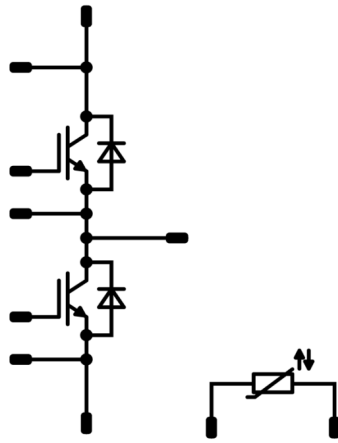




Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
datasheet

VINcoDUAL E3		1200 V / 690 A
Features • Low V_{CEsat} with the new 7th gen Mitsubishi chip generation • Max. Junction temperature T_{vjmax} 175 °C • Solid cover technology for higher reliability • Industry standard housing • Press-fit pin and pre-applied Phase Change Thermal Interface Material available		VINco E3 
Target applications • Industrial Drives • Power Supply • UPS		Schematic 
Types • A0-VS122PA690M7-L750F70 • A0-VP122PA690M7-L750F70T		

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Half-Bridge Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	678	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	1380	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	2065	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, 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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	546	A
Repetitive peak forward current	I_{FRM}		1500	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	896	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 $t_p = 2\text{ s}$	4000	V
Creepage distance			18,1	mm
Clearance			16,2	mm
Comparative Tracking Index	CTI		> 200	



Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
 datasheet

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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,069	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		690	25 125 150		1,54 1,74 1,80	1,9	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			690	µA
Gate-emitter leakage current	I_{GES}		20	0		25			1500	nA
Internal gate resistance	r_g							0,66		Ω
Input capacitance	C_{ies}	0	10		25			132000		pF
Output capacitance	C_{oes}							3900		
Reverse transfer capacitance	C_{res}							1590		
Gate charge	Q_g		15	600	690	25		4500		nC

Thermal

Thermal resistance junction to case	$R_{th(j-c)}$							0,046		K/W
Thermal resistance case to sink	$R_{th(c-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,029		K/W

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{goff} = 2 \Omega$ $R_{gon} = 2 \Omega$	±15	600	685	25 125 150		752 768 758		ns
Rise time	t_r					25 125 150		122 144 141		
Turn-off delay time	$t_{d(off)}$					25 125 150		524 557 574		
Fall time	t_f					25 125 150		57 89 88		
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 54,8 \mu C$ $Q_{tFWD} = 88,9 \mu C$ $Q_{tFWD} = 94,6 \mu C$				25 125 150		89,877 122,444 125,037		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		48,689 70,087 64,737		



Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
 datasheet

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				750	25 125		1,70 1,87	2,2	V
Reverse leakage current	I_R			1200		25			450	µA

Thermal

Thermal resistance junction to case	$R_{th(j-c)}$							0,070		K/W
Thermal resistance case to sink	$R_{th(c-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,036		K/W

Dynamic

Peak recovery current	I_{RRM}	$di/dt = 5557$ A/µs $di/dt = 4738$ A/µs $di/dt = 6750$ A/µs	± 15	600	685	25 125 150		317 344 358		A
Reverse recovery time	t_{rr}					25 125 150		368 517 541		ns
Recovered charge	Q_r					25 125 150		54,754 88,890 94,624		µC
Reverse recovered energy	E_{rec}					25 125 150		18,371 31,246 29,901		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		1157 1025 938		A/µs

Thermistor

Rated resistance	R					25		5		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 493 \Omega$				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	



Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
datasheet

Half-Bridge Switch Characteristics

figure 1. IGBT
Typical output characteristics

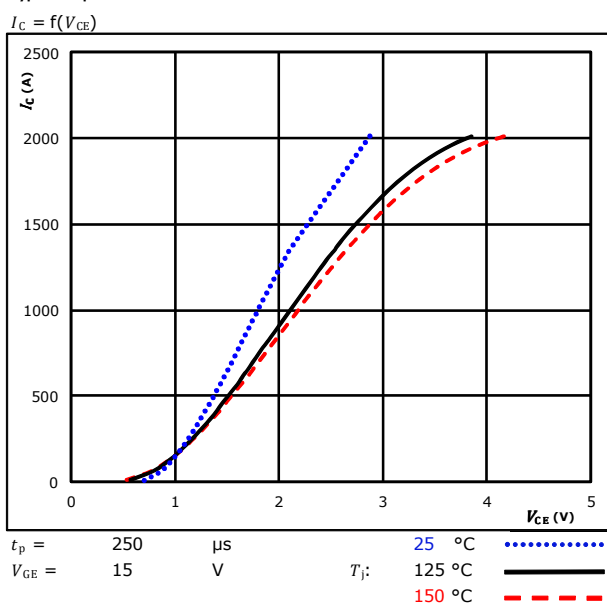
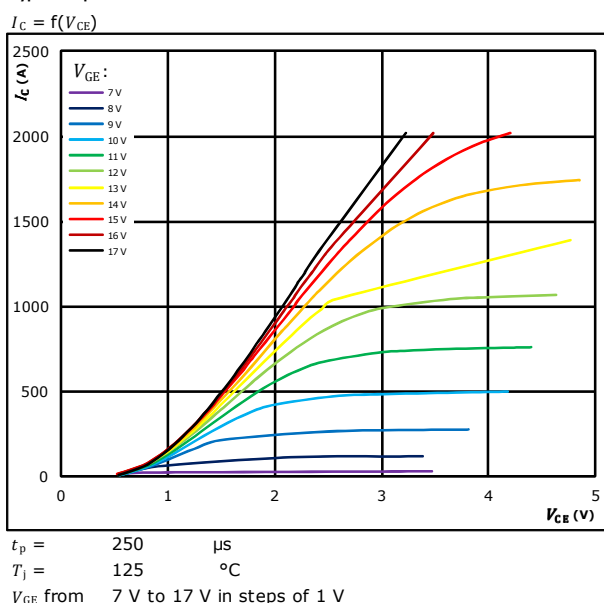
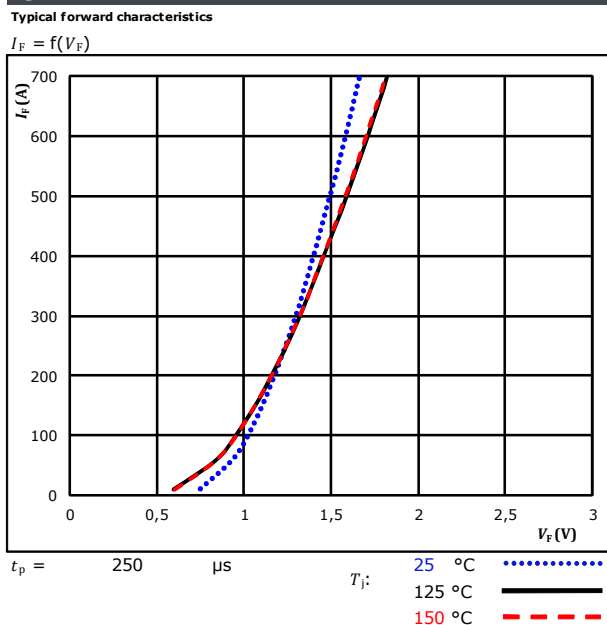


figure 2. IGBT
Typical output characteristics



Half-Bridge Diode Characteristics

figure 1. FWD
Typical forward characteristics





Vincotech

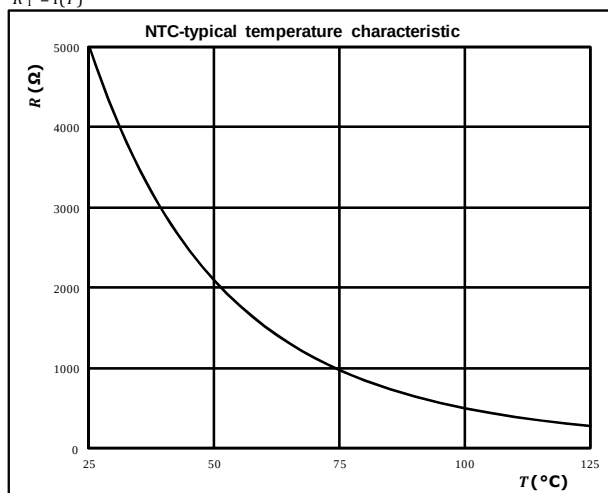
A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
datasheet

