30-PT10NAA200S701-PE59F08Y
datasheet

***flow*ANPC 2** — **950 V / 200 A**

Topology features

- Temperature sensor
- Advanced Neutral Point Clamped topology

Component features

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

Housing features

- Base isolation: Al_2O_3
- Convex shaped baseplate for superior thermal contact
- Cu baseplate
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

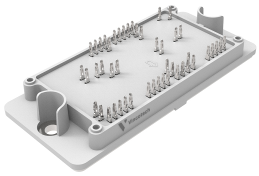
Target applications

- Energy Storage Systems
- Solar Inverters

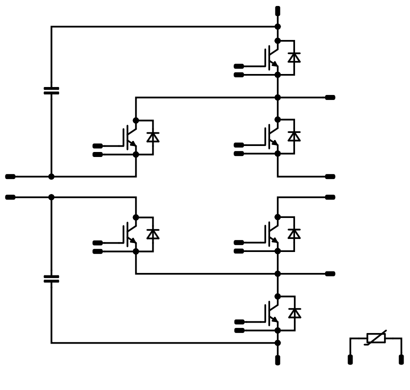
Types

- 30-PT10NAA200S701-PE59F08Y

flow 2 13 mm housing



Schematic



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	203	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	256	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	108	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	192	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	153	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	300	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	108	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	192	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	153	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	300	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Neutral Point Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	108	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	192	W
Maximum junction temperature	T_{jmax}			175	°C
Capacitor (DC)					
Maximum DC voltage	V_{MAX}			750	V
		T_j = 125 °C		1000	
		T_j = 150 °C		750	
Operation Temperature	T_{op}			-55 … 150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
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			>12,7	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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00325	25	4,15	4,85	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,22 1,25 1,26	1,4(1)	V
Collector-emitter cut-off current	I_{CES}		0	950		25			4	μA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							1,5		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		24600		pF
Output capacitance	C_{oes}	f = 100 kHz	0	25		25		265		pF
Reverse transfer capacitance	C_{res}	f = 100 kHz	0	25		25		110		pF
Gate charge	Q_g		±15		0	25		2050		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,37		K/W
AC Diode										
Static										
Forward voltage	V_F				200	25 125 150	2,1	2,64 2,44 2,36	2,8(1)	V
Reverse leakage current	I_R	V_r = 950 V				25			8	μA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,5		K/W

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	
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} = 3,4 W/mK (PSX)						0,32		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	750	170	25 125 150		85,83 88,21 89,19		ns
Rise time	t_r					25 125 150		13,34 15,07 15,31		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		101,78 131,72 139,97		ns
Fall time	t_f					25 125 150		19,65 41,02 50,59		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=4,95 µC Q_{rFWD}=11,2 µC Q_{rFWD}=13,4 µC				25 125 150		7,2 9,86 10,58		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,22 9,58 10,81		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				200	25 125 150	2,1	2,64 2,44 2,36	2,8(1)	V
Reverse leakage current	I_R	V_r = 950 V				25			8	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,5		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=6941 A/µs d*i*/d*t*=7416 A/µs d*i*/d*t*=7571 A/µs	±15	750	170	25 125 150		104,12 156,48 171,85		A
Reverse recovery time	t_{rr}					25 125 150		110,17 150,99 166,05		ns
Recovered charge	Q_r					25 125 150		4,95 11,2 13,4		µC
Reverse recovered energy	E_{rec}					25 125 150		1,88 4,69 5,74		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2387,68 1344,81 1455,48		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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00334	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} = 3,4 W/mK (PSX)						0,32		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	750	170	25 125 150		260,37 258,01 257,36		ns
Rise time	t_r					25 125 150		38,04 40,64 41,29		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		189,81 221,15 229,97		ns
Fall time	t_f					25 125 150		20,63 41,58 49,96		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=4,32 µC Q_{rFWD}=10,47 µC Q_{rFWD}=12,58 µC				25 125 150		12,71 15,81 16,54		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,16 8,57 9,48		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	
Neutral Point Diode										
Static										
Forward voltage	V_F				200	25 125 150	2,1	2,64 2,44 2,36	2,8(1)	V
Reverse leakage current	I_R	V_r = 950 V				25			8	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,5		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=3481 A/µs d*i*/d*t*=3450 A/µs d*i*/d*t*=3656 A/µs	±15	750	170	25 125 150		81,59 123,07 133,99		A
Reverse recovery time	t_{rr}					25 125 150		127,76 182,08 197,89		ns
Recovered charge	Q_r					25 125 150		4,32 10,47 12,58		µC
Reverse recovered energy	E_{rec}					25 125 150		1,35 3,66 4,58		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1504,45 1171,27 1258,98		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		750		V
Tolerance							-5		5	%
Dissipation factor		f = 1 kHz				25		0,1		%
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	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

