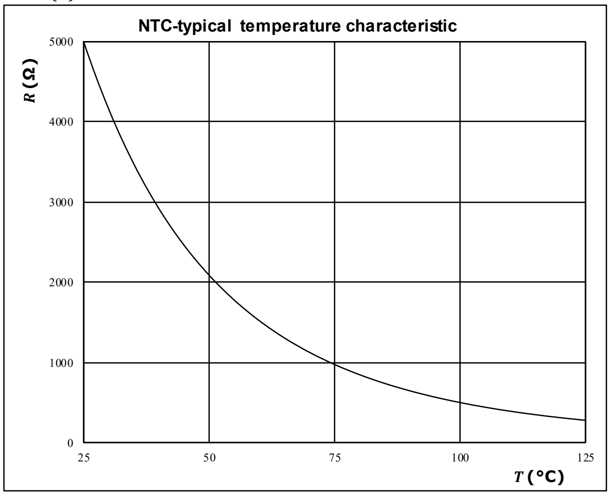
R (K/W)	τ (s)
1,27E-02	1,04E+01
3,22E-02	1,79E+00
6,57E-02	2,21E-01
1,32E-01	3,76E-02
3,46E-02	6,33E-03

Thermistor Characteristics

figure 1.	Thermistor

Typical NTC characteristic
as a function of temperature

$R = f(T)$

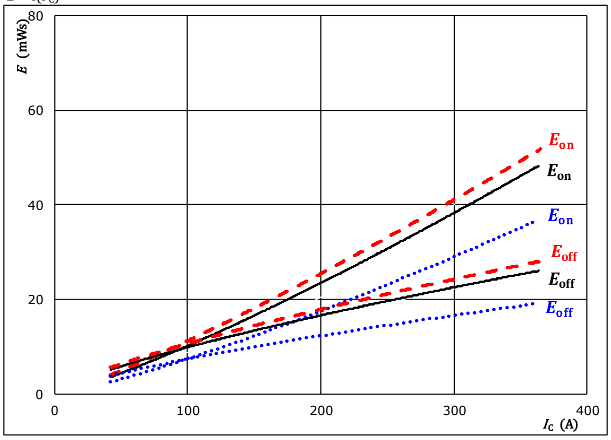


Half-Bridge Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



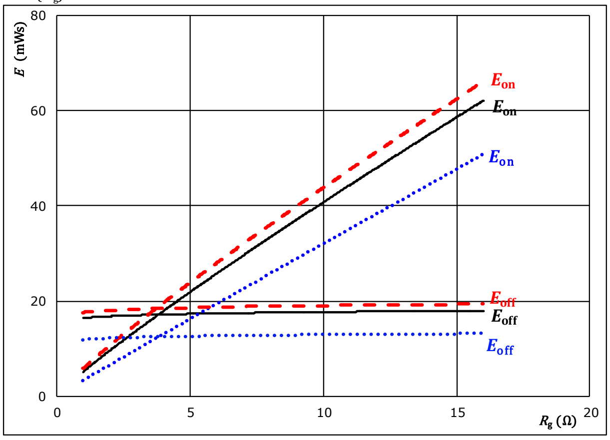
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
R_{gon} =	4	Ω		150 °C (dashed)
R_{goff} =	4	Ω		

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



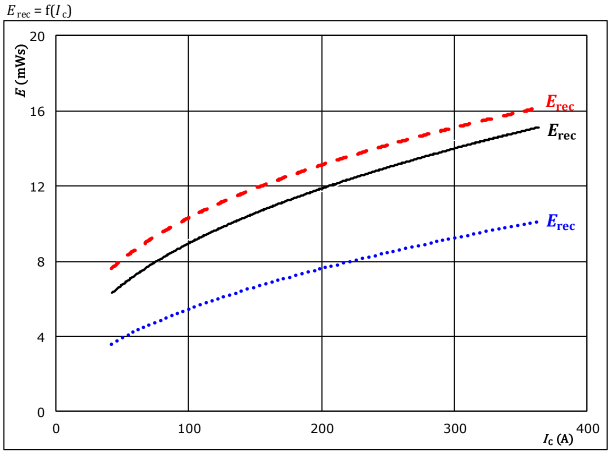
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
I_C =	200	A		150 °C (dashed)