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$$R_T = f(T)$$





Vincotech

A0-VS122PA690M7-L750F70 A0-VP122PA690M7-L750F70T

datasheet

Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

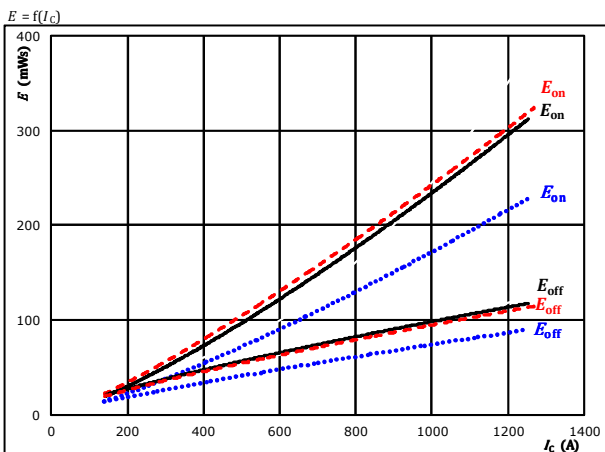


figure 2. IGBT

Typical switching energy losses as a function of gate resistor

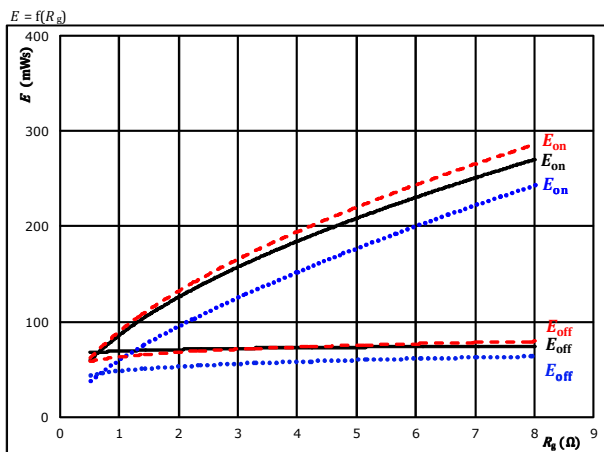


figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

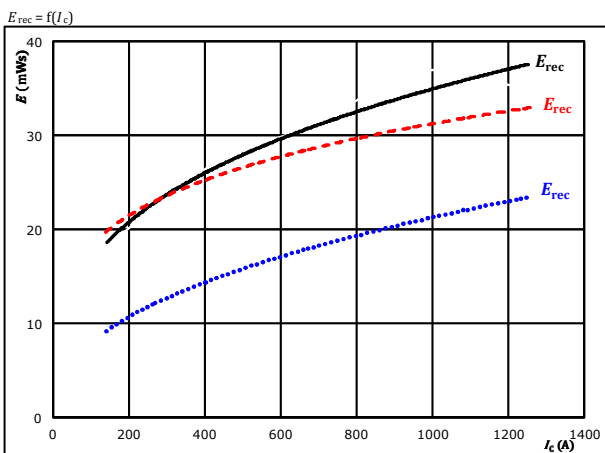
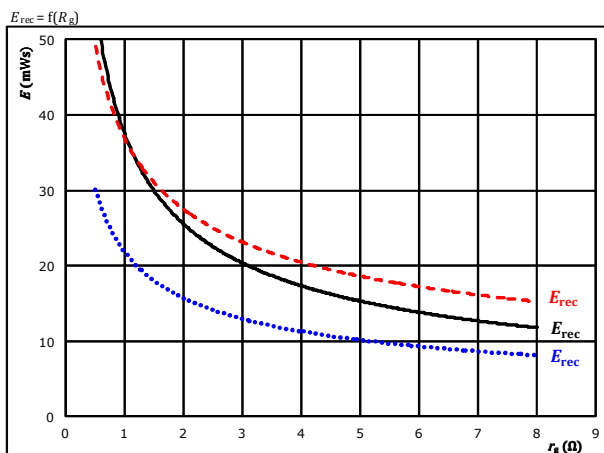


figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor





Vincotech

A0-VS122PA690M7-L750F70 A0-VP122PA690M7-L750F70T

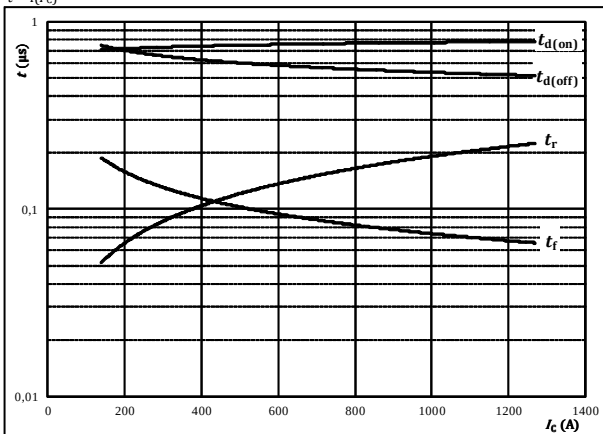
datasheet

Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



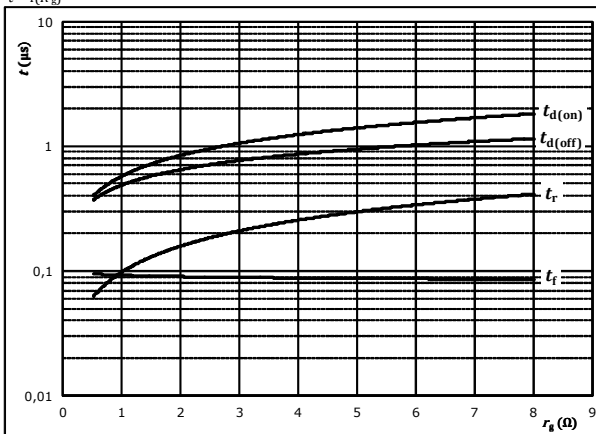
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	± 15	V
$R_{g(on)} =$	2	Ω
$R_{g(off)} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



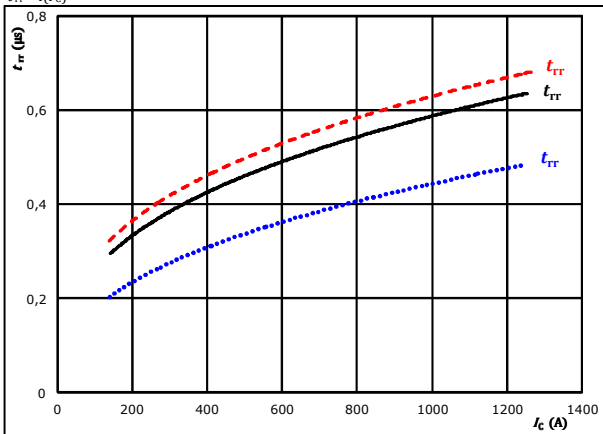
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	± 15	V
$I_C =$	685	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