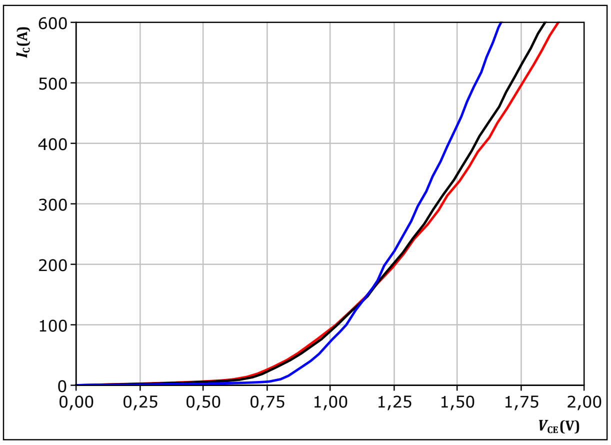
(2) Only valid with pre-applied Vincotech thermal interface material.

AC Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

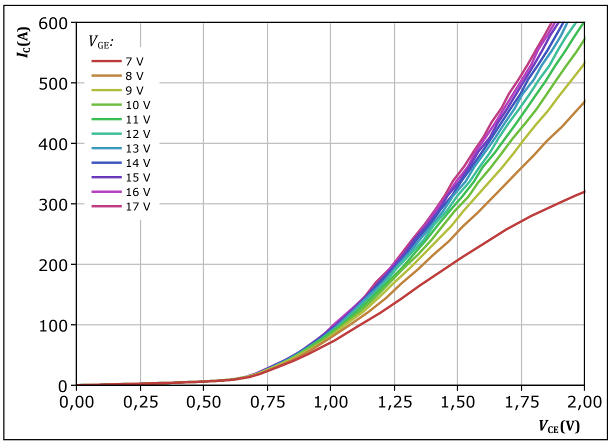


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

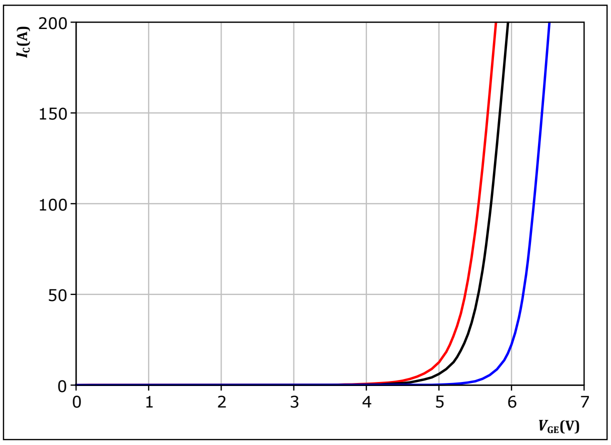


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

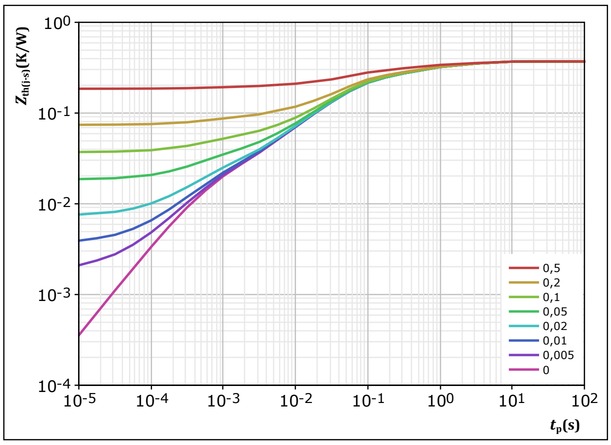


t_p = 250 µs
V_{CE} = 59 V
T_j: 25 °C, 125 °C, 150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
$R_{th(j-s)}$ = 0,371 K/W

