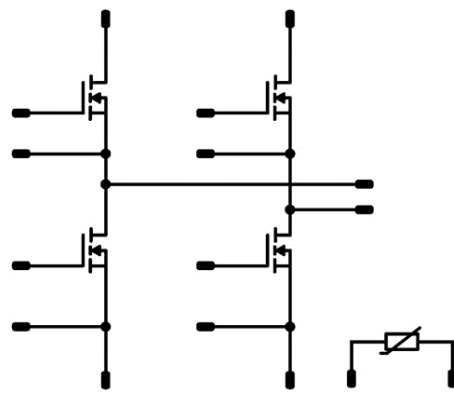




Vincotech

fastPACK 0 H		1200 V / 40 mΩ
Features	flow 0 12 mm housing	
• H-bridge or 2x half-bridge • SiC MOS • Thermistor		
Target applications	Schematic	
• Power Supply		
Types		
• 10-PC124PA040MR-L638F18Y		

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
H-Bridge Switch				
Drain-source voltage	V_{DS}		1200	V
Drain current	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	28	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	137	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	68	W
Gate-source voltage	V_{GS}		-4/22	V
Maximum Junction Temperature	T_{jmax}		175	°C



Vincotech

10-PC124PA040MR-L638F18Y
datasheet

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
-----------	--------	-----------	-------	------

Module Properties

Thermal Properties

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

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			9,57	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



Vincotech

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	

H-Bridge Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		18		20	25 125 150		39 52 60	50	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$		10	0,01	25	2,7		5,6	V
Gate to Source Leakage Current	I_{GSS}		-4/22	0		25			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			10	μA
Internal gate resistance	r_g							7		Ω
Gate charge	Q_g	18	600	20	25			107		nC
Gate to source charge	Q_{GS}							22		
Gate to drain charge	Q_{GD}							41		
Short-circuit input capacitance	C_{iss}	$f = 1\text{MHz}$	0	800	25			1337		pF
Short-circuit output capacitance	C_{oss}							76		
Reverse transfer capacitance	C_{rss}							27		

Reverse Diode Static

Diode forward voltage	VSD		0		20	25		3,2		V
-----------------------	-----	--	---	--	----	----	--	-----	--	---

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK (PSX)}$						1,41		K/W
-------------------------------------	---------------	--	--	--	--	--	--	------	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4 \text{ } \Omega$ $R_{goff} = 4 \text{ } \Omega$	-4 / 16	700	33	25 125 150		16 15 15		ns
Rise time	t_r					25 125 150		7 7 7		
Turn-off delay time	$t_{d(off)}$					25 125 150		46 52 53		
Fall time	t_f					25 125 150		8 10 8		
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 0,5 \text{ } \mu\text{C}$ $Q_{tFWD} = 0,5 \text{ } \mu\text{C}$ $Q_{tFWD} = 0,6 \text{ } \mu\text{C}$				25 125 150		0,598 0,582 0,601		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,334 0,352 0,352		



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	

H-Bridge Switch

Dynamic

Peak recovery current	I_{RRM}	$di/dt = 3744 \text{ A}/\mu\text{s}$ $di/dt = 5388 \text{ A}/\mu\text{s}$ $di/dt = 3349 \text{ A}/\mu\text{s}$	-4 / 16	700	33	25 125 150		34 33 33		A
Reverse recovery time	t_{rr}					25 125 150		21 23 24		ns
Recovered charge	Q_r					25 125 150		0,474 0,516 0,558		μC
Reverse recovered energy	E_{rec}					25 125 150		0,131 0,157 0,170		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		3782 3764 5296		A/ μs

Thermistor

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



Vincotech

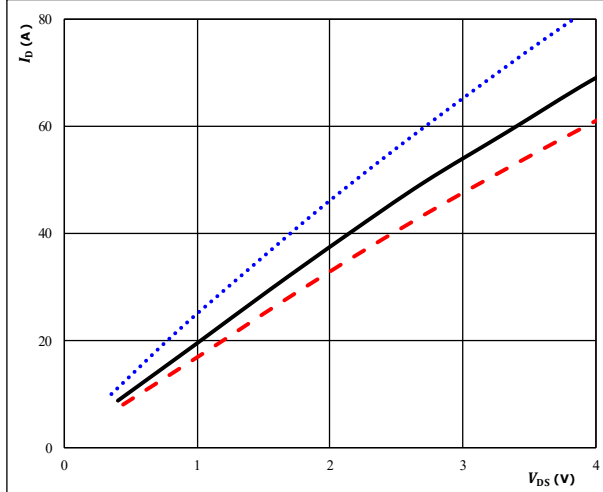
10-PC124PA040MR-L638F18Y datasheet

H-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$

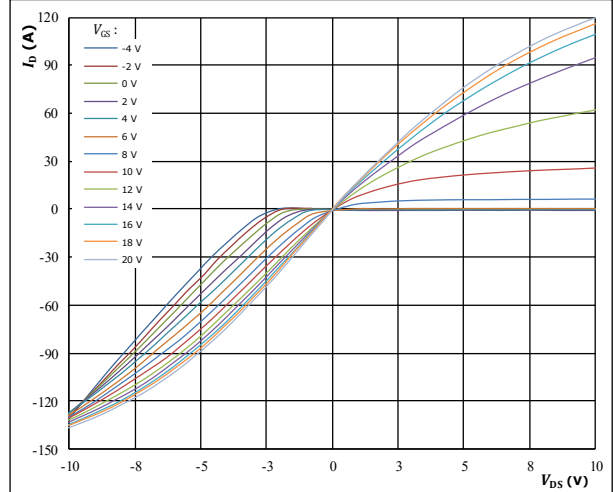


$t_p = 250 \mu s$
 $V_{GS} = 18 V$
 $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $125 \text{ } ^\circ C$ (solid black line)
 $150 \text{ } ^\circ C$ (dashed red line)