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

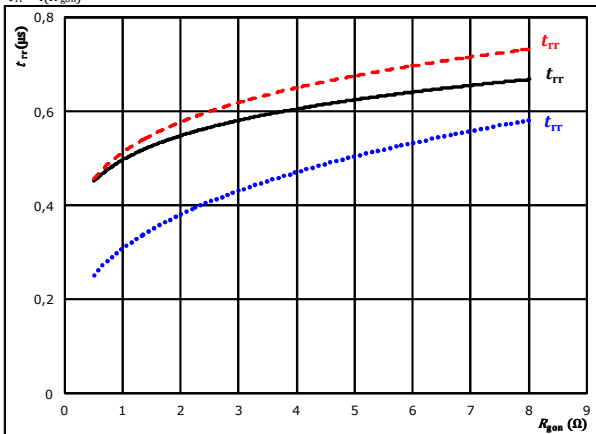


At	$V_{CE} =$	600	V	$T_j =$	25 °C	
	$V_{GE} =$	± 15	V		125 °C	————
	$R_{g(on)} =$	2	Ω		150 °C	-----

figure 8. FWD

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

$$t_{rr} = f(R_{g(on)})$$



At	$V_{CE} =$	600	V	$T_j =$	25 °C	
	$V_{GE} =$	± 15	V		125 °C	————
	$I_C =$	685	A		150 °C	-----



Vincotech

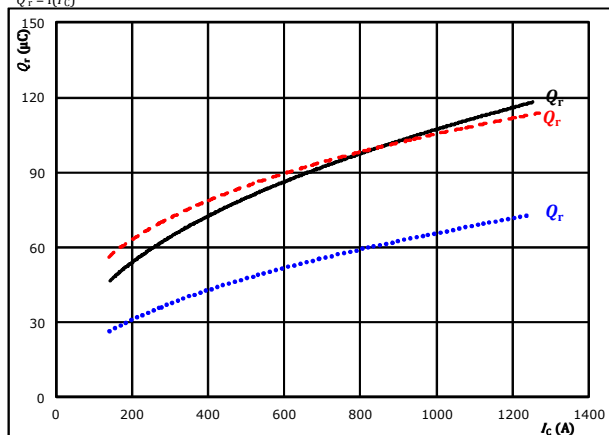
A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
 datasheet

Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

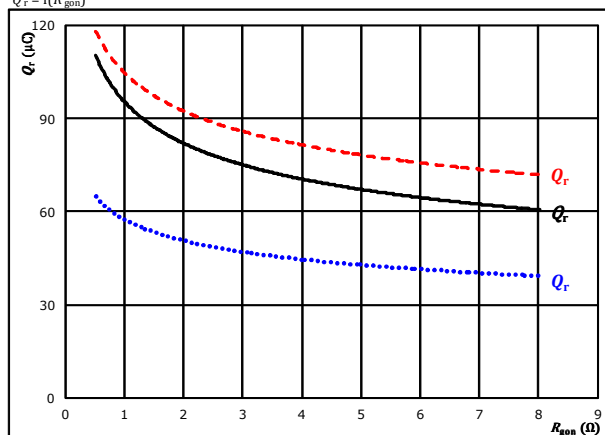


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 10. FWD

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

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

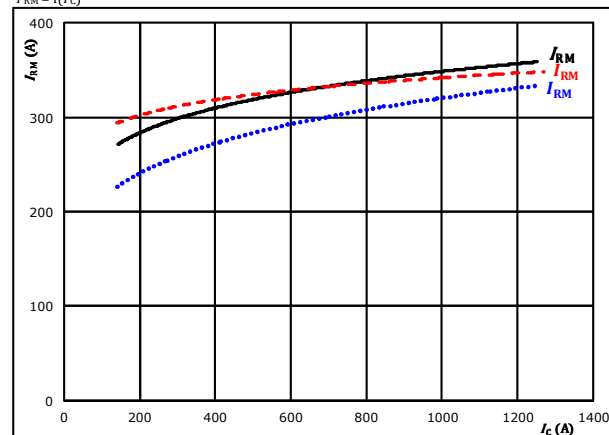


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 685$ A
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

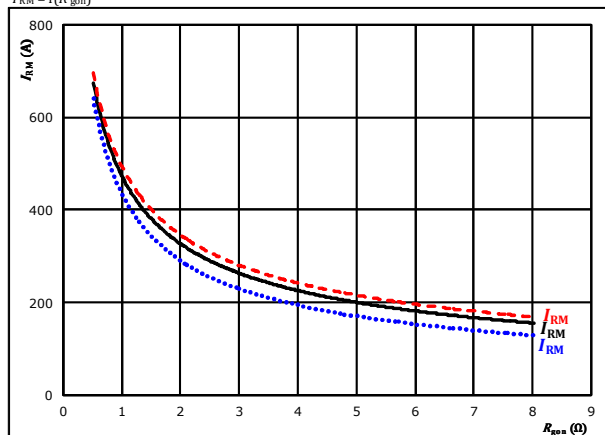


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 12. FWD

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

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



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 685$ A
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)



