Vincotech

B0-SP10NAx600S7-LQx9F08T
datasheet

***flow*ANPC S3 split** **1500 V / 600 A**

Topology features

- Temperature sensor
- Advanced Neutral Point Clamped topology
- Integrated Capacitor
- Split topology

Component features

- Low collector emitter saturation voltage
- High speed and smooth switching

Housing features

- Base isolation: Al_2O_3
- CTI600 housing material
- Compact, baseplate-less housing
- VINcoPress Technology
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications

- Solar Inverters

Types

- B0-SP10NAD600S7-LQ79F08T
- B0-SP10NAE600S7-LQ89F08T

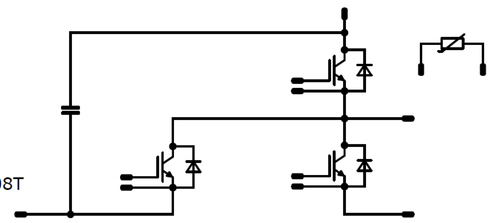
flow S3 12 mm housing

LQ79F08T

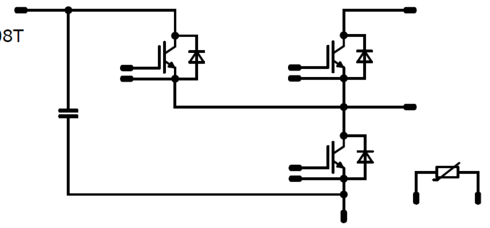
LQ89F08T

Schematic

LQ79F08T



LQ89F08T



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
AC Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	318	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	365	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
AC Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	157	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	277	W
Maximum junction temperature	T_{jmax}			175	°C
Neutral Point Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	148	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	283	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	Conditions		Value	Unit
DC-Link Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	157	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	277	W
Maximum junction temperature	T_{jmax}			175	°C
DC-Link Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	292	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		1200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	491	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Neutral Point Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	144	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	858	A
Surge current capability	I^2t			3672	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	301	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Capacitor (DC)				
Maximum DC voltage	V_{MAX}		1000	V
		T_j = 125 °C	1000	
		T_j = 150 °C	750	
Operation Temperature	T_{op}		-55 ... 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 s	6000	V
Creepage distance			>12,7	mm
Clearance		LQ79F08T / LQ89F08T	12,16 / 11,8	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production

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	
AC Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0065	25	4,15	4,85	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		400	25 125 150		1,21 1,23 1,24	1,4(1)	V
Collector-emitter cut-off current	I_{CES}		0	950		25			8	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,75		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		49200		pF
Output capacitance	C_{oes}							530		pF
Reverse transfer capacitance	C_{res}							220		pF
Gate charge	Q_g		±15		0	25		4100		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,26		K/W
AC Diode										
Static										
Forward voltage	V_F				300	25 125 150	2,1	2,59 2,43 2,37	2,8(1)	V
Reverse leakage current	I_R	V_r = 950 V				25			12	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,34		K/W

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
Neutral Point Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00334	25	4,35	5,1	5,85	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,83 2,06 2,11	2,35(1)	V
Collector-emitter cut-off current	I_{CES}		0	950		25			4	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,75		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		13000		pF
Output capacitance	C_{oes}							278		pF
Reverse transfer capacitance	C_{res}							40		pF
Gate charge	Q_g		±15		0	25		460		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,34		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	225	25 125 150		89,6 92,8 93,44		ns
Rise time	t_r					25 125 150		11,84 13,44 14,08		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		95,04 116,8 122,24		ns
Fall time	t_f					25 125 150		21,84 43,77 52,18		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=8,4 µC Q_{rFWD}=18,65 µC Q_{rFWD}=22,53 µC				25 125 150		5,42 7,51 8,04		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,79 9,12 9,98		mWs

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	
DC-Link Diode										
Static										
Forward voltage	V_F				300	25 125 150	2,1	2,59 2,43 2,37	2,8[(1)]	V
Reverse leakage current	I_R	V_r = 950 V				25			12	µA
Thermal										
Thermal resistance junction to sink[(2)]	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,34		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=16479 A/µs di/dt=15192 A/µs di/dt=14757 A/µs	±15	600	225	25 125 150		281,62 412,72 452,68		A
Reverse recovery time	t_{rr}					25 125 150		75,17 110,38 121,86		ns
Recovered charge	Q_r					25 125 150		8,4 18,65 22,53		µC
Reverse recovered energy	E_{rec}					25 125 150		3,73 8,77 10,68		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		13298 13191 13480		A/µs

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
DC-Link Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00975	25	4,35	5,1	5,85	V
Collector-emitter saturation voltage	V_{CEsat}		15		600	25 125 150		1,82 2,07 2,13	2,25(1)	V
Collector-emitter cut-off current	I_{CES}		0	950		25			12	µA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Internal gate resistance	r_g							0,5		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		37800		pF
Output capacitance	C_{oes}	f = 100 kHz	0	25		25		810		pF
Reverse transfer capacitance	C_{res}	f = 100 kHz	0	25		25		120		pF
Gate charge	Q_g		±15		0	25		1350		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,19		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	225	25 125 150		193,08 196,81 198,35		ns
Rise time	t_r	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	225	25 125 150		16,02 18,33 18,72		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	225	25 125 150		194,16 242,48 256,56		ns
Fall time	t_f	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	225	25 125 150		23,46 44,46 54,73		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,715 µC Q_{rFWD}=0,707 µC Q_{rFWD}=0,7 µC	±15	600	225	25 125 150		4,42 4,89 4,93		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	225	25 125 150		5,32 9,62 10,98		mWs

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
Neutral Point Diode										
Static										
Forward voltage	V_F				120	25 125 150		1,44 1,71 1,81	1,6(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		1,2 84	480	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,32		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=13649 A/µs d*i*/d*t*=12810 A/µs d*i*/d*t*=12887 A/µs	±15	600	225	25 125 150		89,37 85,82 84,02		A
Reverse recovery time	t_{rr}					25 125 150		13,66 14,12 14,08		ns
Recovered charge	Q_r					25 125 150		0,715 0,707 0,7		µC
Reverse recovered energy	E_{rec}					25 125 150		0,03 0,028 0,027		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		19045,32 18252,19 16046,84		A/µs

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	
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		33		nF
Tolerance							-5		5	%
Dissipation factor		f = 1 kHz				25		0,1		%
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	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	

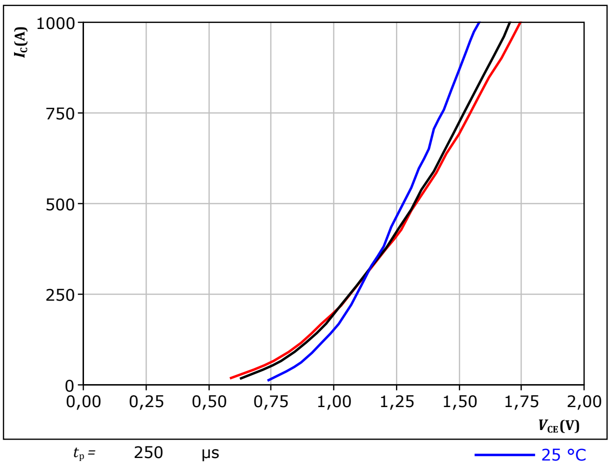
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

AC Switch Characteristics

figure 1. IGBT

Typical output characteristics

I_C = f(V_{CE})

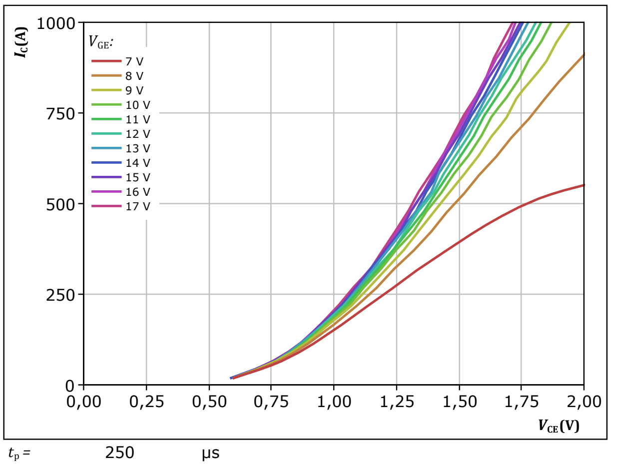


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. IGBT

Typical output characteristics

I_C = f(V_{CE})



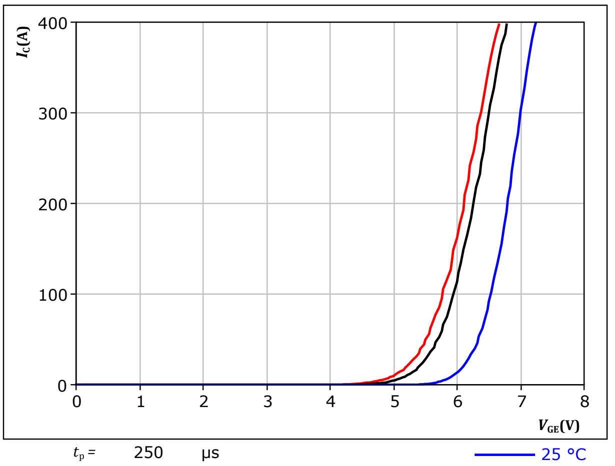
t_p =	250	µs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