IGBT thermal model values

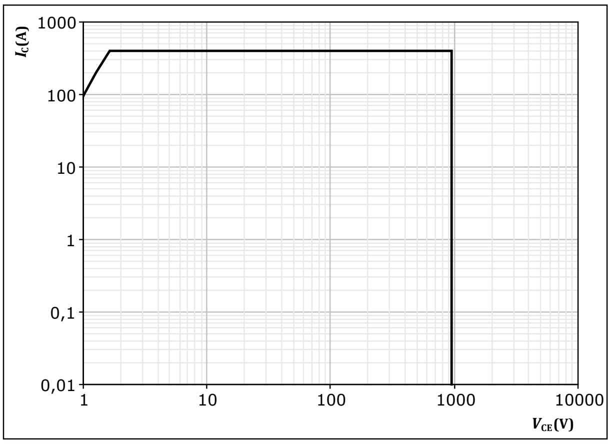
R (K/W)	τ (s)
6,29E-02	2,66E+00
9,87E-02	3,54E-01
1,71E-01	4,59E-02
2,32E-02	6,22E-03
1,51E-02	5,38E-04

AC Switch Characteristics

figure 5.	IGBT

Safe operating area

I_C = f(V_{CE})



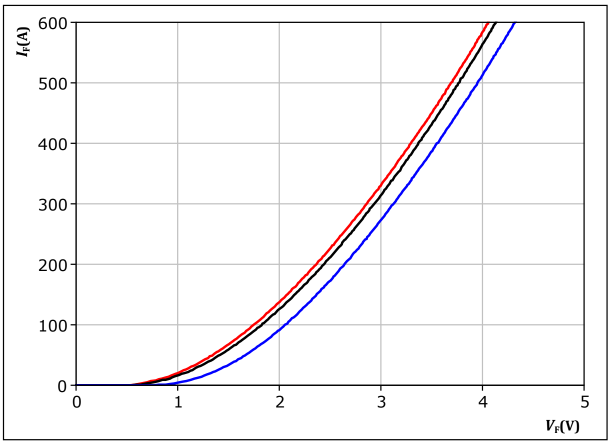
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

AC Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

I_F = f(V_F)



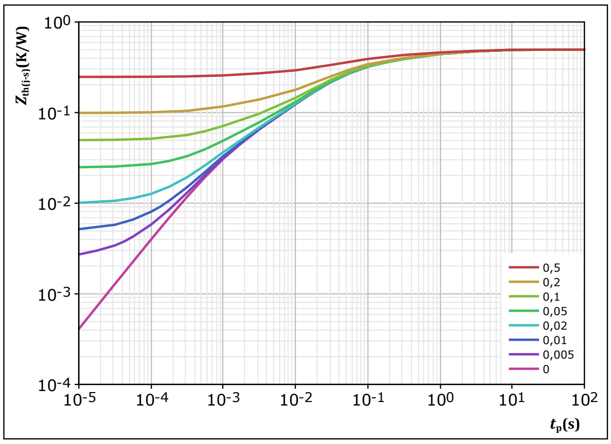
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,495 K/W

FWD thermal model values

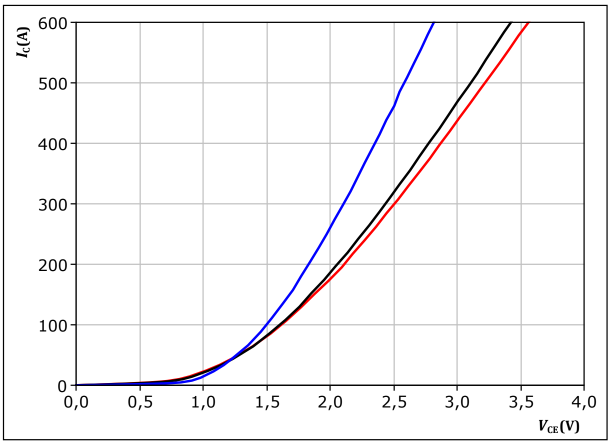
R (K/W)	τ (s)
5,54E-02	3,24E+00
1,07E-01	4,54E-01
1,95E-01	5,74E-02
1,05E-01	1,25E-02
3,26E-02	1,12E-03