figure 2. MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$

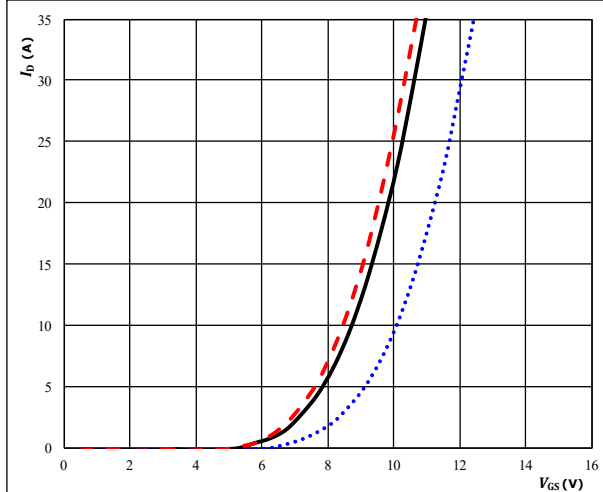


$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GS} from -4 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

$$I_D = f(V_{GS})$$

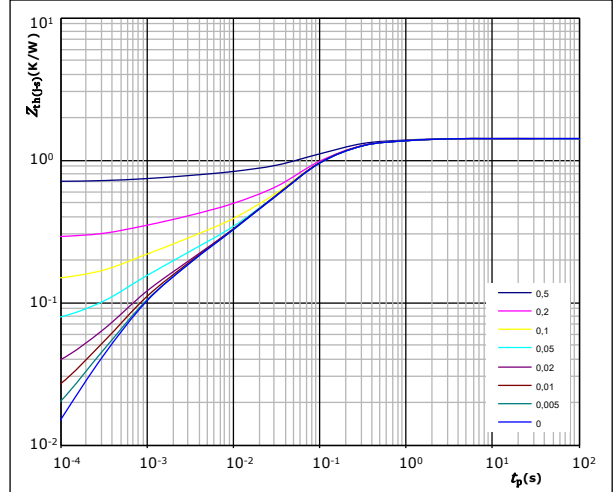


$t_p = 100 \mu s$
 $V_{DS} = 10 V$
 $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $125 \text{ } ^\circ C$ (solid black line)
 $150 \text{ } ^\circ C$ (dashed red line)

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,41 \text{ K/W}$
MOSFET thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
1,24E-01	1,00E+00
3,91E-01	1,66E-01
6,76E-01	6,11E-02
1,21E-01	5,50E-03
9,55E-02	8,02E-04