I_C = f(V_{GE})

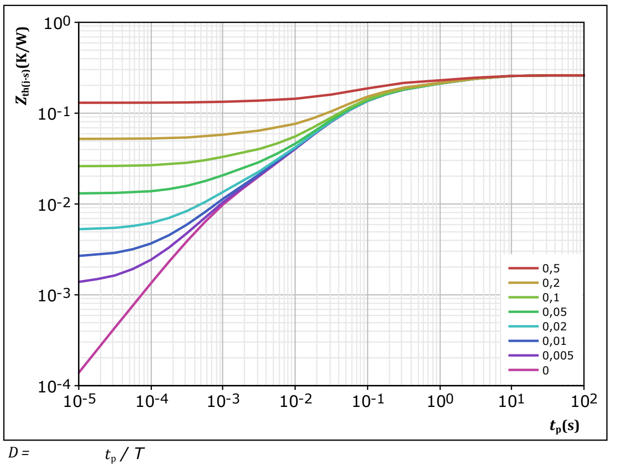


t_p =	250	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,26	K/W

IGBT thermal model values

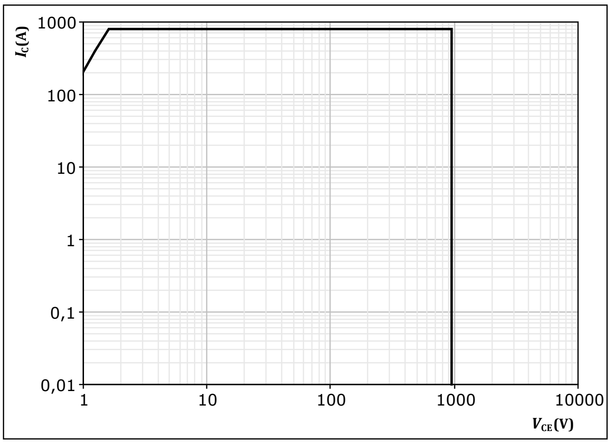
R (K/W)	τ (s)
4,48E-02	3,94E+00
5,61E-02	7,03E-01
1,18E-01	7,58E-02
3,20E-02	1,49E-02
9,31E-03	9,18E-04

AC Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})



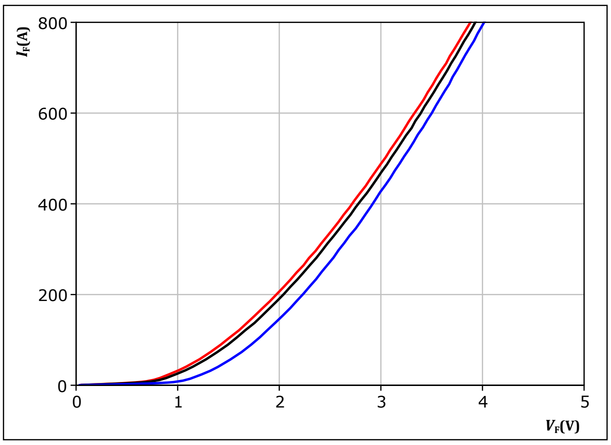
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

AC Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

I_F = f(V_F)

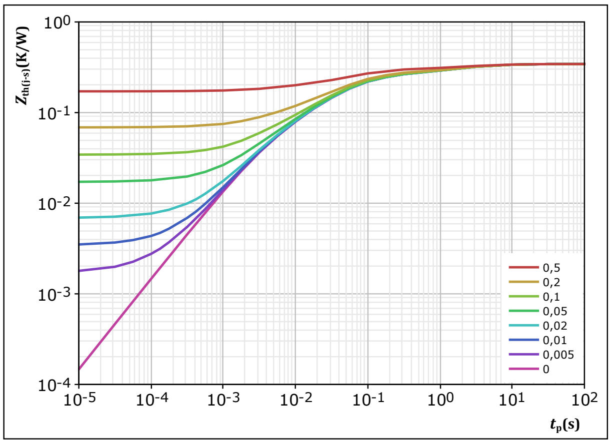


t_p =	250	µs
T_j:	25 °C	
	125 °C	
	150 °C	

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,343 K/W

FWD thermal model values

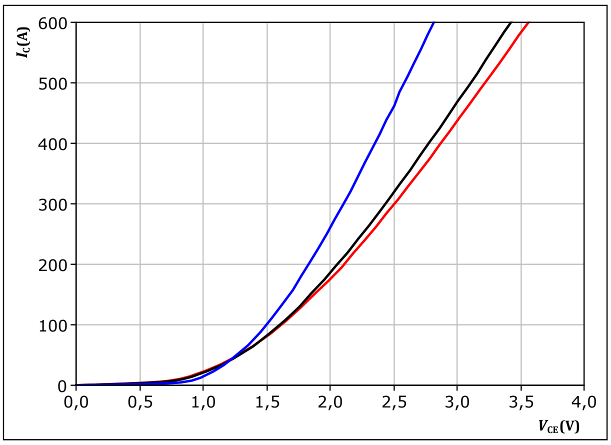
R (K/W)	τ (s)
2,28E-02	6,68E+00
6,16E-02	1,56E+00
9,29E-02	1,14E-01
1,29E-01	2,95E-02
3,71E-02	3,90E-03

Neutral Point Switch Characteristics

figure 8. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

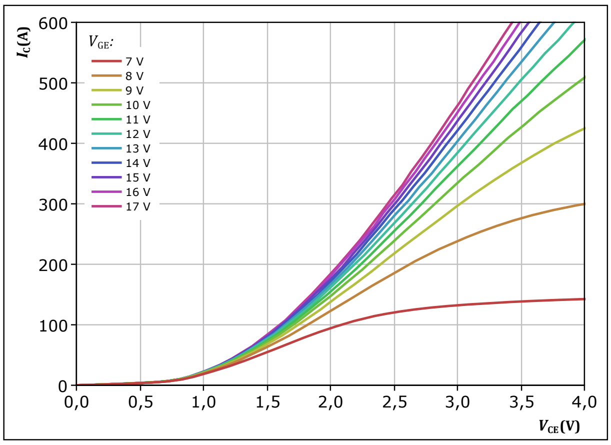


$t_p =$ 250 μs
$V_{GE} =$ 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 9. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

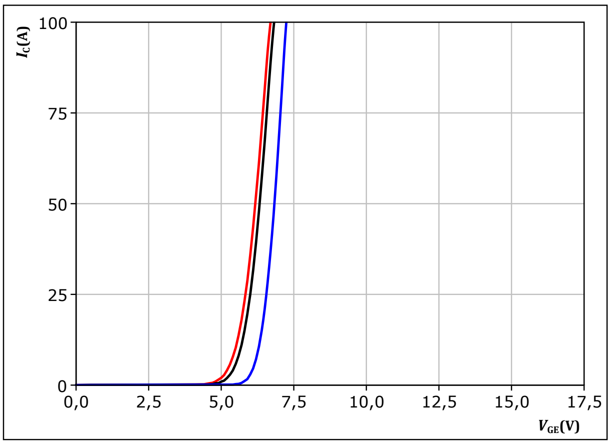


$t_p =$ 250 μs
$T_j =$ 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

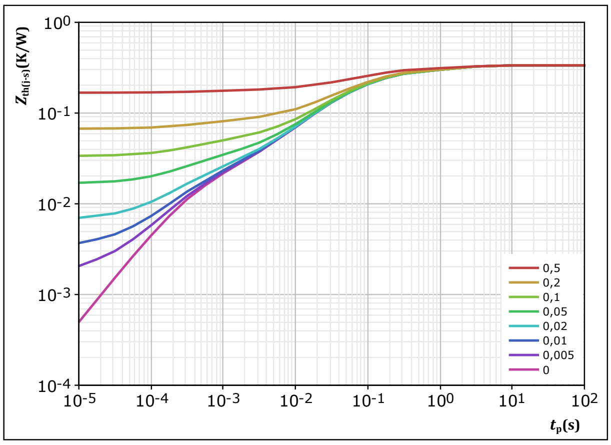


$t_p =$ 250 μs
$V_{CE} =$ 8 V
T_j: 25 °C, 125 °C, 150 °C

figure 11. **IGBT**

Transient thermal impedance as a function of pulse width

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



$D =$ t_p / T
$R_{th(j-s)} =$ 0,336 K/W

IGBT thermal model values

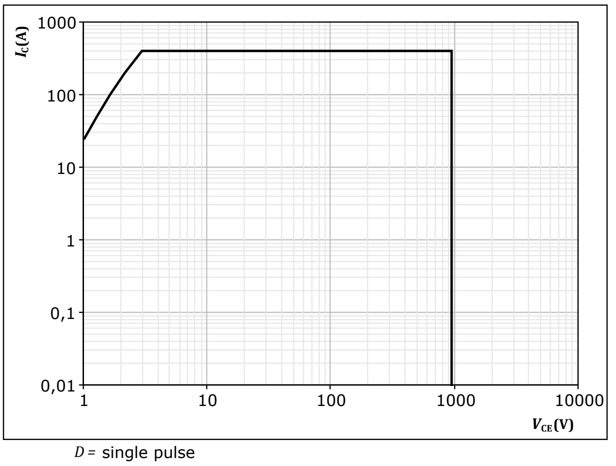
R (K/W)	τ (s)
6,56E-02	1,61E+00
1,54E-01	1,15E-01
9,21E-02	2,31E-02
1,13E-02	2,30E-03
1,31E-02	3,26E-04