Neutral Point Switch Characteristics

figure 8. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

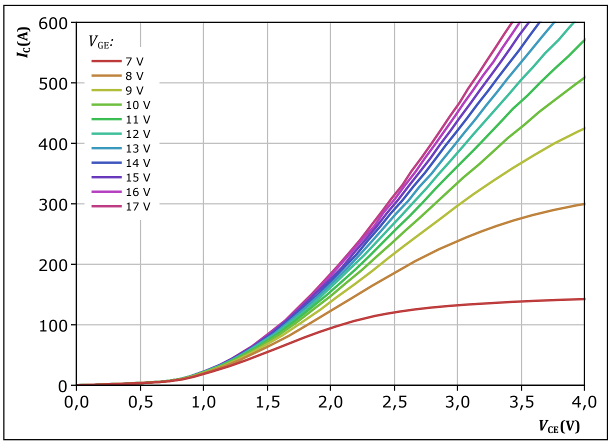


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 9. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



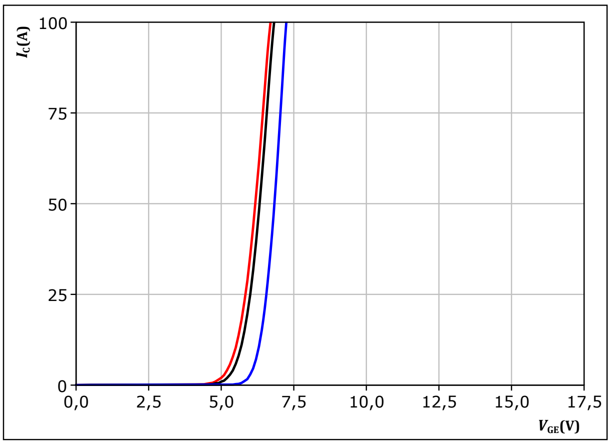
t_p =	250	µs
T_j =	150	°C

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

figure 10. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

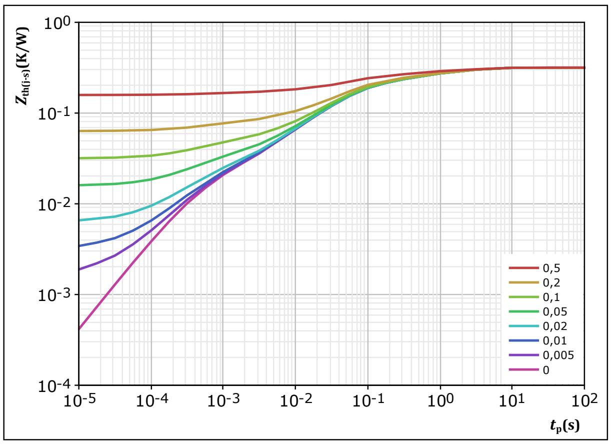


t_p =	250	µs		25 °C
V_{CE} =	8	V	T_j:	125 °C
				150 °C

figure 11. **IGBT**

Transient thermal impedance as a function of pulse width

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



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

IGBT thermal model values

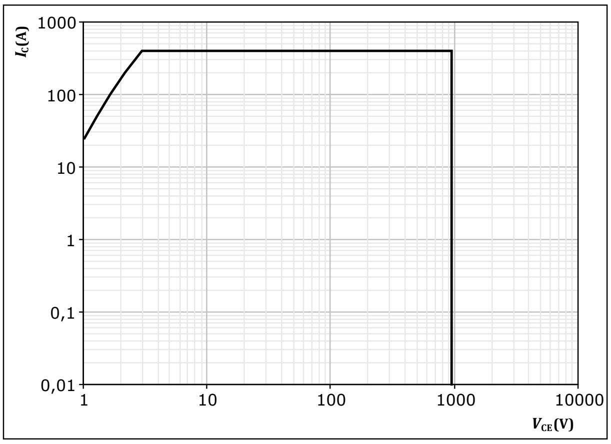
R (K/W)	τ (s)
6,47E-02	2,21E+00
8,02E-02	2,58E-01
1,36E-01	3,99E-02
2,02E-02	4,97E-03
1,51E-02	4,41E-04