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



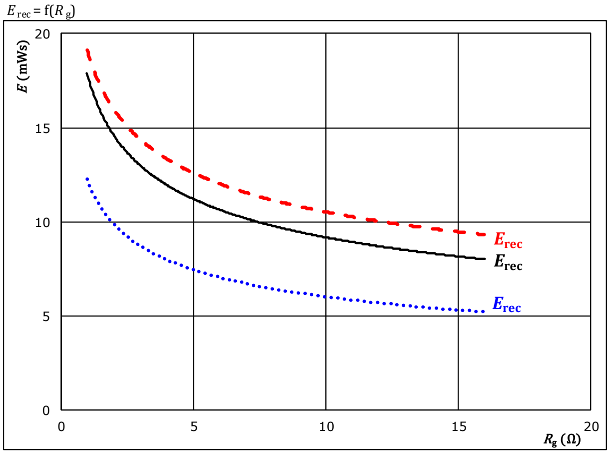
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
R_{gon} =	4	Ω		150 °C (dashed)

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

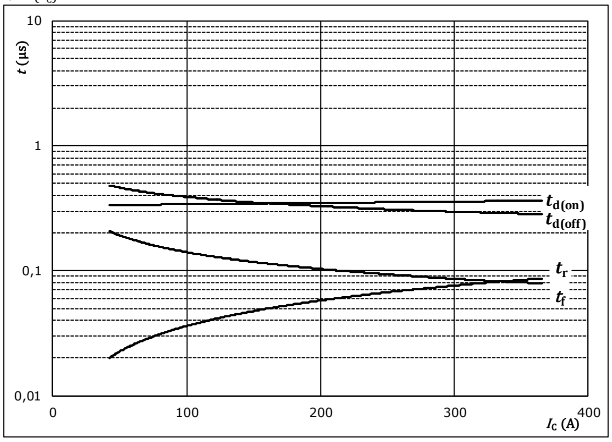
V_{CE} =	600	V	T_j:	25 °C (dotted)
V_{GE} =	±15	V		125 °C (solid)
I_C =	200	A		150 °C (dashed)

Half-Bridge Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



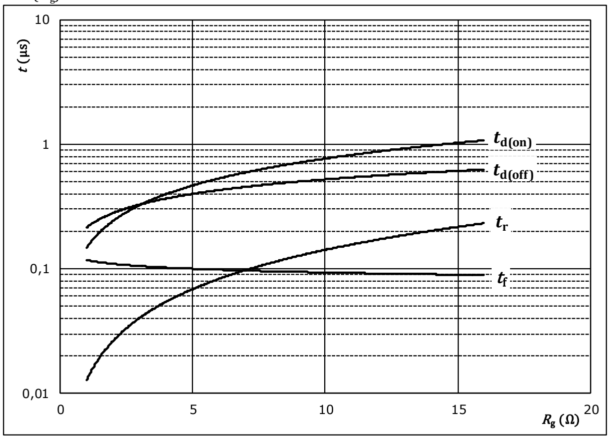
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



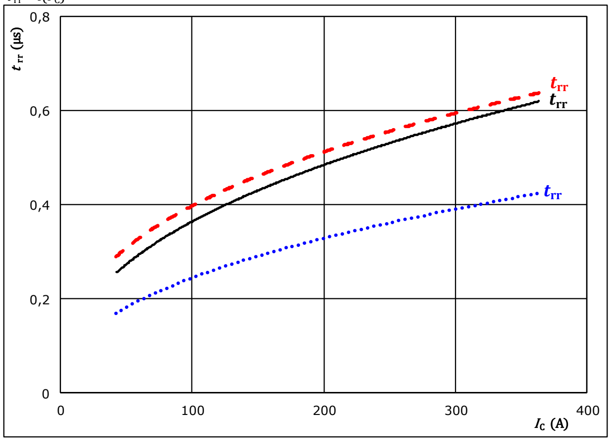
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	200	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



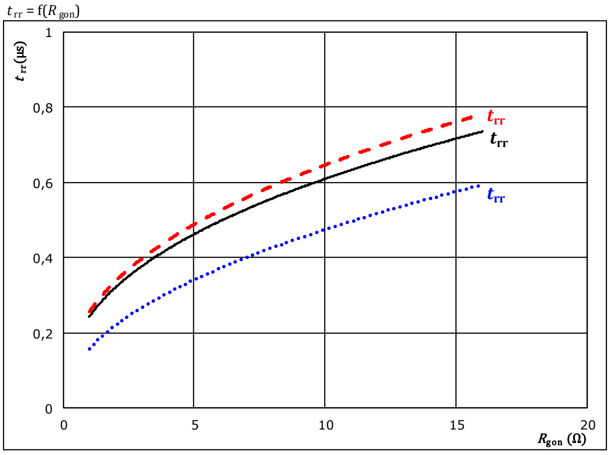
With an inductive load at

V_{CE}=	600	V	T_j:	25 °C
V_{GE}=	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 8. FWD