Neutral Point Switch Characteristics

figure 12.	IGBT

Safe operating area

I_C = f(V_{CE})



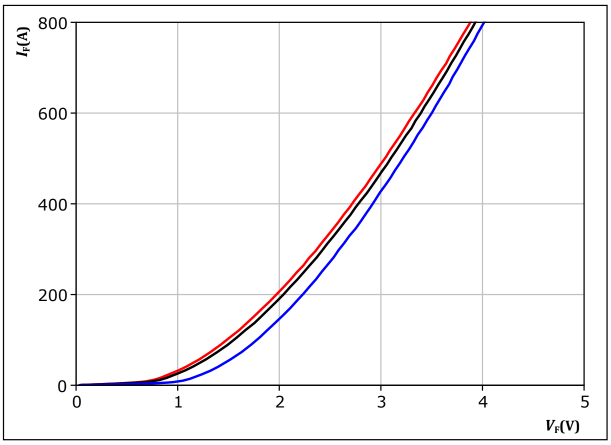
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

DC-Link Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



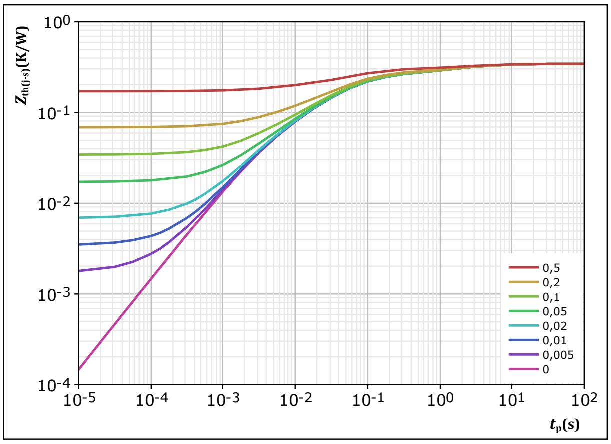
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 14. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,343 K/W

FWD thermal model values

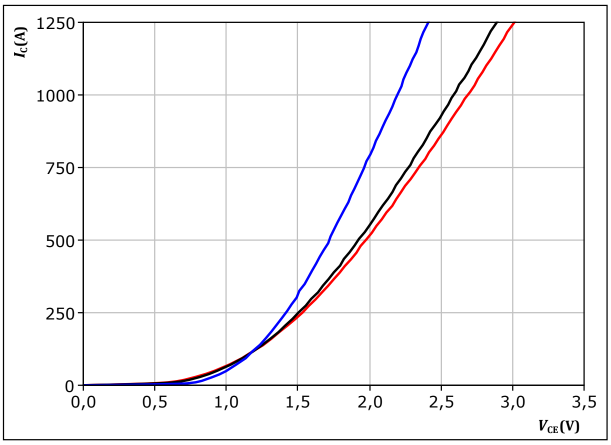
R (K/W)	τ (s)
2,28E-02	6,68E+00
6,16E-02	1,56E+00
9,29E-02	1,14E-01
1,29E-01	2,95E-02
3,71E-02	3,90E-03

DC-Link Switch Characteristics

figure 15. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



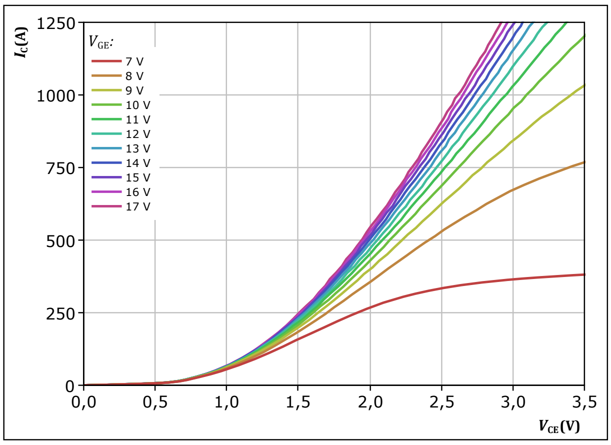
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 16. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



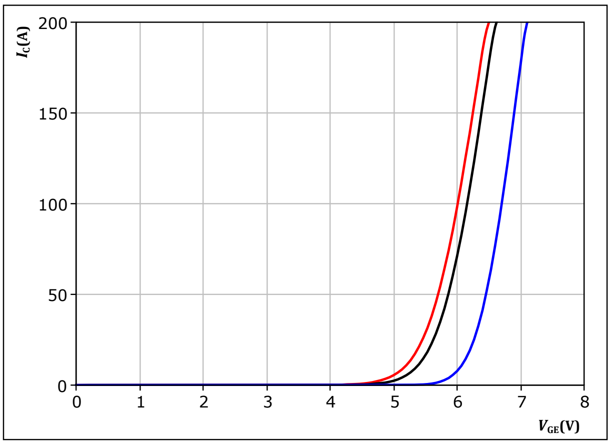
t_p =	250	µs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 17. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



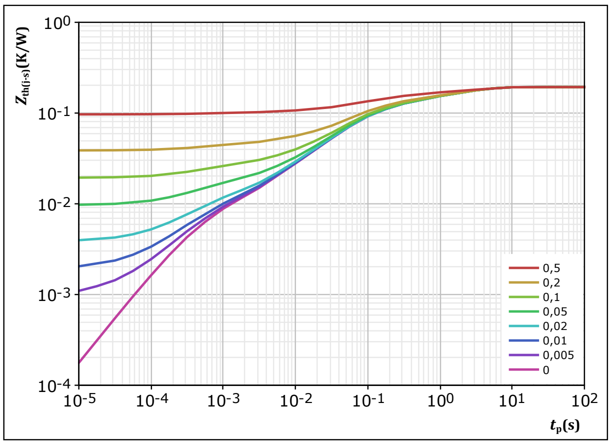
t_p =	250	µs
V_{CE} =	24	V

T_j: 25 °C, 125 °C, 150 °C

figure 18. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,193	K/W

IGBT thermal model values

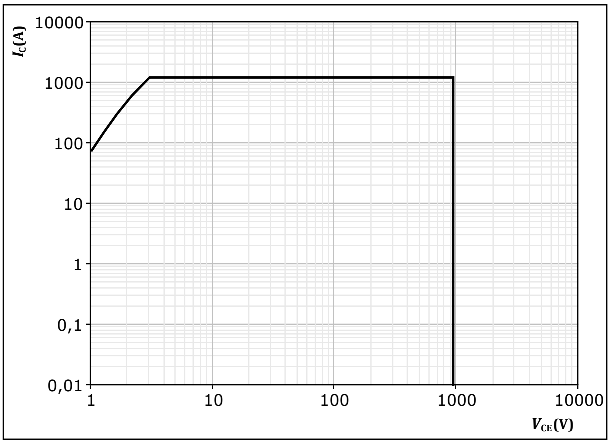
R (K/W)	τ (s)
5,95E-02	2,31E+00
5,08E-02	2,43E-01
6,71E-02	5,42E-02
9,38E-03	6,03E-03
6,67E-03	4,50E-04

DC-Link Switch Characteristics

figure 19. **IGBT**

Safe operating area

I_C = f(V_{CE})



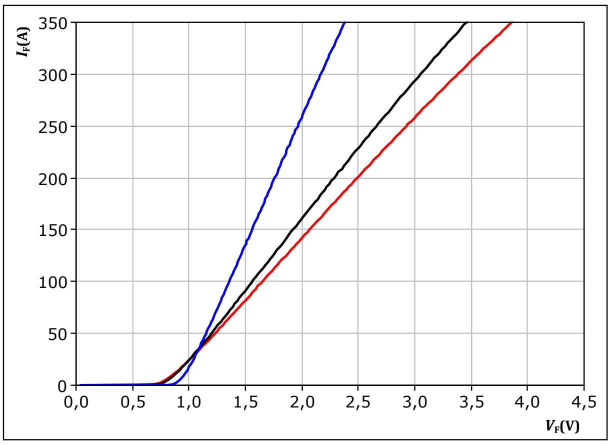
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Neutral Point Diode Characteristics

figure 20. FWD

Typical forward characteristics

I_F = f(V_F)



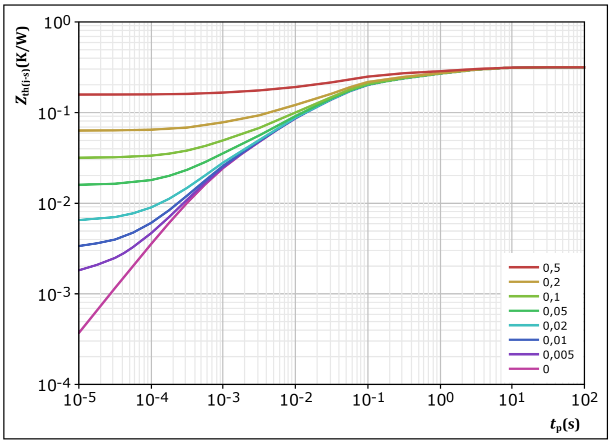
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 21. FWD