Neutral Point Switch Characteristics

figure 12. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



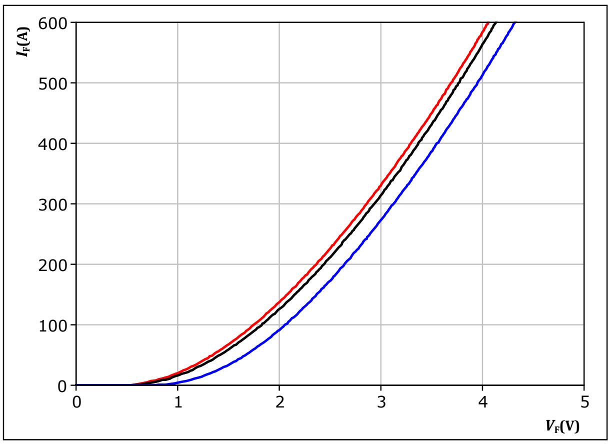
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

DC-Link Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

I_F = f(V_F)



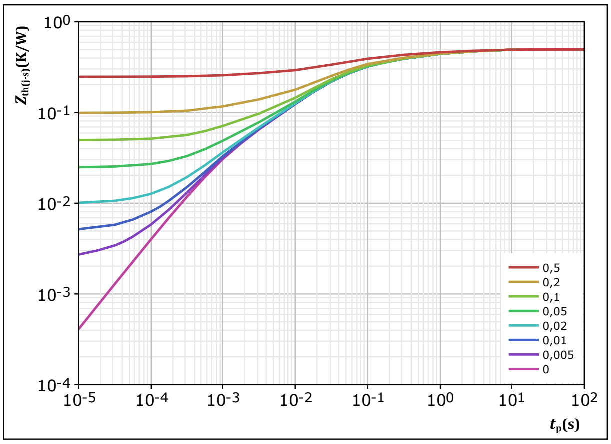
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,495 K/W

FWD thermal model values

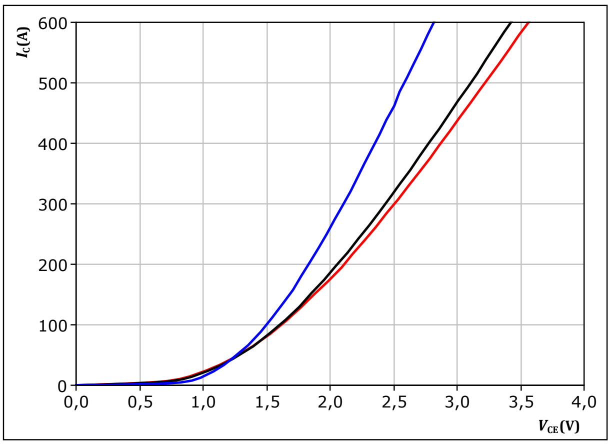
R (K/W)	τ (s)
5,54E-02	3,24E+00
1,07E-01	4,54E-01
1,95E-01	5,74E-02
1,05E-01	1,25E-02
3,26E-02	1,12E-03

DC-Link Switch Characteristics

figure 15. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

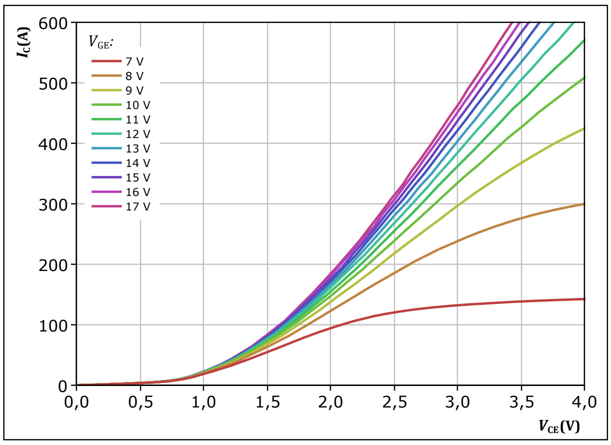


t_p =	250	μs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 16. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