Vincotech

A0-VS122PA690M7-L750F70 A0-VP122PA690M7-L750F70T

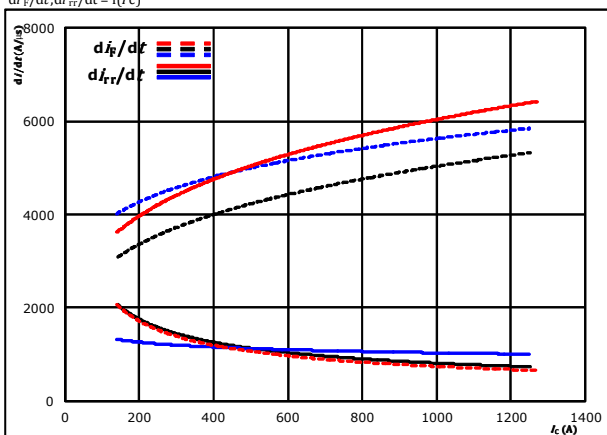
datasheet

Switching Characteristics

figure 13. FWD

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

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

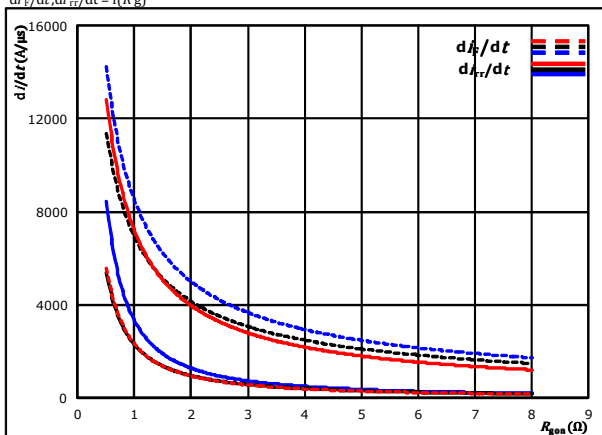


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $T_J: 25$ °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 14. FWD

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

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

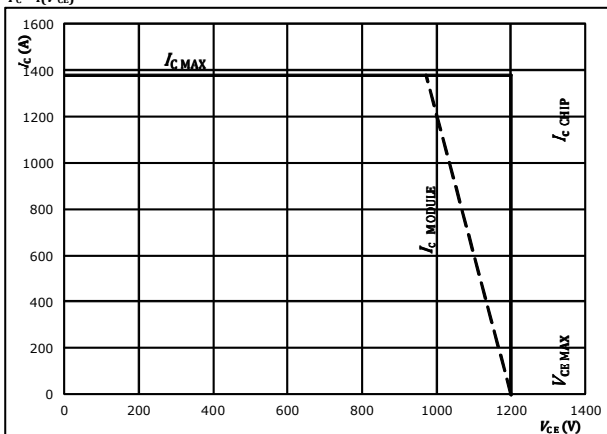


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 685$ A
 $T_J: 25$ °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 15. IGBT

Reverse bias safe operating area

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



At $T_J = 175$ °C
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω



Vincotech

A0-VS122PA690M7-L750F70 A0-VP122PA690M7-L750F70T

datasheet

Switching Characteristics

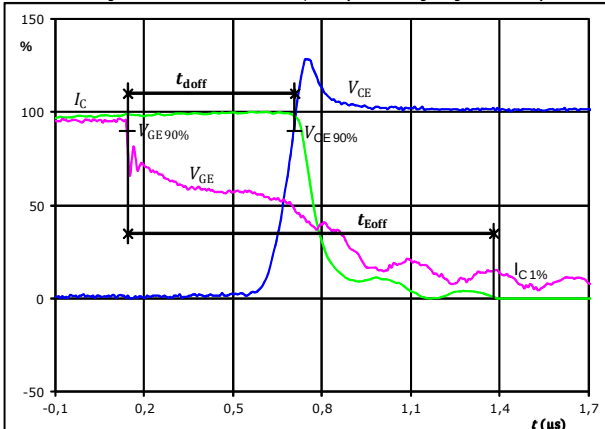
General conditions

T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1.

IGBT

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

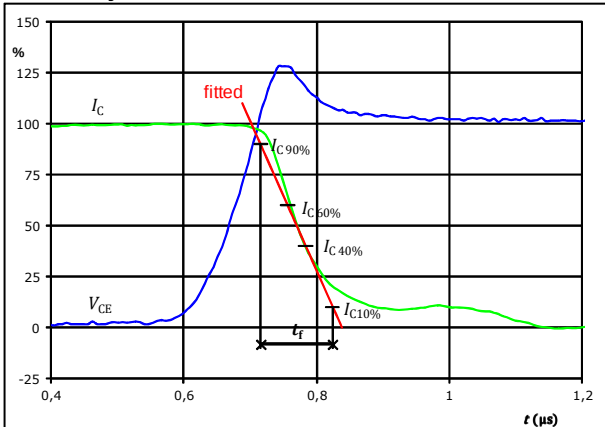


$V_{GE}(0\%)$	=	-15	V
$V_{GE}(100\%)$	=	15	V
$V_C(100\%)$	=	600	V
$I_C(100\%)$	=	686	A
t_{doff}	=	0,557	μs
t_{Eoff}	=	1,236	μs

figure 3.