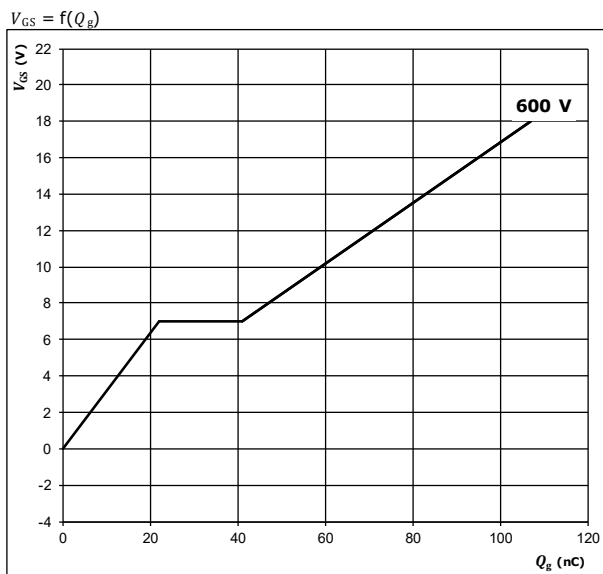


Vincotech

H-Bridge Switch Characteristics

figure 5. MOSFET

Gate voltage vs Gate charge



At

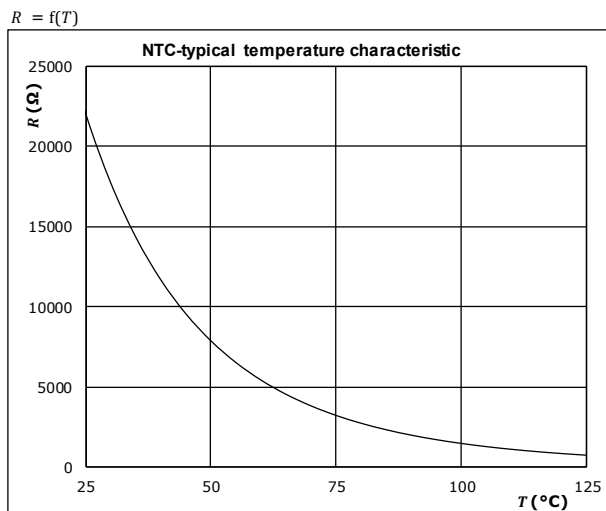
$I_c = 20$ A



Vincotech

Thermistor Characteristics

figure 1. Thermistor
Typical NTC characteristic as a function of temperature





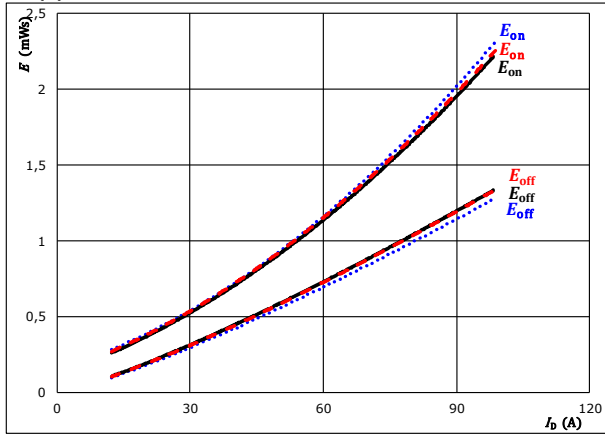
Vincotech

H-Bridge Switching Characteristics

figure 1. MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



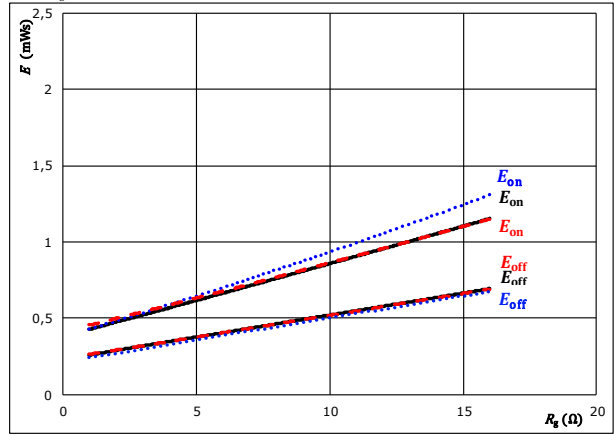
With an inductive load at

$V_{DS} =$	700 V	$T_j:$	25 °C
$V_{GS} =$	-4 / 16 V		125 °C
$R_{gon} =$	4 Ω		150 °C
$R_{goff} =$	4 Ω		

figure 2. MOSFET

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



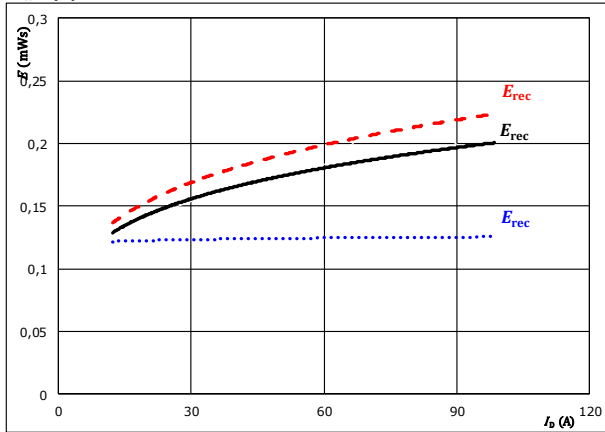
With an inductive load at

$V_{DS} =$	700 V	$T_j:$	25 °C
$V_{GS} =$	-4 / 16 V		125 °C
$I_D =$	33 A		150 °C

figure 3. FWD

Typical reverse recovered energy loss as a function of drain current

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



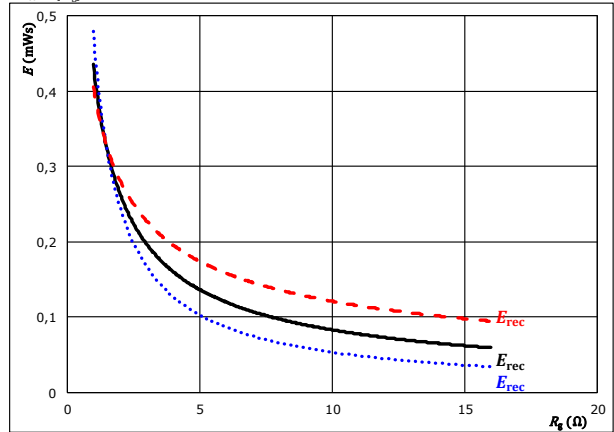
With an inductive load at

$V_{DS} =$	700 V	$T_j:$	25 °C
$V_{GS} =$	-4 / 16 V		125 °C
$R_{gon} =$	4 Ω		150 °C