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,316 K/W

FWD thermal model values

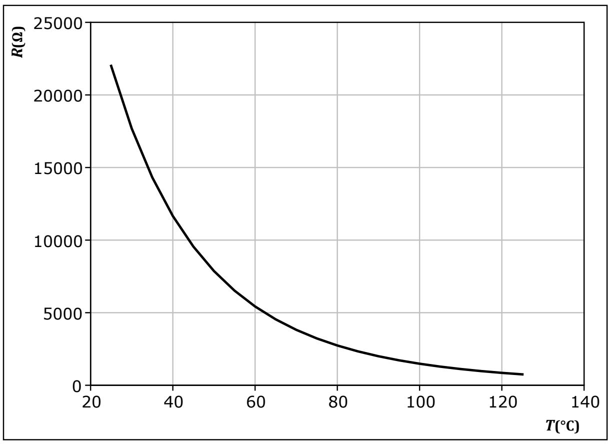
R (K/W)	τ (s)
4,78E-02	3,14E+00
5,51E-02	6,41E-01
1,40E-01	5,18E-02
5,42E-02	6,78E-03
1,91E-02	7,23E-04

Thermistor Characteristics

figure 22.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

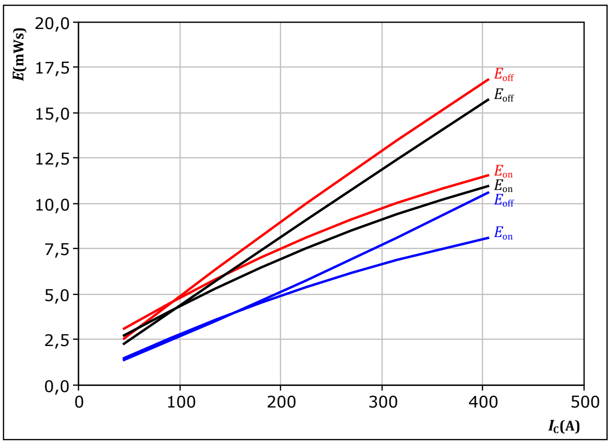


Neutral Point Switching Characteristics

figure 23. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



With an inductive load at

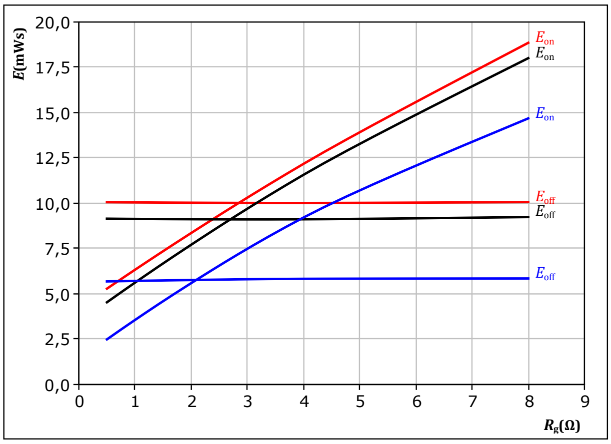
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
R_{goff} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 24. **IGBT**

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

$E = f(R_g)$



With an inductive load at

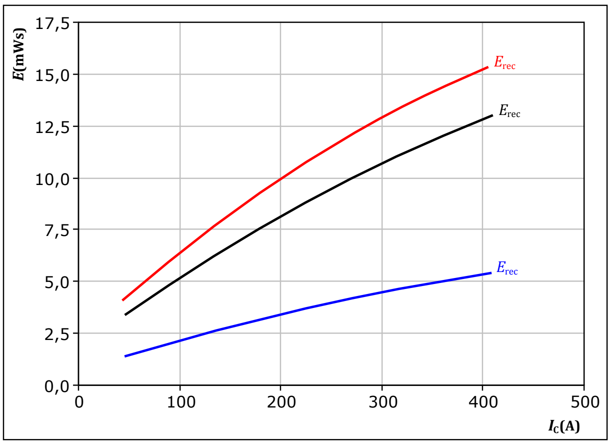
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 225 A

T_j: 25 °C, 125 °C, 150 °C

figure 25. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

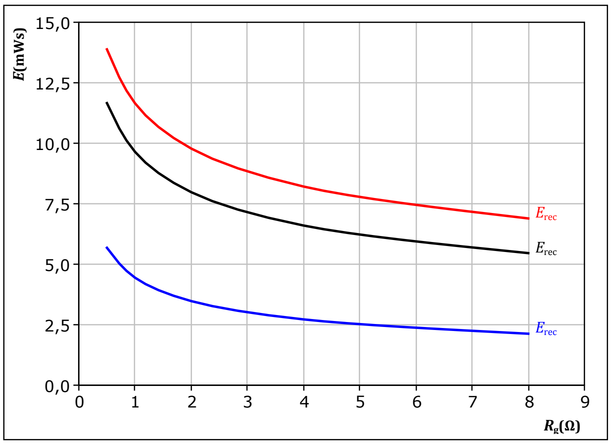
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 26. **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 V
V_{GE} = ±15 V
I_C = 225 A

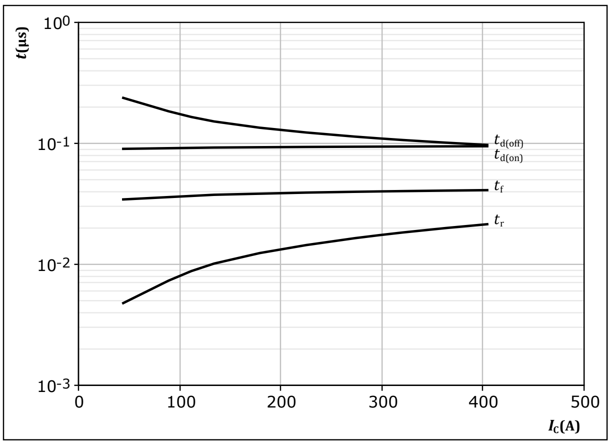
T_j: 25 °C, 125 °C, 150 °C

Neutral Point Switching Characteristics

figure 27. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



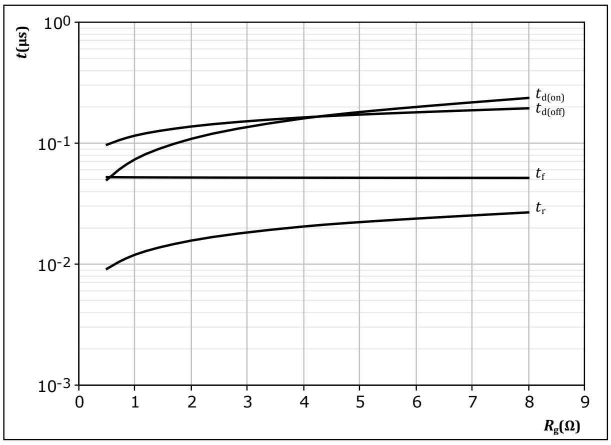
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 28. **IGBT**

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

t = f(R_g)



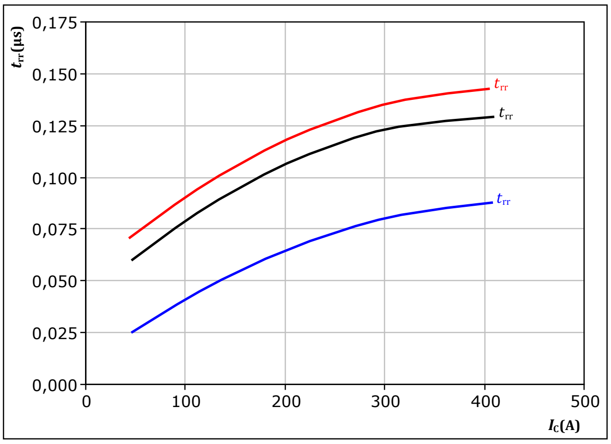
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	225	A

figure 29. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

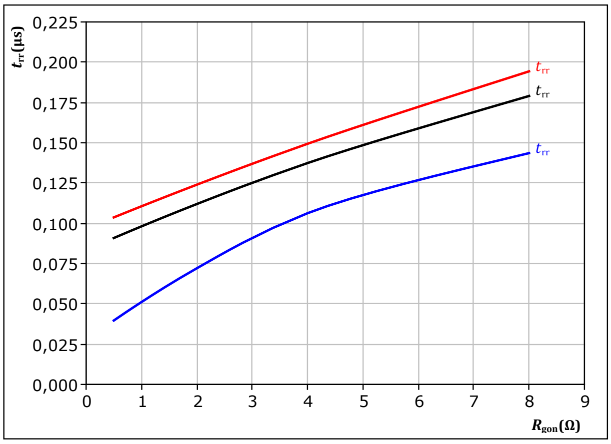
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

figure 30. **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} =	±15	V
I_C =	225	A

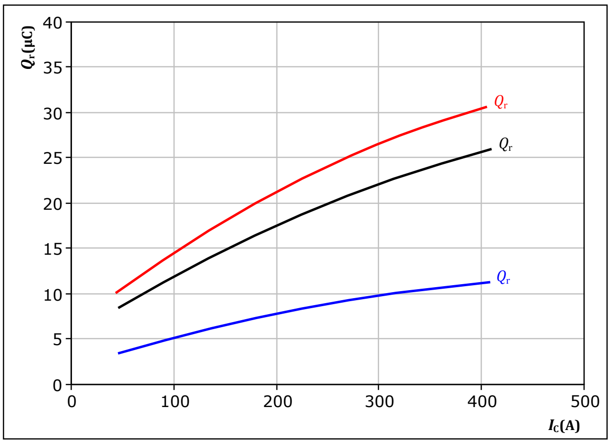
T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