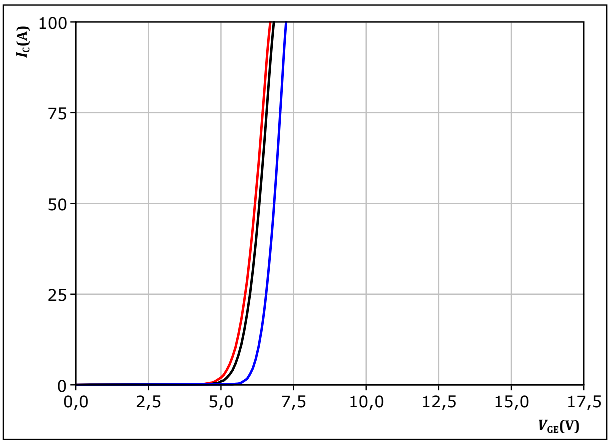
t_p =	250	μs
T_j =	150	°C

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

figure 17. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

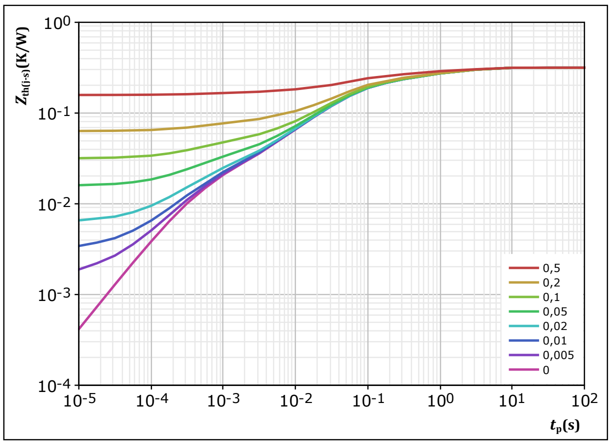


t_p =	250	μs		25 °C
V_{CE} =	8	V	T_j:	125 °C
				150 °C

figure 18. **IGBT**

Transient thermal impedance as a function of pulse width

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



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

IGBT thermal model values

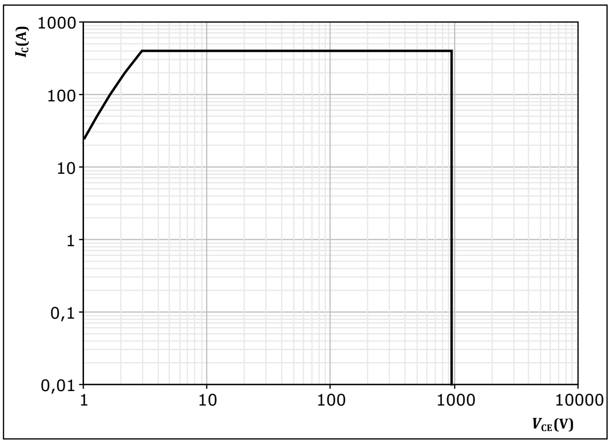
R (K/W)	τ (s)
6,47E-02	2,21E+00
8,02E-02	2,58E-01
1,36E-01	3,99E-02
2,02E-02	4,97E-03
1,51E-02	4,41E-04

DC-Link Switch Characteristics

figure 19.	IGBT

Safe operating area

$I_C = f(V_{CE})$



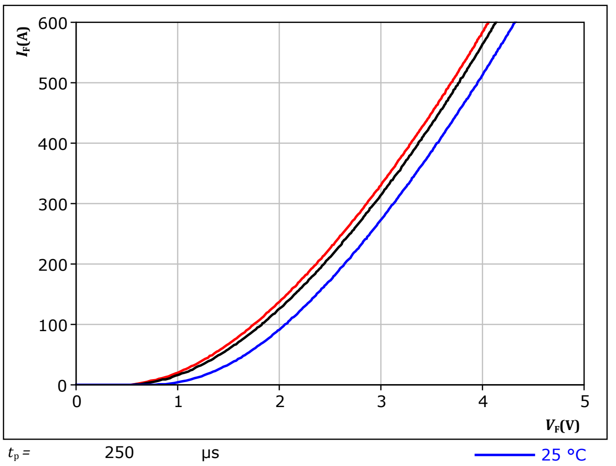
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Neutral Point Diode Characteristics

figure 20. **FWD**

Typical forward characteristics

I_F = f(V_F)