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

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



With an inductive load at

$V_{DS} =$	700 V	$T_j:$	25 °C
$V_{GS} =$	-4 / 16 V		125 °C
$I_D =$	33 A		150 °C



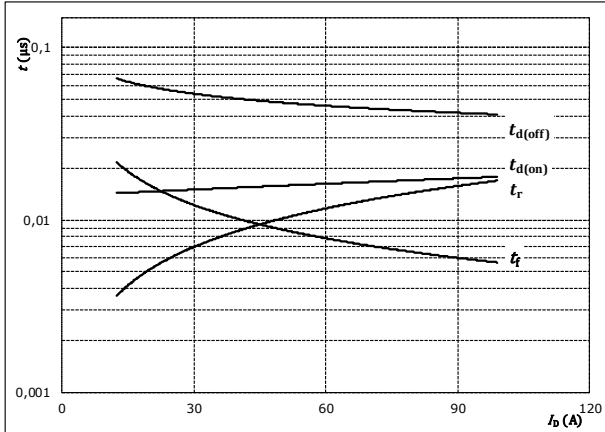
Vincotech

H-Bridge Switching Characteristics

figure 5. MOSFET

Typical switching times as a function of drain current

$$t = f(I_D)$$



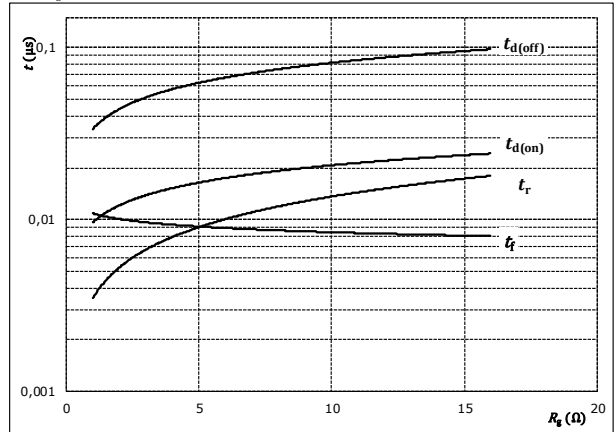
With an inductive load at

$T_J = 150$ °C
 $V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $R_{g\text{on}} = 4$ Ω
 $R_{g\text{off}} = 4$ Ω

figure 6. MOSFET

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



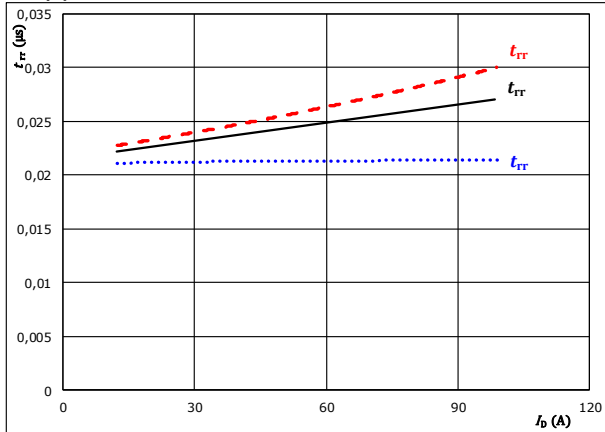
With an inductive load at

$T_J = 150$ °C
 $V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $I_D = 33$ A

figure 7. FWD

Typical reverse recovery time as a function of drain current

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



With an inductive load at

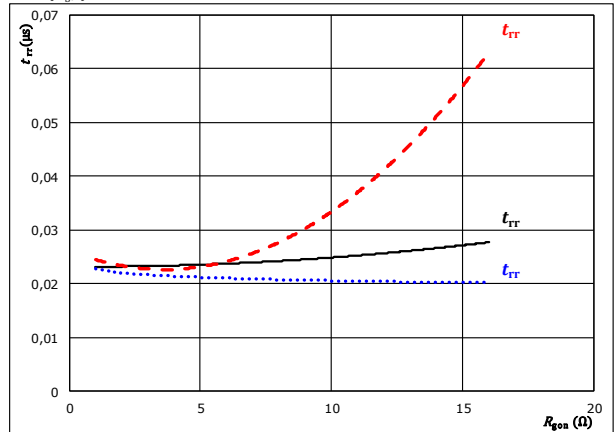
$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $R_{g\text{on}} = 4$ Ω

T_J : 25 °C
125 °C
150 °C - - - - -

figure 8. FWD

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

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



With an inductive load at

$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $I_D = 33$ A

T_J : 25 °C
125 °C
150 °C - - - - -



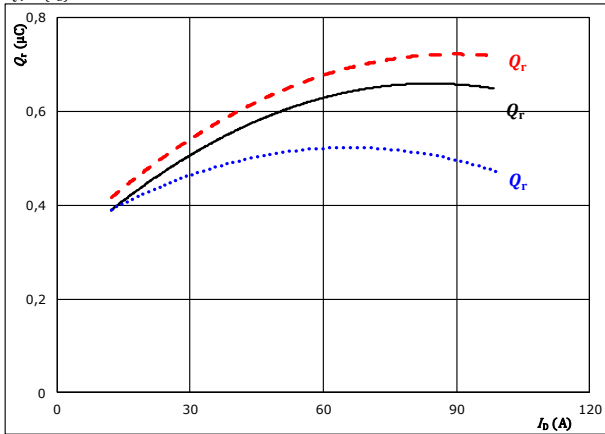
Vincotech

H-Bridge Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



With an inductive load at

$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $R_{gon} = 4$ Ω

T_j :