Neutral Point Switching Characteristics

figure 31. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



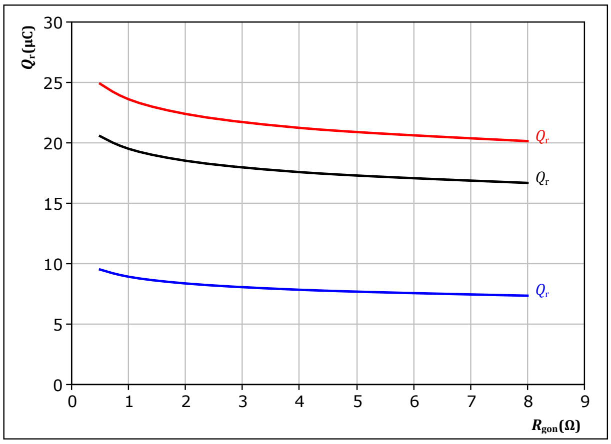
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 32. **FWD**

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

Q_r = f(R_{gon})



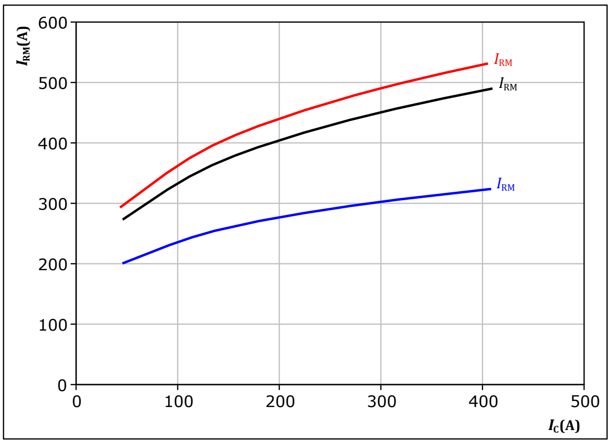
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

figure 33. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



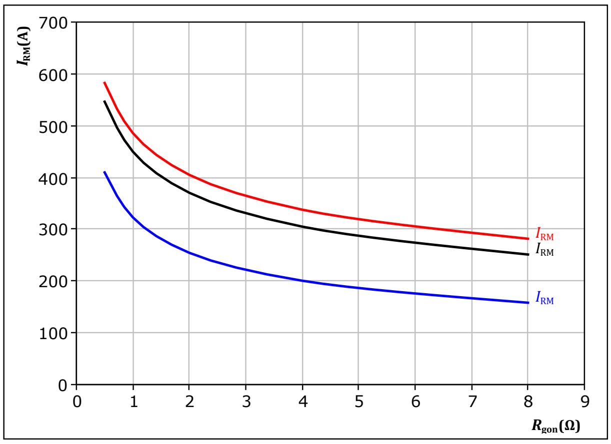
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 34. **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

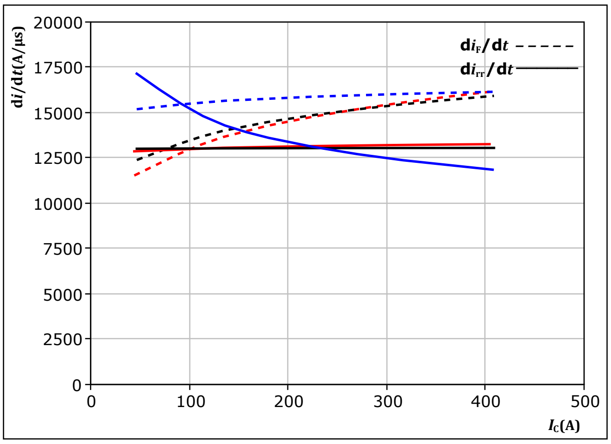
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

Neutral Point Switching Characteristics

figure 35.	**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)



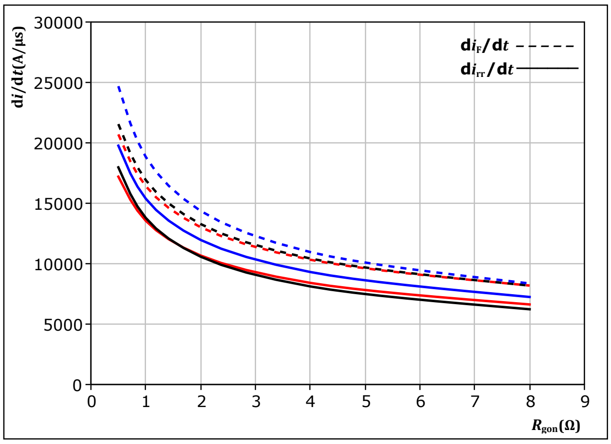
With an inductive load at

			T_j:	
V_{CE} =	600	V		25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 36.	**FWD**

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

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



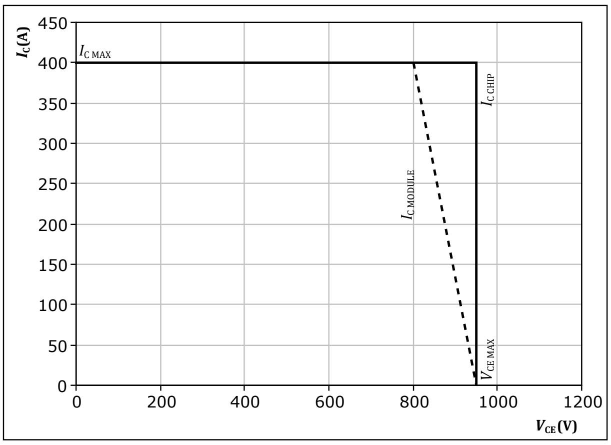
With an inductive load at

			T_j:	
V_{CE} =	600	V		25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

figure 37.	**IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



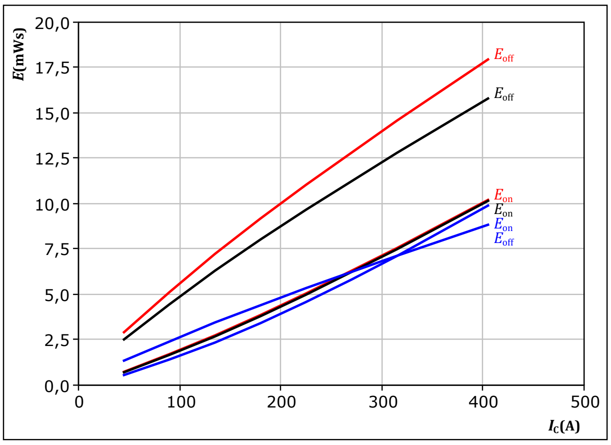
At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

DC-Link Switching Characteristics

figure 38. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



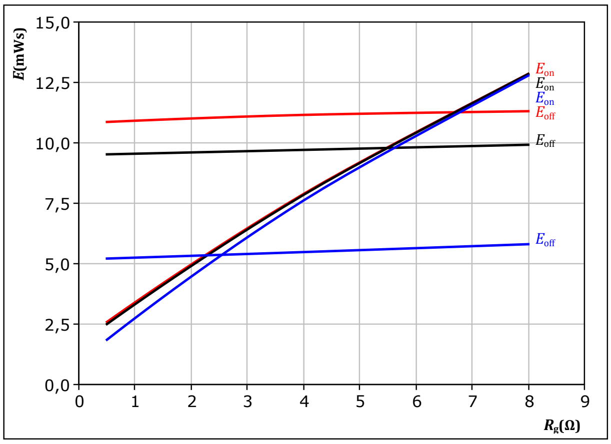
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	2	Ω		

figure 39. IGBT

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

$E = f(R_g)$



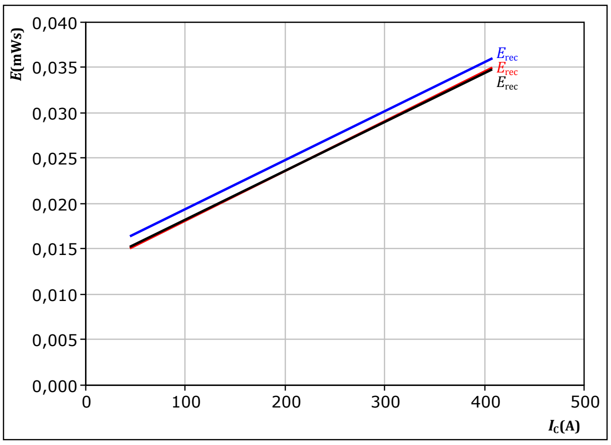
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

figure 40. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



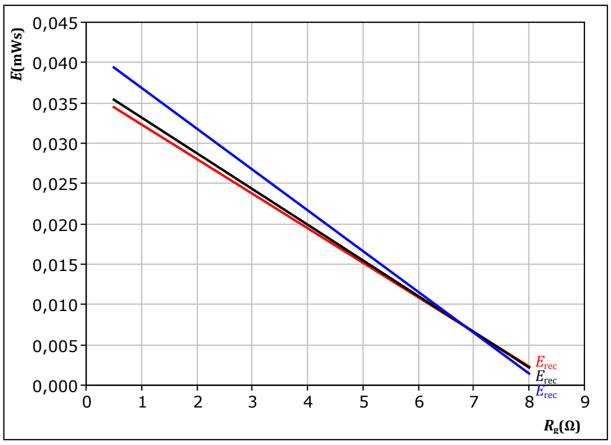
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 41. 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