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

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



With an inductive load at

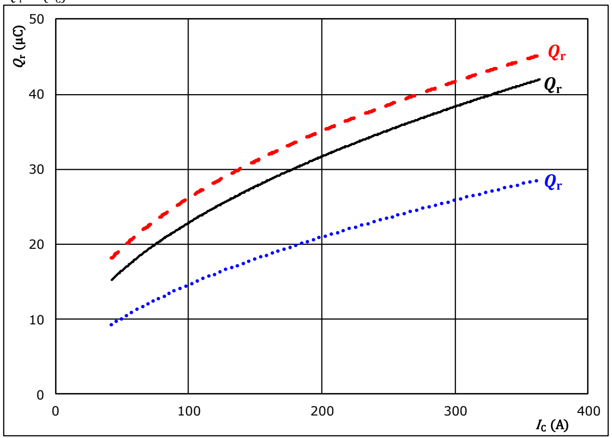
V_{CE}=	600	V	T_j:	25 °C
V_{GE}=	±15	V		125 °C
I_C=	200	A		150 °C

Half-Bridge Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



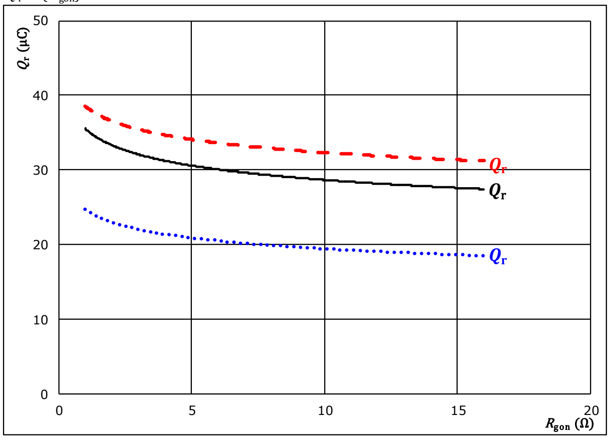
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



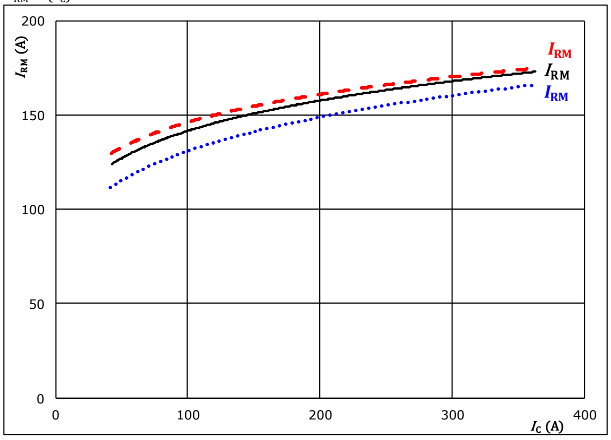
With an inductive load at

V_{CE}=	600	V	T_j:	25 °C	········
V_{GE} =	±15	V		125 °C	———
I_C=	200	A		150 °C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



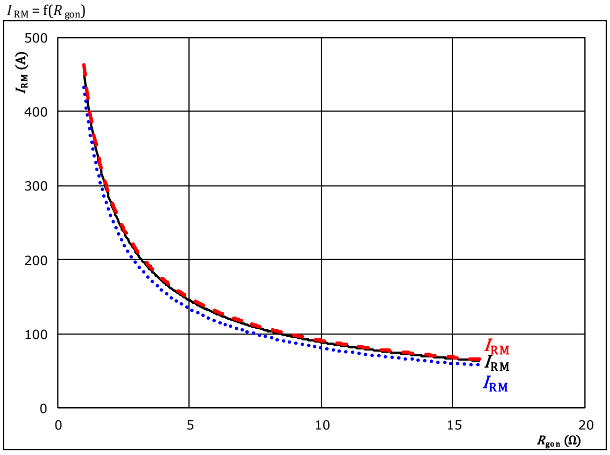
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 12. **FWD**