25 °C

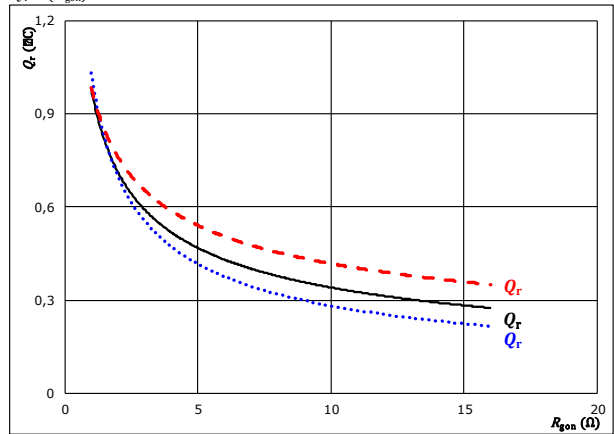
125 °C

150 °C

figure 10. FWD

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

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



With an inductive load at

$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $I_D = 33$ A

T_j :

25 °C

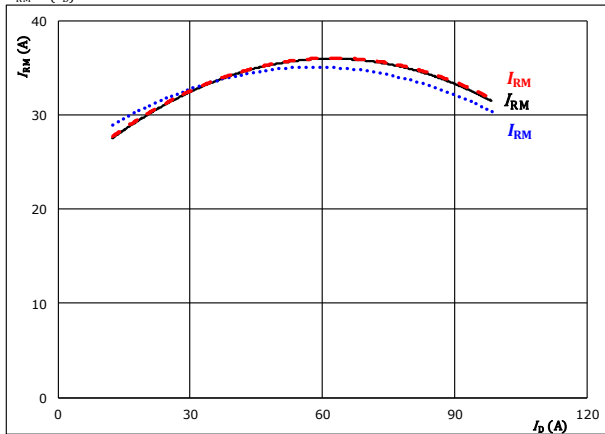
125 °C

150 °C

figure 11. FWD

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

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



With an inductive load at

$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $R_{gon} = 4$ Ω

T_j :

25 °C

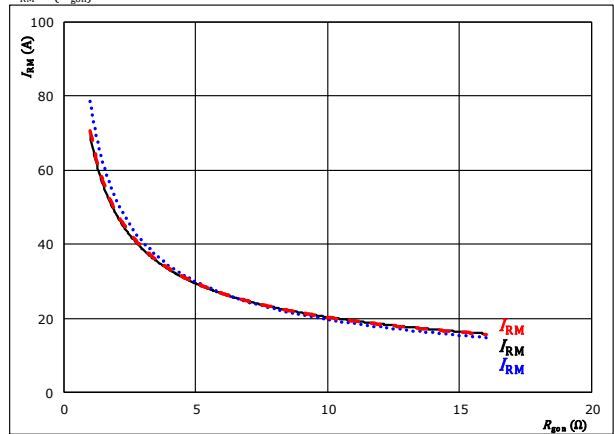
125 °C

150 °C

figure 12. FWD

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

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



With an inductive load at

$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $I_D = 33$ A

T_j :