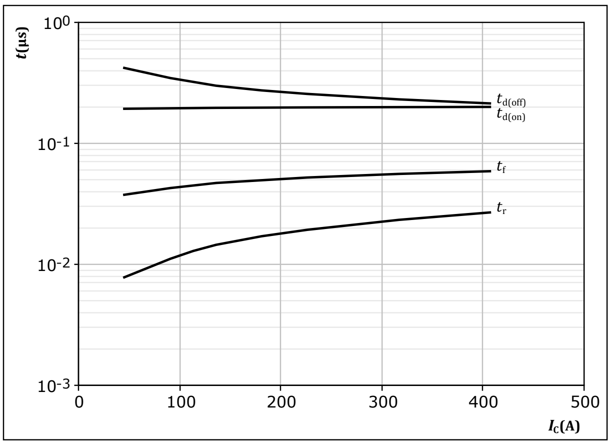
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

DC-Link Switching Characteristics

figure 42. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



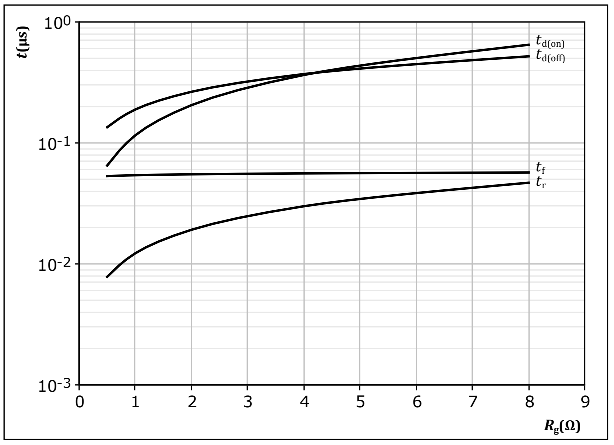
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 43. **IGBT**

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

t = f(R_g)



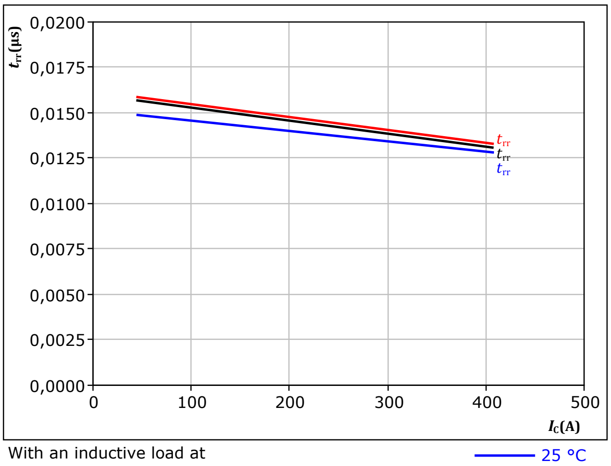
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	225	A

figure 44. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

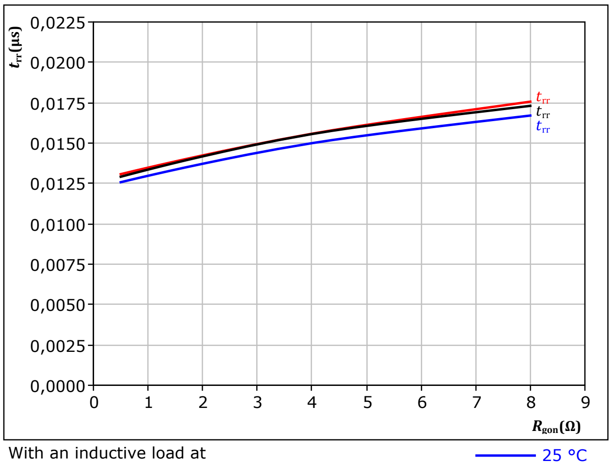
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 45. **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} =	±15	V
I_C =	225	A

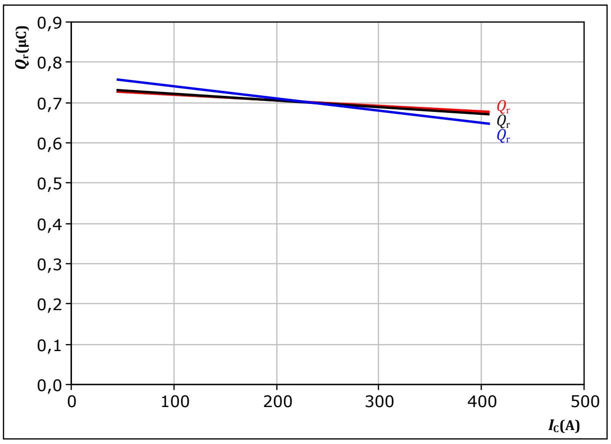
T_j: 25 °C, 125 °C, 150 °C

DC-Link Switching Characteristics

figure 46. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



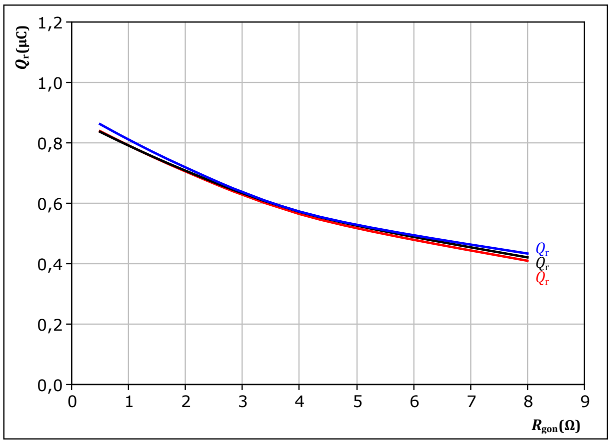
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 47. **FWD**

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

Q_r = f(R_{gon})



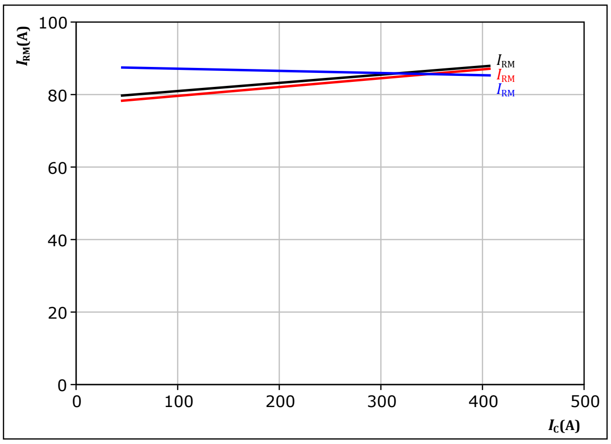
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

figure 48. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



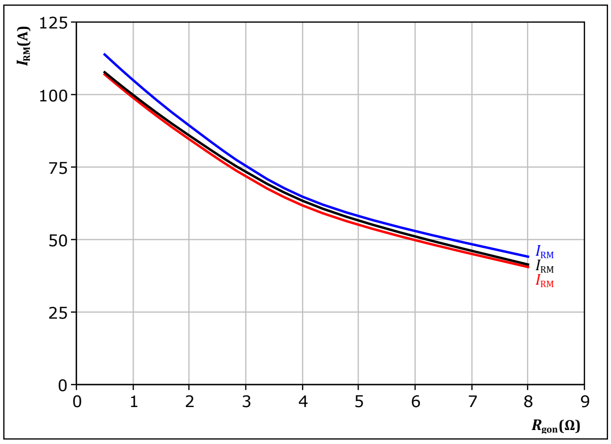
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 49. **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

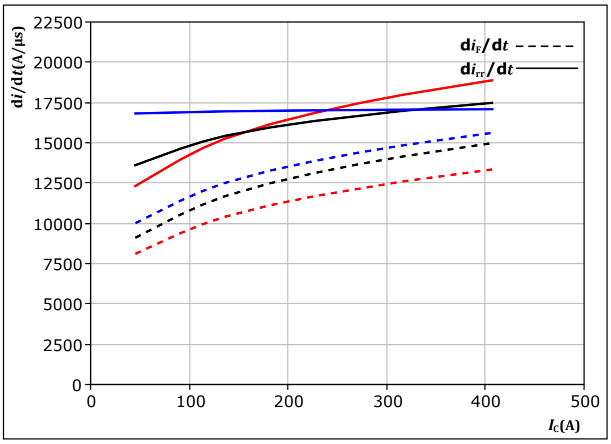
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

DC-Link Switching Characteristics

figure 50. **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)