IGBT

Turn-off Switching Waveforms & definition of t_f

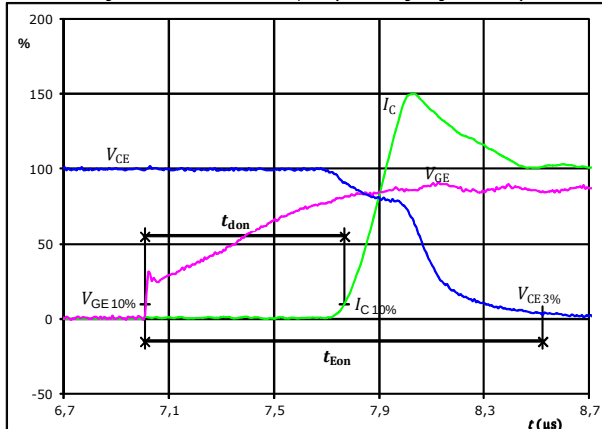


$V_C(100\%)$	=	600	V
$I_C(100\%)$	=	686	A
t_f	=	0,089	μs

figure 2.

IGBT

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

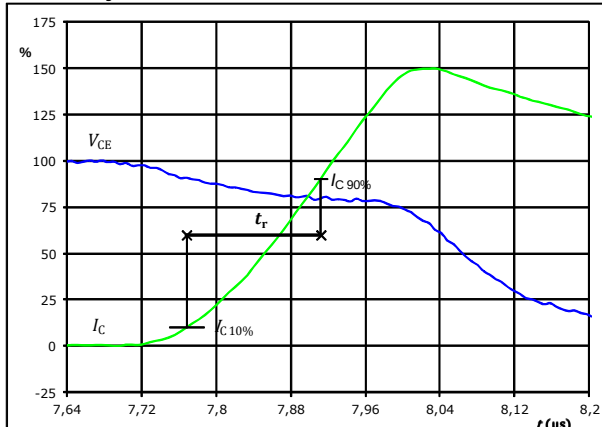


$V_{GE}(0\%)$	=	-15	V
$V_{GE}(100\%)$	=	15	V
$V_C(100\%)$	=	600	V
$I_C(100\%)$	=	686	A
t_{don}	=	0,768	μs
t_{Eon}	=	1,515	μs

figure 4.

IGBT

Turn-on Switching Waveforms & definition of t_r



$V_C(100\%)$	=	600	V
$I_C(100\%)$	=	686	A
t_r	=	0,144	μs

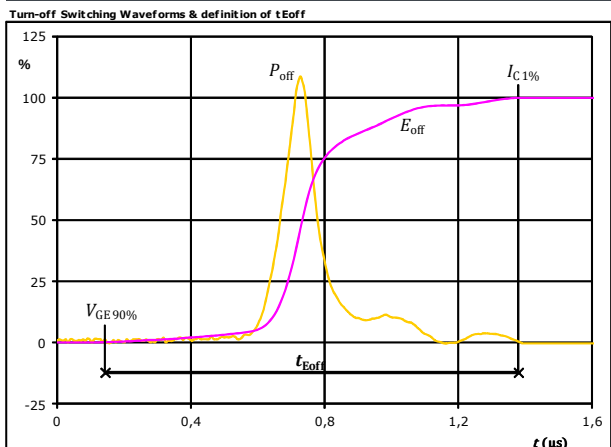


Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
datasheet

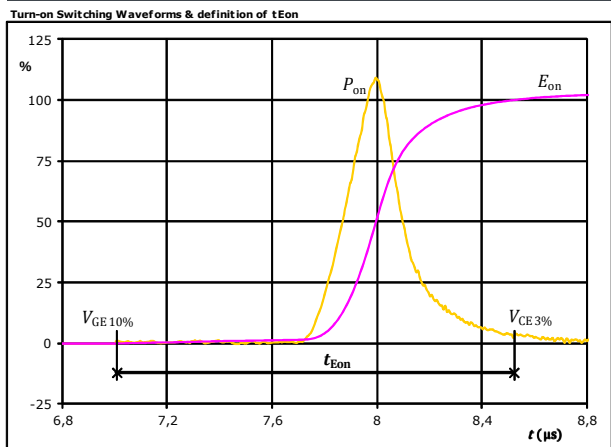
Switching Characteristics

figure 5. IGBT



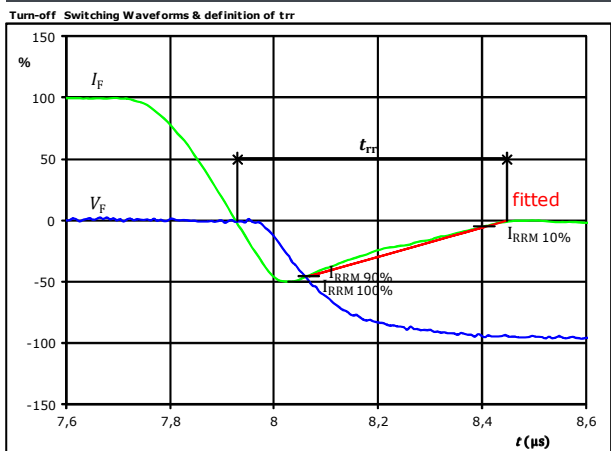
$P_{off} (100\%) = 411,59$ kW
 $E_{off} (100\%) = 70,09$ mJ
 $t_{Eoff} = 1,24$ μs

figure 6. IGBT



$P_{on} (100\%) = 411,59$ kW
 $E_{on} (100\%) = 122,44$ mJ
 $t_{Eon} = 1,52$ μs

figure 7. FWD



$V_F (100\%) = 600$ V
 $I_F (100\%) = 686$ A
 $I_{RRM} (100\%) = -344$ A
 $t_{rr} = 0,517$ μs