25 °C

125 °C

150 °C



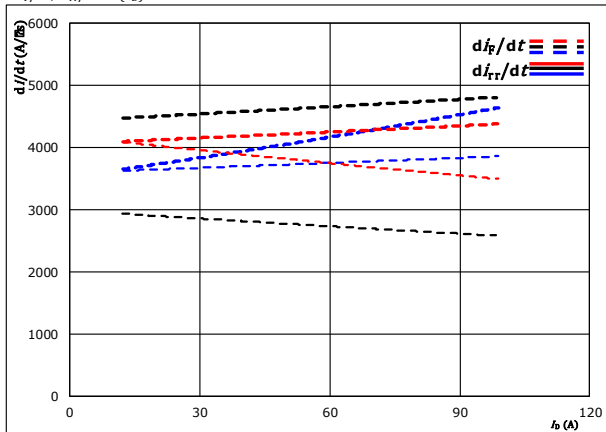
Vincotech

10-PC124PA040MR-L638F18Y datasheet

H-Bridge Switching Characteristics

figure 13. FWD

Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_{rr}/dt = f(I_D)$



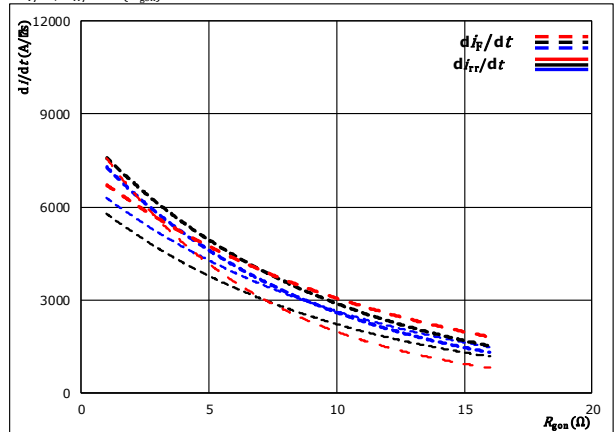
With an inductive load at

$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $R_{gon} = 4$ Ω

T_j : 25 °C
125 °C
150 °C

figure 14. FWD

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



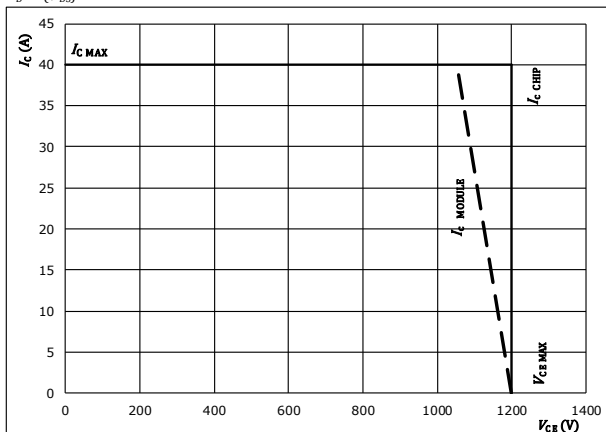
With an inductive load at

$V_{DS} = 700$ V
 $V_{GS} = -4 / 16$ V
 $I_D = 33$ A

T_j : 25 °C
125 °C
150 °C

figure 15. MOSFET

Reverse bias safe operating area
 $I_D = f(V_{DS})$



At

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



Vincotech

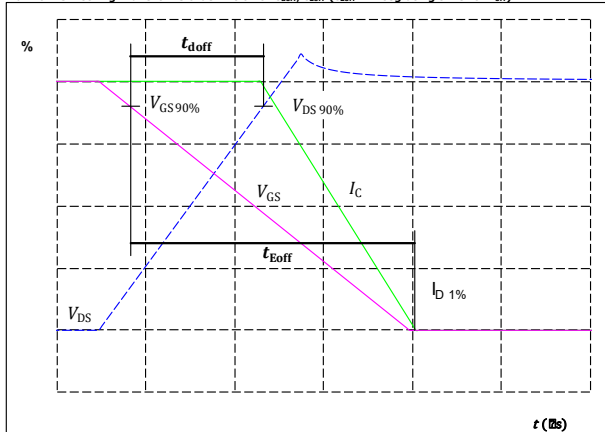
H-Bridge Switching Definitions

General conditions

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

figure 1. IGBT

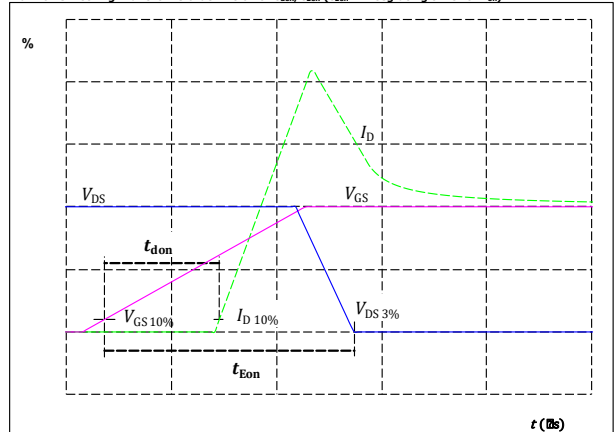
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GS}(0\%)$	=	-4	V
$V_{GS}(100\%)$	=	16	V
$V_{DS}(100\%)$	=	700	V
$I_D(100\%)$	=	33	A
t_{doff}	=	53	ns

figure 2. IGBT

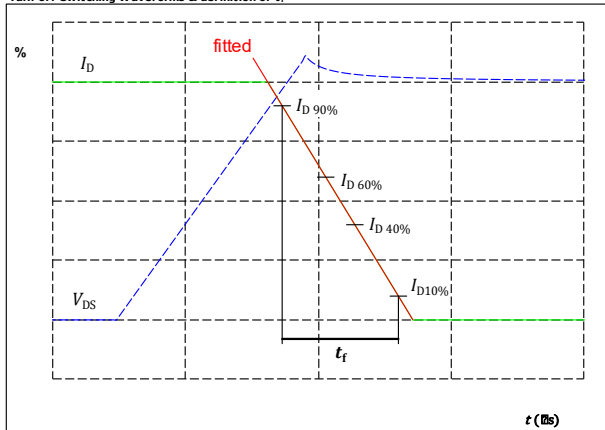
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GS}(0\%)$	=	-4	V
$V_{GS}(100\%)$	=	16	V
$V_{DS}(100\%)$	=	700	V
$I_D(100\%)$	=	33	A
t_{don}	=	15	ns

figure 3. IGBT

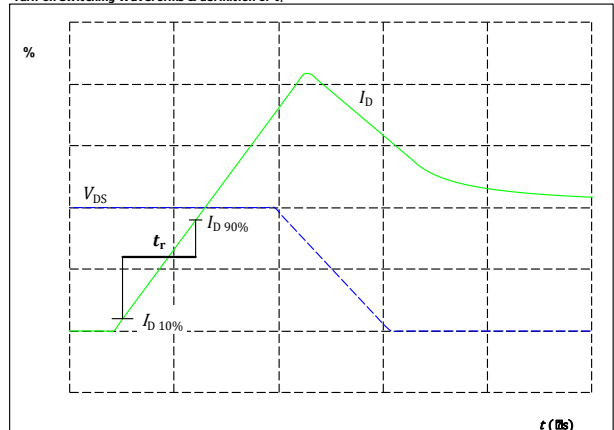
Turn-off Switching Waveforms & definition of t_f