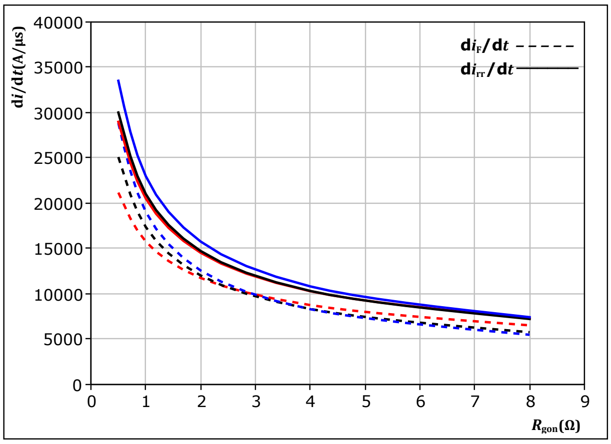
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 51. **FWD**

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

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



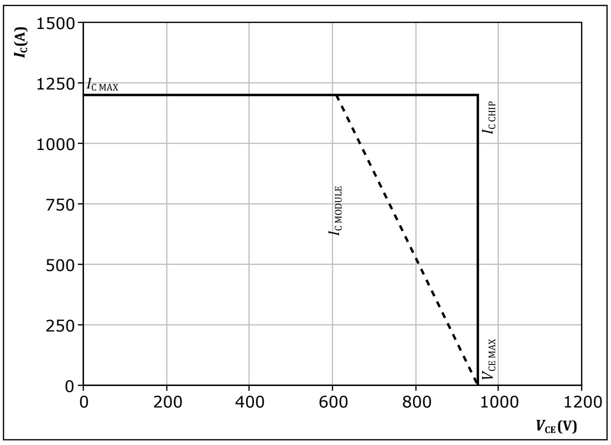
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	225	A		150 °C

figure 52. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



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

Switching Definitions

figure 53.	IGBT

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

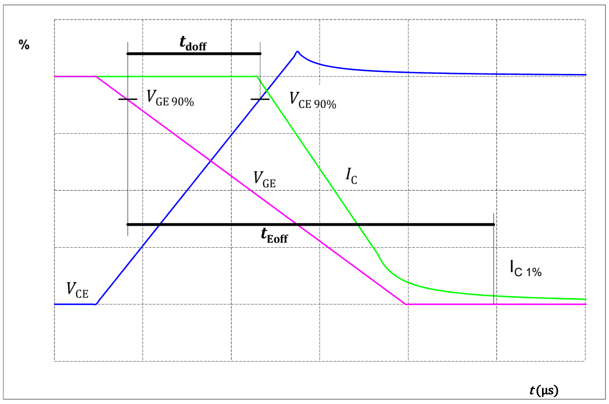


figure 54.	IGBT

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

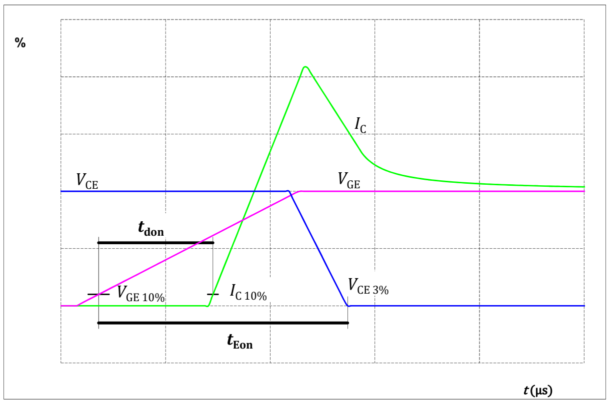


figure 55.	IGBT

Turn-off Switching Waveforms & definition of t_f

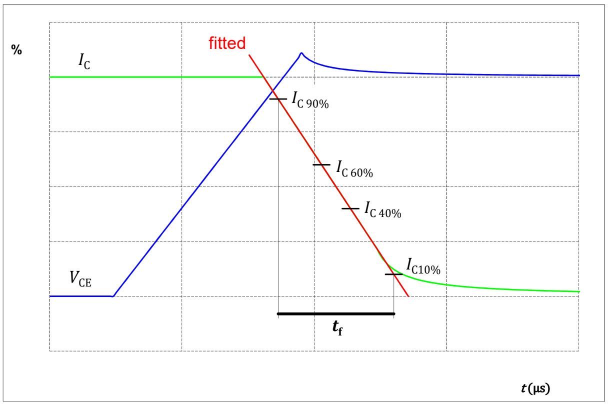
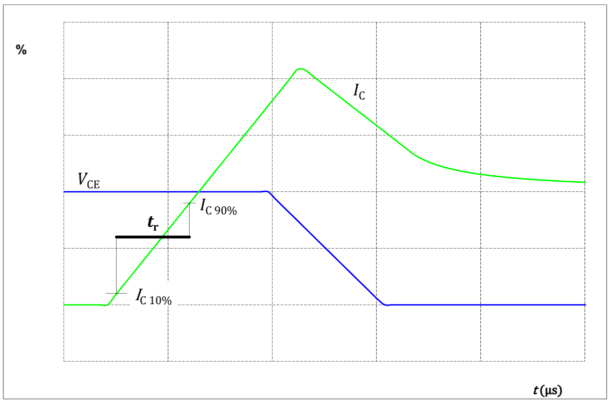


figure 56.	IGBT

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 57.	FWD

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

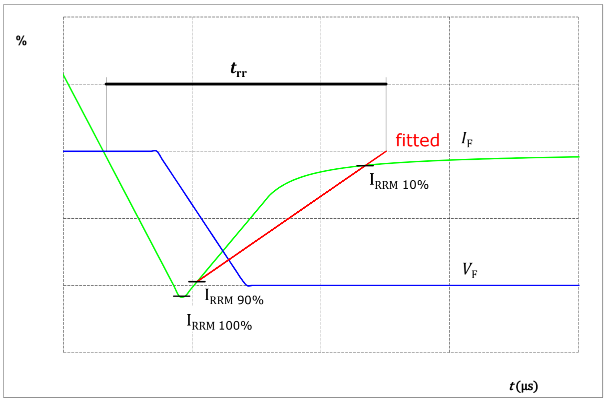
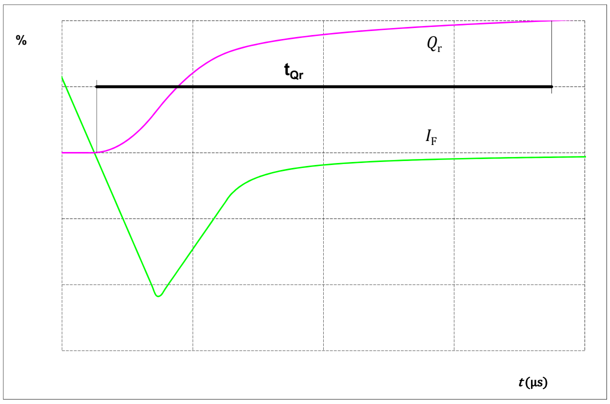


figure 58.	FWD

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



Vincotech

B0-SP10NAD600S7-LQ79F08T

Ordering Code

Version	Ordering Code
Without thermal paste	B0-SP10NAD600S7-LQ79F08T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-SP10NAD600S7-LQ79F08T-/7/

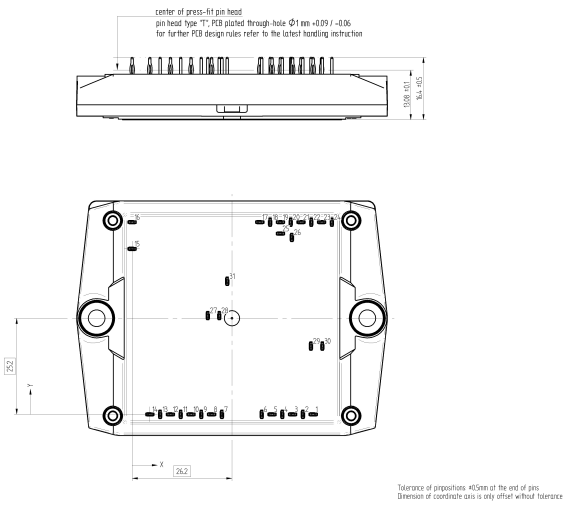
Marking

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

Outline

Pin table [mm]

Pin	X	Y	Function
1	47,5	0	GND1
2	44,8	0	GND1
3	42,1	0	GND1
4	39,4	0	GND1
5	36,7	0	GND1
6	34	0	GND1
7	23,55	0	DC+
8	20,85	0	DC+
9	18,15	0	DC+
10	15,45	0	DC+
11	12,75	0	DC+
12	10,05	0	DC+
13	7,35	0	DC+
14	4,65	0	DC+
15	0	43,4	Therm1
16	0	50,4	Therm2
17	33,5	50,4	Ph1
18	36,2	50,4	Ph1
19	38,9	50,4	Ph1
20	41,6	50,4	Ph1
21	44,3	50,4	Ph1
22	47	50,4	Ph1
23	49,7	50,4	Ph1
24	52,4	50,4	Ph1
25	38,9	47,4	S13
26	41,9	46,4	G13
27	19,85	25,9	G11
28	22,85	25,9	S11
29	46,9	17,9	S16
30	49,9	17,9	G16
31	24,95	34,9	C13