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

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



With an inductive load at

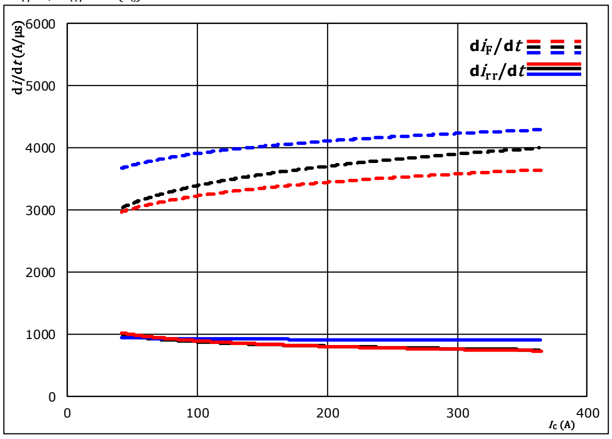
V_{CE} =	600	V	T_j:	25 °C	········
V_{GE} =	±15	V		125 °C	———
I_C =	200	A		150 °C	– – –

Half-Bridge Switching Characteristics

figure 13. **FWD**

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

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



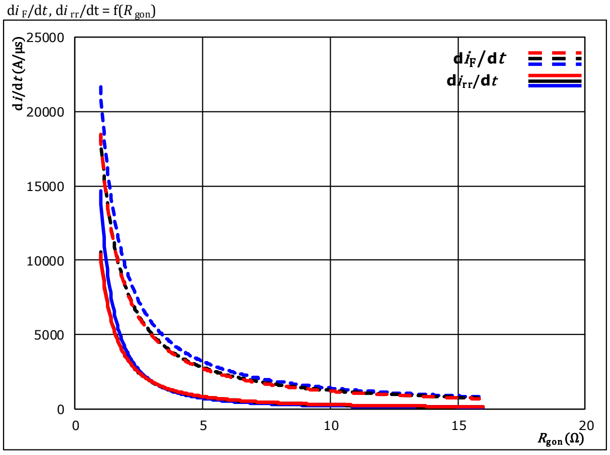
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 14. **FWD**

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

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



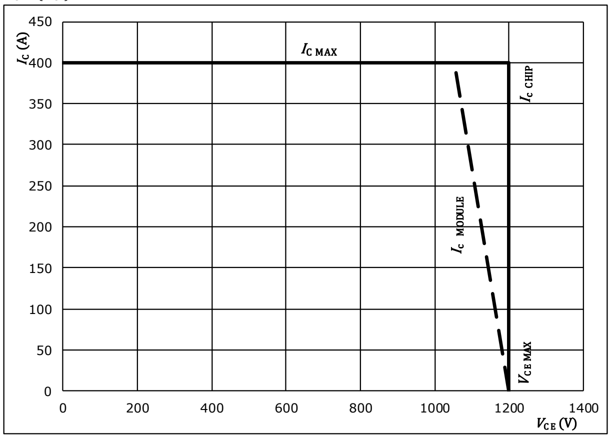
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	200	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	150	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

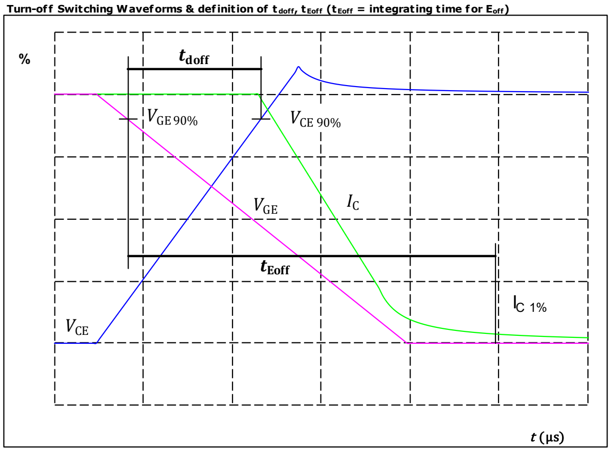
Half-Bridge Switching Definitions

General conditions

T_j	=	**150 °C**
R_{gon}	=	**4 Ω**
R_{goff}	=	**4 Ω**

figure 1. **IGBT**

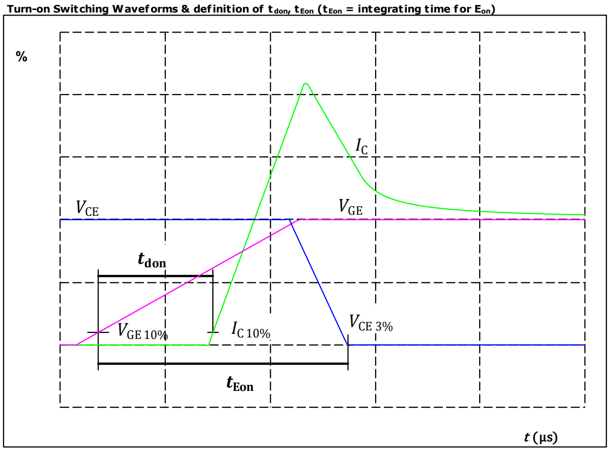
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	200	A
t_{doff} =	326	ns