$V_{DS}(100\%)$	=	700	V
$I_D(100\%)$	=	33	A
t_f	=	8	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



$V_{DS}(100\%)$	=	700	V
$I_D(100\%)$	=	33	A
t_r	=	7	ns

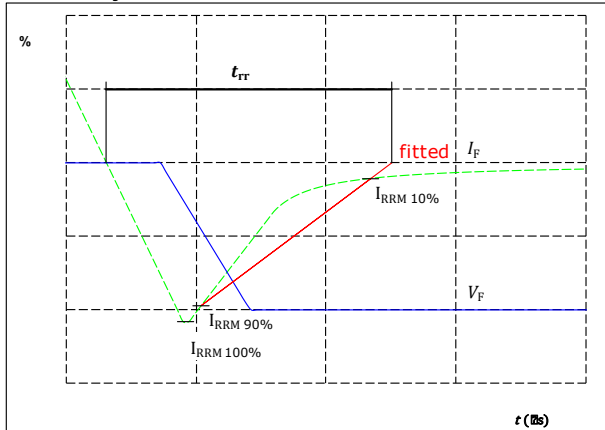


Vincotech

H-Bridge Switching Characteristics

figure 5. FWD

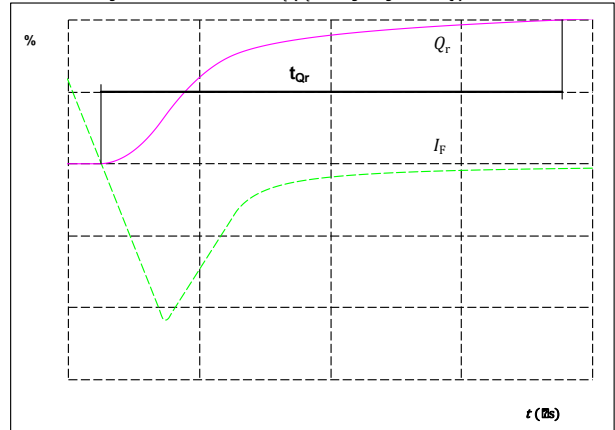
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%) =$	700	V
$I_F(100\%) =$	33	A
$I_{RRM}(100\%) =$	33	A
$t_{rr} =$	24	ns