Vincotech

A0-VS122PA690M7-L750F70 **A0-VP122PA690M7-L750F70T** datasheet

Switching Characteristics

figure 8. FWD

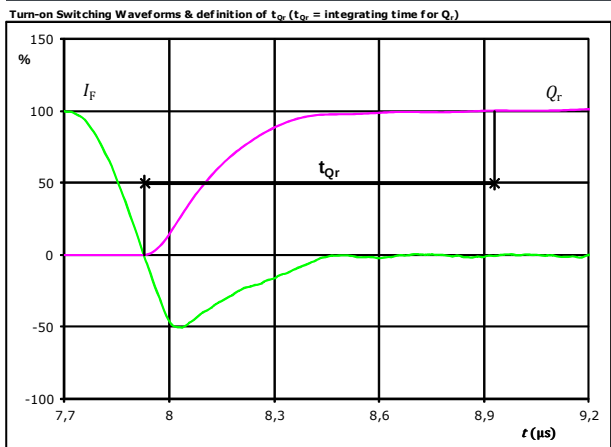
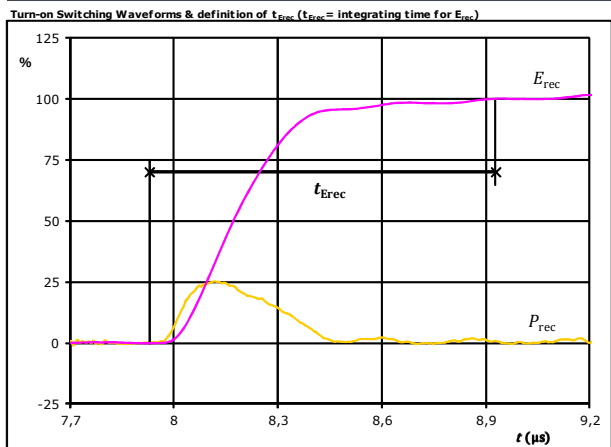


figure 9. FWD





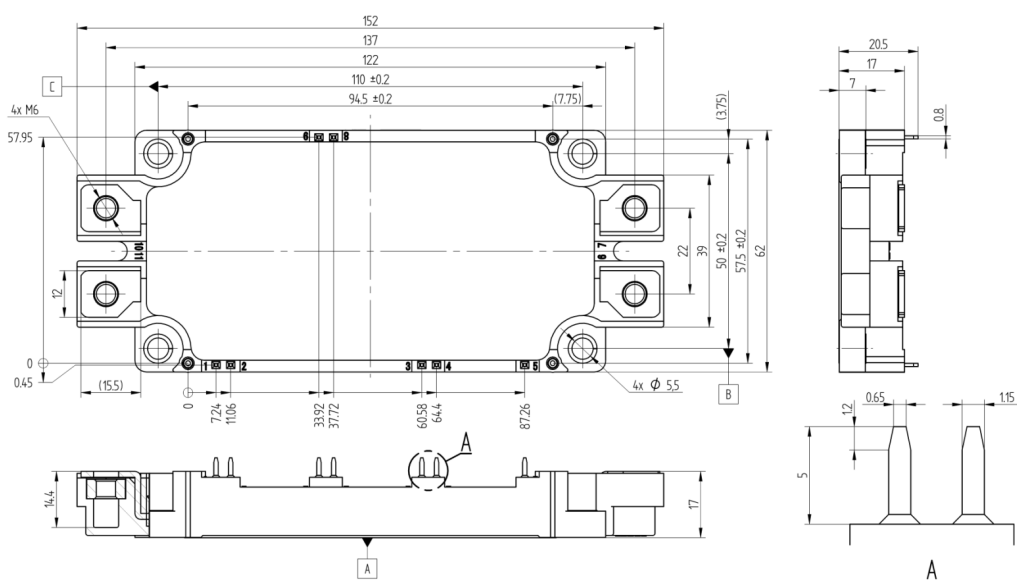
Vincotech

A0-VS122PA690M7-L750F70 A0-VP122PA690M7-L750F70T

datasheet

Ordering Code & Marking									
Version			Ordering Code						
without thermal paste solder pins			A0-VS122PA690M7-L750F70						
with thermal paste solder pins			A0-VS122PA690M7-L750F70-/3/						
without thermal paste Press-fit pins			A0-VP122PA690M7-L750F70T						
with thermal paste Press-fit pins			A0-VP122PA690M7-L750F70T-/3/						
NN-NNNNNNNNNN-TTTTTTVV VIN WWYY LLLL SSSS 			Text	Name	VIN	Date code	Lot	Serial	
				NN-NNNNNNNNNN-TTTTTTVV	VIN	WWYY	LLLL	SSSS	
			Datamatrix	Type&Ver	Lot number	Serial	Date code		
				TTTTTTTVV	LLLL	SSSS	WWYY		