figure 2. **IGBT**

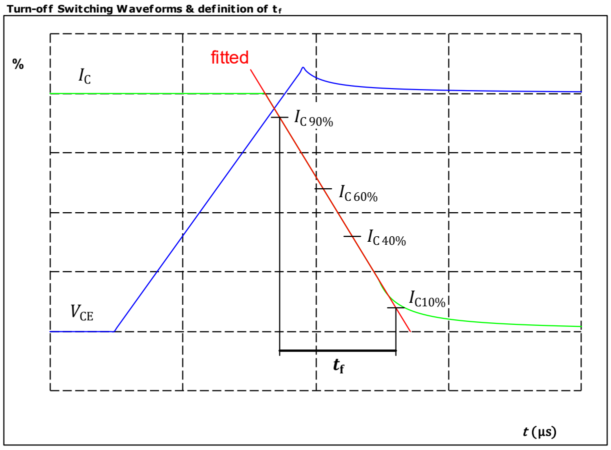
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	200	A
t_{don} =	350	ns

figure 3. **IGBT**

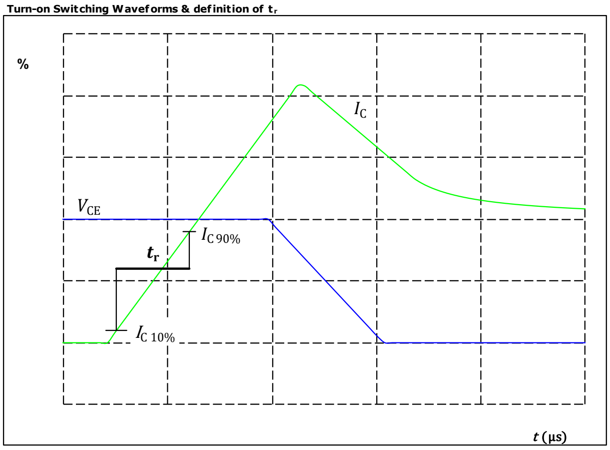
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	200	A
t_f =	110	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

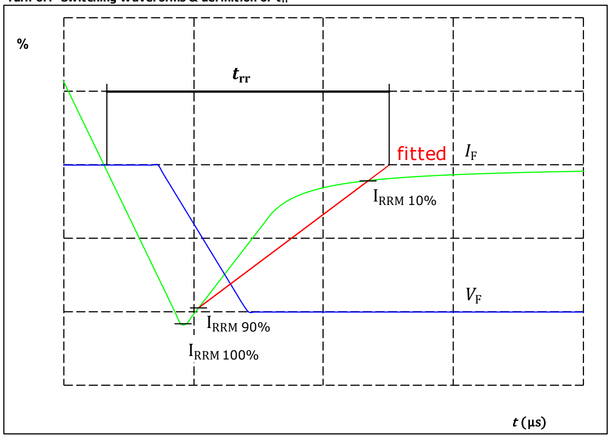


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	200	A
t_r =	57	ns

Half-Bridge Switching Characteristics

figure 5. **FWD**

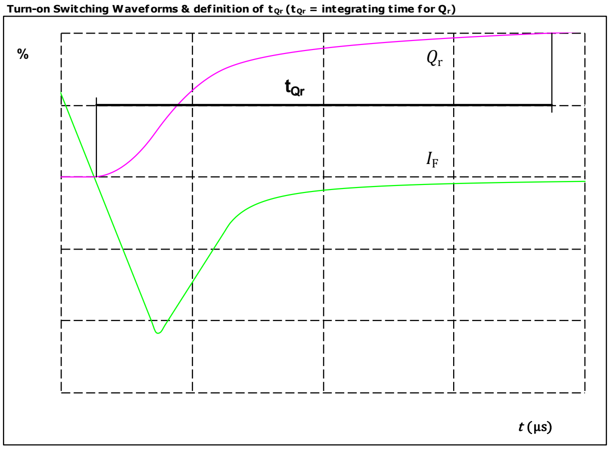
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	600	V
I_F (100%) =	200	A
I_{RRM} (100%) =	169	A
t_{rr} =	471	ns

figure 6. **FWD**

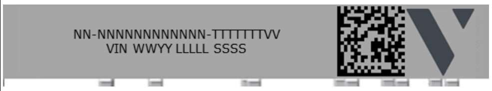
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	200	A
Q_r (100%) =	35	µC