figure 6. FWD

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



$I_F(100\%) =$	33	A
$Q_r(100\%) =$	1	μC

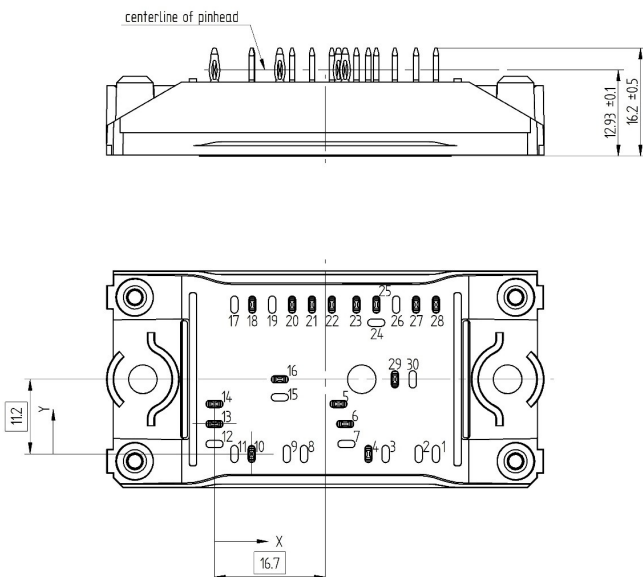


10-PC124PA040MR-L638F18Y

datasheet

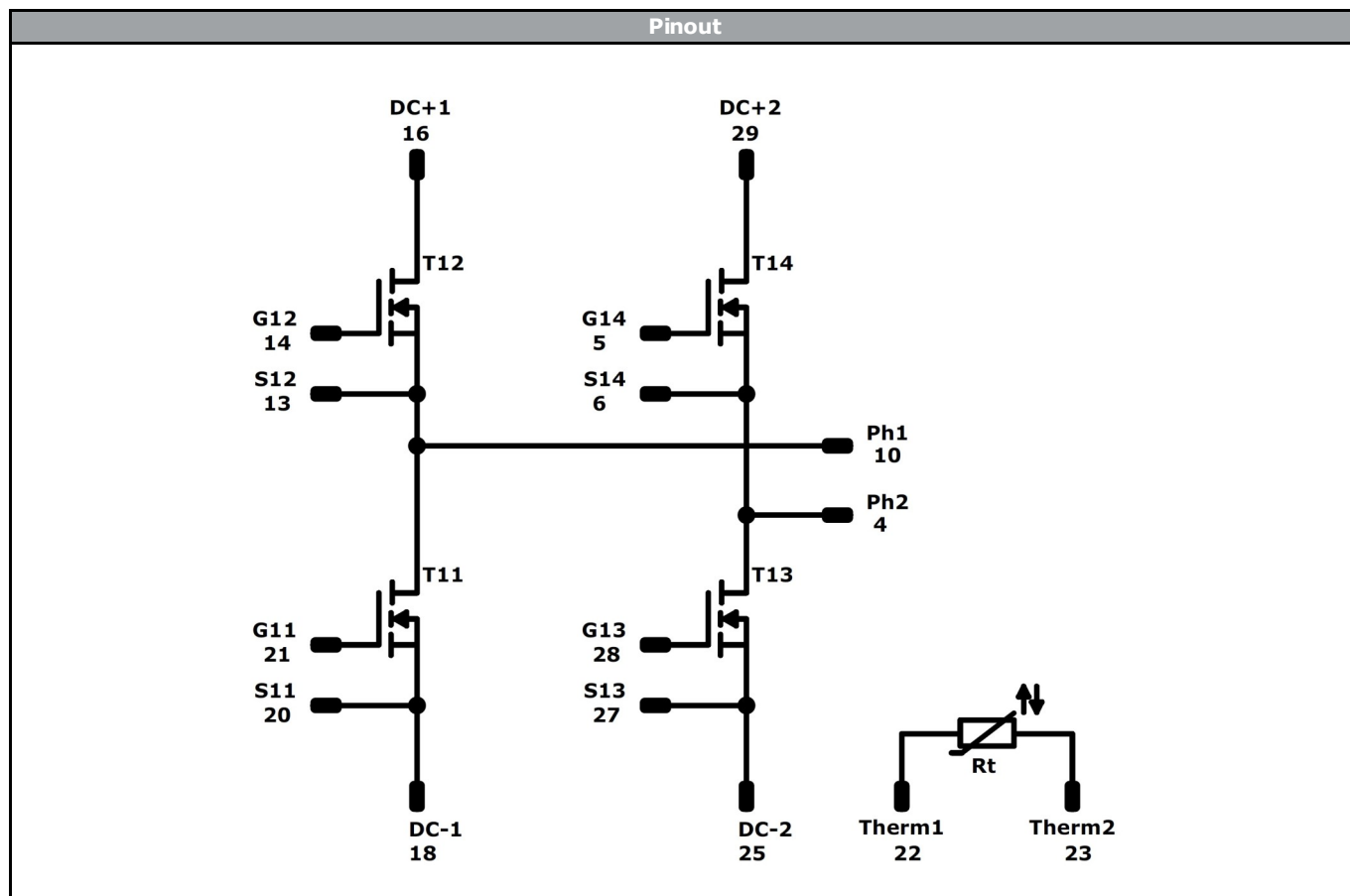
Vincotech

Ordering Code & Marking									
Version			Ordering Code						
without thermal paste 12 mm housing with Press-fit pins			10-PC124PA040MR-L638F18Y						
with thermal paste 12 mm housing with Press-fit pins			10-PC124PA040MR-L638F18Y-/3/						
			Text	Name		Date code	UL & VIN	Lot	Serial
				NN-NNNNNNNNNNNNNN-TTTTWW		WWYY	UL VIN	LLLLL	SSSS
			Datamatrix	Type&Ver	Lot number	Serial	Date code		
				TTTTTWW	LLLLL	SSSS	WWYY		

Pin table				Outline		
Pin	X	Y	Function			
1			not assembled			
2			not assembled			
3			not assembled			
4	23,2	0	Ph2			
5	18,7	7,5	G14			
6	19,7	4,5	S14			
7			not assembled			
8			not assembled			
9			not assembled			
10	5,6	0	Ph1			
11			not assembled			
12			not assembled			
13	0	4,5	S12			
14	0	7,5	G12			
15			not assembled			
16	9,85	11,2	DC+1			
17			not assembled			
18	5,7	22,4	DC-1			
19			not assembled			
20	11,7	22,4	S11			
21	14,7	22,4	G11			
22	17,7	22,4	Therm1			
23	21,4	22,4	Therm2			
24			not assembled			
25	24,4	22,4	DC-2			
26			not assembled			
27	30,4	22,4	S13			
28	33,4	22,4	G13			
29	27,2	11,2	DC+2			
30			not assembled			
						
				Tolerance of pinpositions: ±0,5mm at the end of pins Dimension of coordinate axis is only offset without tolerance		



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11 , T12 , T13 , T14	MOSFET	1200 V	40 mΩ	H-Bridge Switch	
Rt	NTC			Thermistor	



Vincotech

10-PC124PA040MR-L638F18Y
datasheet

Packaging instruction			
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</i> 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
10-PC124PA040MR-L638F18Y-D3-14	06 May. 2019	Correction of gate-source voltage, drain current, switching definitions	All

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.