B0-SP10NAE600S7-LQ89F08T

Ordering Code

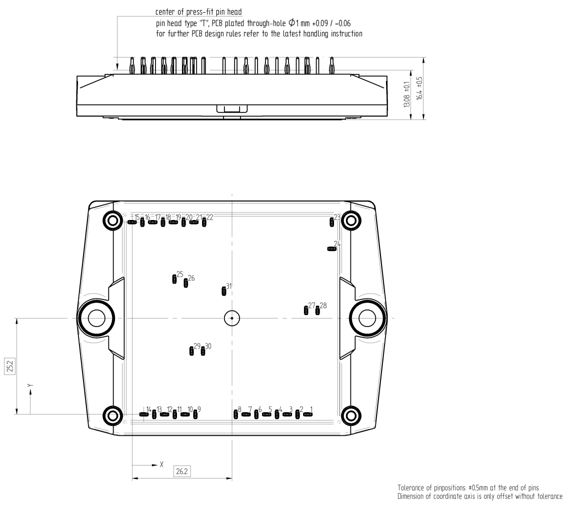
Version	Ordering Code
Without thermal paste	B0-SP10NAE600S7-LQ89F08T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-SP10NAE600S7-LQ89F08T-/7/

Marking

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

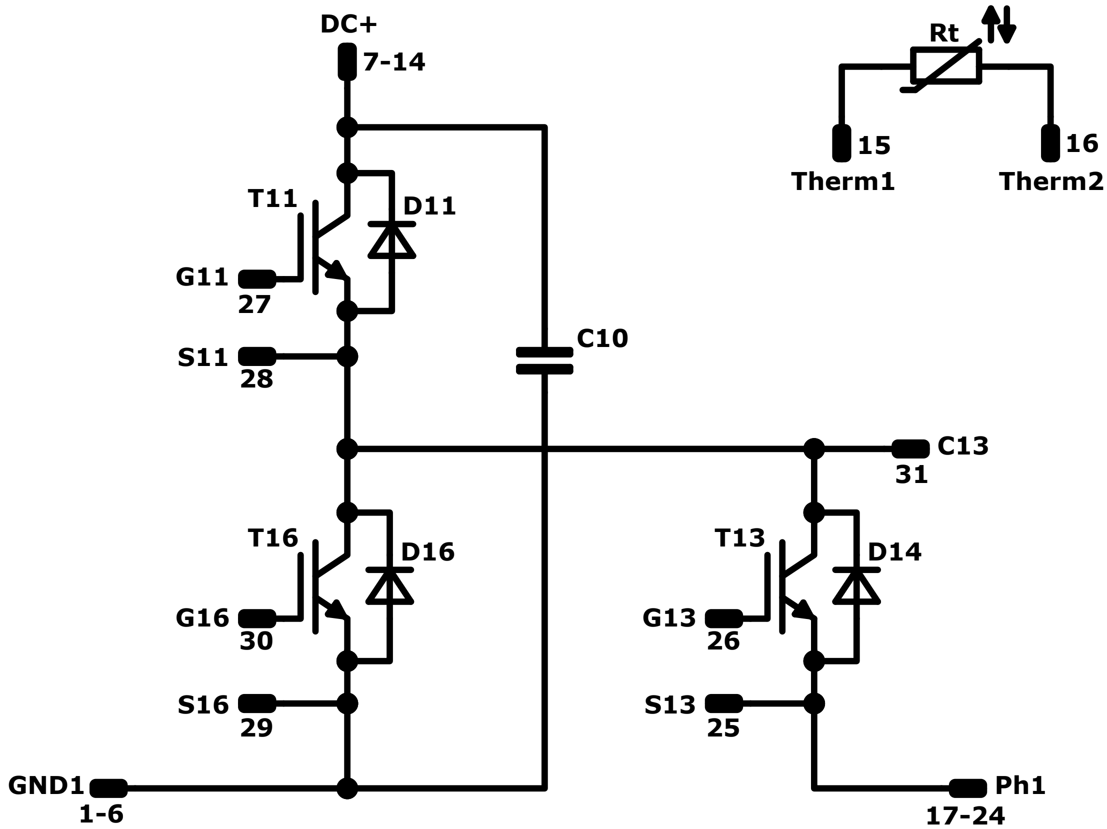
Outline

Pin table [mm]			
Pin	X	Y	Function
1	46,1	0	DC-
2	43,4	0	DC-
3	40,7	0	DC-
4	38	0	DC-
5	35,3	0	DC-
6	32,6	0	DC-
7	29,9	0	DC-
8	27,2	0	DC-
9	16,6	0	GND2
10	13,9	0	GND2
11	11,2	0	GND2
12	8,5	0	GND2
13	5,8	0	GND2
14	3,1	0	GND2
15	0	50,4	Ph2
16	2,7	50,4	Ph2
17	5,4	50,4	Ph2
18	8,1	50,4	Ph2
19	10,8	50,4	Ph2
20	13,5	50,4	Ph2
21	16,2	50,4	Ph2
22	18,9	50,4	Ph2
23	52,4	50,4	Therm1
24	52,4	43,4	Therm2
25	11,1	35,45	G14
26	14,1	34,45	S14
27	45,65	27,25	G12
28	48,65	27,25	S12
29	15,6	16,6	S15
30	18,6	16,6	G15
31	24,1	32,3	C12



B0-SP10NAD600S7-LQ79F08T

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T13	IGBT	950 V	400 A	AC Switch	
D14	FWD	950 V	300 A	AC Diode	
T16	IGBT	950 V	200 A	Neutral Point Switch	
D11	FWD	950 V	300 A	DC-Link Diode	
T11	IGBT	950 V	600 A	DC-Link Switch	
D16	FWD	1200 V	120 A	Neutral Point Diode	
C10	Capacitor	1000 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	

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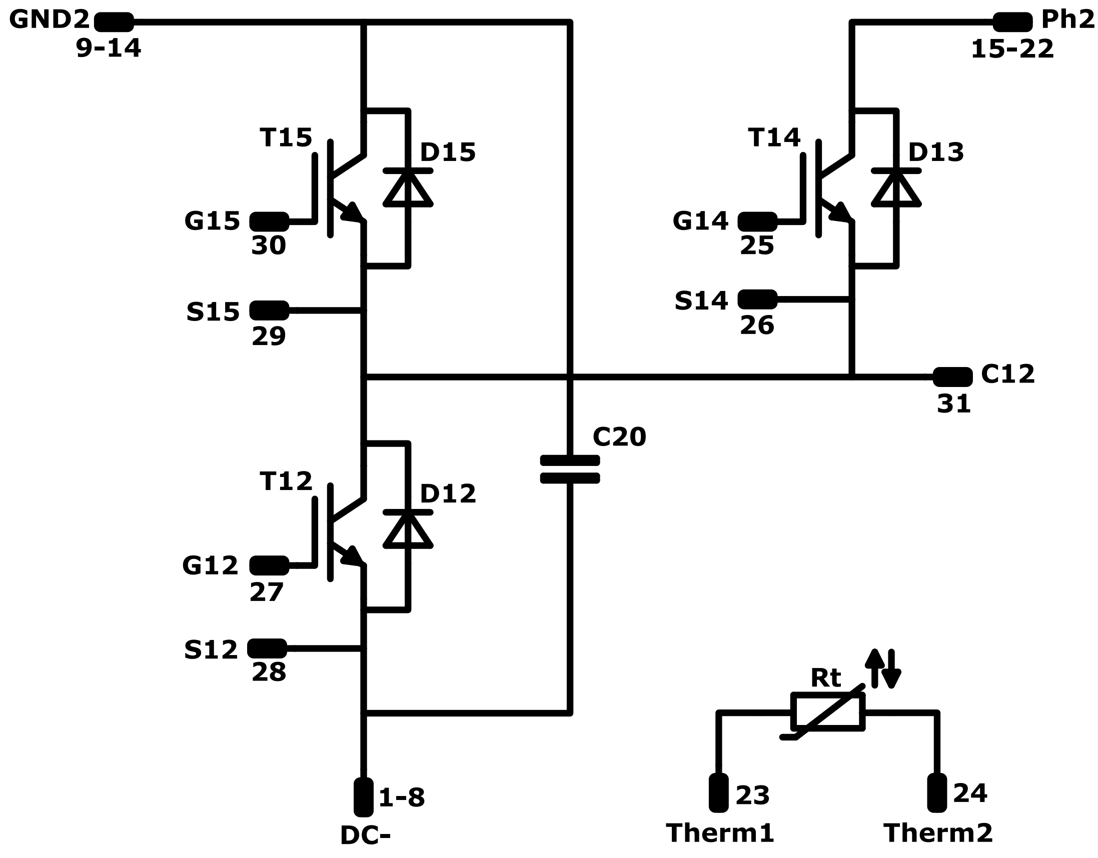
Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T14	IGBT	950 V	400 A	AC Switch	
D13	FWD	950 V	300 A	AC Diode	
T15	IGBT	950 V	200 A	Neutral Point Switch	
D12	FWD	950 V	300 A	DC-Link Diode	
T12	IGBT	950 V	600 A	DC-Link Switch	
D15	FWD	1200 V	120 A	Neutral Point Diode	
C20	Capacitor	1000 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 45	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* S3 packages see vincotech.com website.

Package data
Package data for *flow* S3 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
B0-SP10NAx600S7-LQx9F08T-D2-14	31 Mar. 2023	Combine LQ79F08T and LQ89F08T datasheets Change Neutral Point Diode	