Ordering Code & Marking

Version	Ordering Code
without thermal paste with solder pins	A0-VS122PA200M7-L756F70
with thermal paste with solder pins	A0-VS122PA200M7-L756F70-/3/
without thermal paste with Press-fit pins	A0-VP122PA200M7-L756F70T
with thermal paste with Press-fit pins	A0-VP122PA200M7-L756F70T-/3/

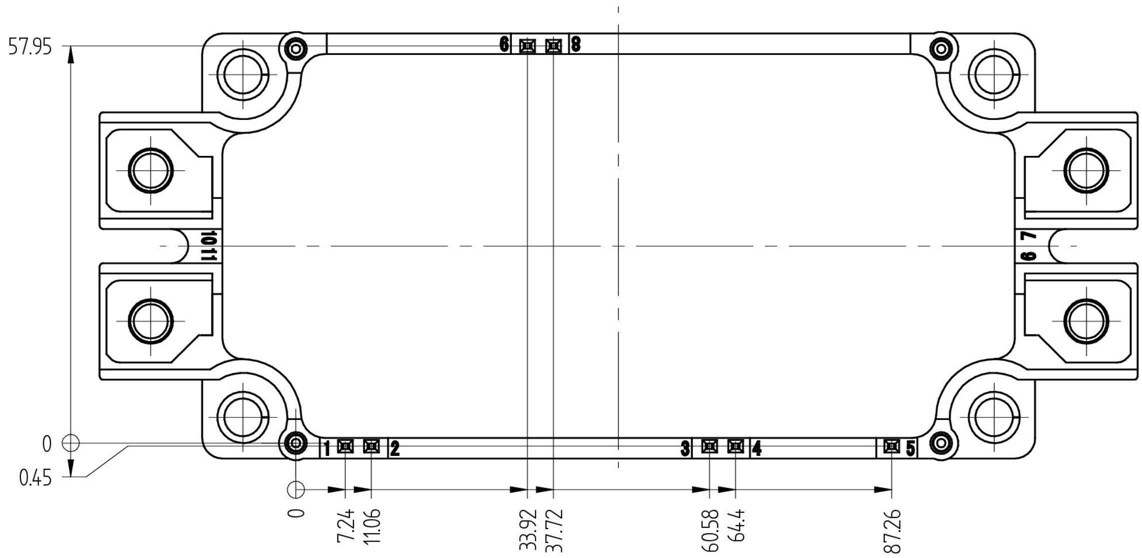


Text	**Name**		**Date code**	**UL & VIN**	**Lot**	**Serial**
	NN-NNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

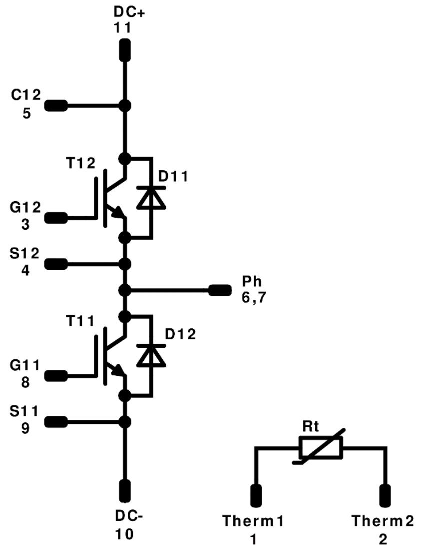
Outline

Pin table

Pin	X	Y	Functions
1	7,24	-0,45	Therm1
2	11,06	-0,45	Therm2
3	60,58	-0,45	G12
4	64,4	-0,45	S12
5	87,26	-0,45	C12
6	-	-	Ph
7	-	-	Ph
8	37,72	57,95	G11
9	33,92	57,95	S11
10	-	-	DC-
11	-	-	DC+



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	200 A	Half-Bridge Switch	
D11, D12	FWD	1200 V	200 A	Half-Bridge Diode	
Rt	NTC			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 24	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for VINco E3 packages see vincotech.com website.

Package data
Package data for VINco E3 packages see vincotech.com website.

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

Document No.:	Date:	Modification:	Pages
A0-Vx122PA200M7-L756F70x-D1-14	08 May. 2019		