Outline				
Pin table [mm]				
Pin	X	Y	Function	
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+	

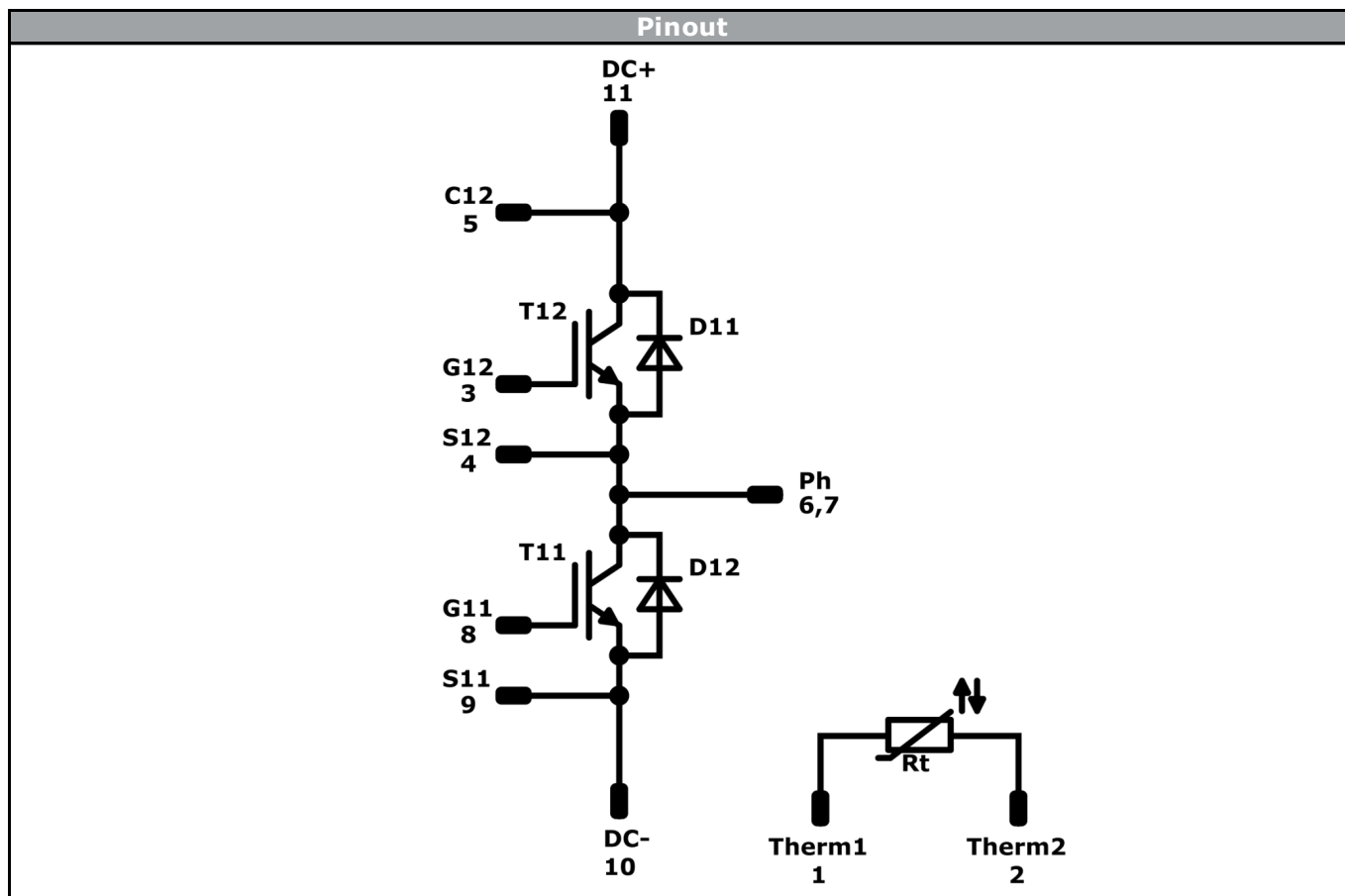


The technical drawing includes a top view with dimensions: 152, 137, 122, 110 ±0.2, 94.5 ±0.2, (7.75), (37.5), 57.95, 12, 0.45, (15.5), 7.24, 11.06, 33.92, 37.72, 60.58, 64.4, 87.26, 4x M6, 4x Ø 5.5, 14.4, 17. The side view shows dimensions: 20.5, 17, 7, 0.8, 72, 39, 50 ±0.2, 57.5 ±0.2, 62. The detail view A shows dimensions: 12, 0.65, 115, 5.



Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
datasheet



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	690 A	Half-Bridge Switch	
D11, D12	FWD	1200 V	750 A	Half-Bridge Diode	
Rt	Thermistor			Thermistor	



Vincotech

A0-VS122PA690M7-L750F70
A0-VP122PA690M7-L750F70T
datasheet

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

Document No.:	Date:	Modification:	Pages
A0-Vx122PA690M7-L750F70x-D1-14	03 Jun. 2016		

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.