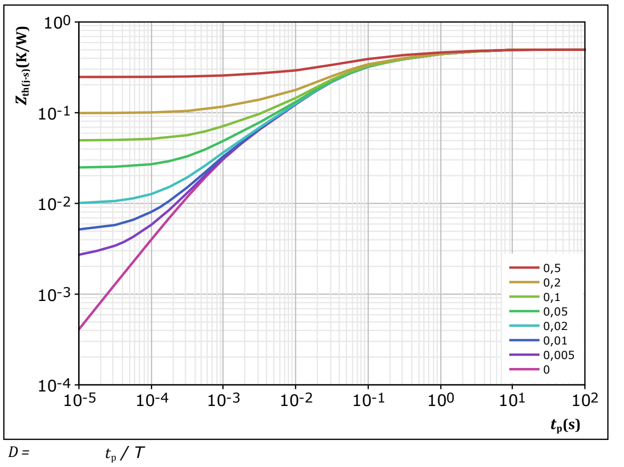
t_p =	250	µs

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

$R_{th(j-s)}$ = 0,495 K/W

FWD thermal model values

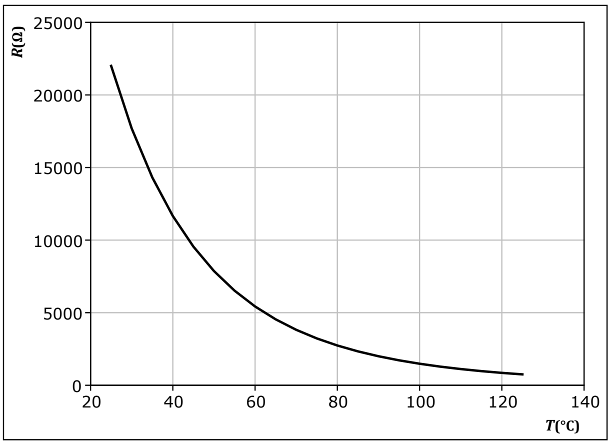
R (K/W)	τ (s)
5,54E-02	3,24E+00
1,07E-01	4,54E-01
1,95E-01	5,74E-02
1,05E-01	1,25E-02
3,26E-02	1,12E-03

Thermistor Characteristics

figure 22. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

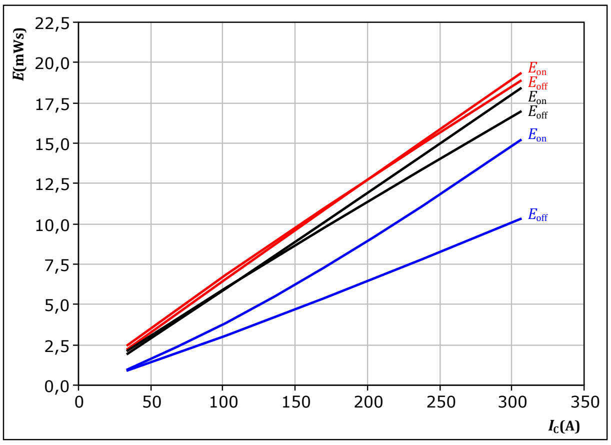


Neutral Point Switching Characteristics

figure 23. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



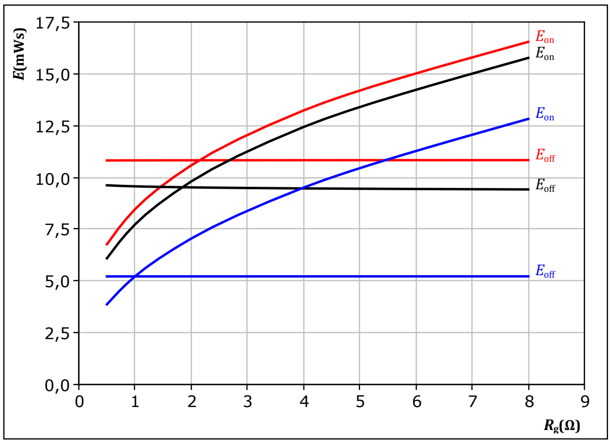
With an inductive load at

V_{CE} =	750	V	
V_{GE} =	±15	V	T_j: 25 °C / 125 °C / 150 °C
R_{gon} =	2	Ω	
R_{goff} =	2	Ω	

figure 24. **IGBT**

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

$E = f(R_g)$



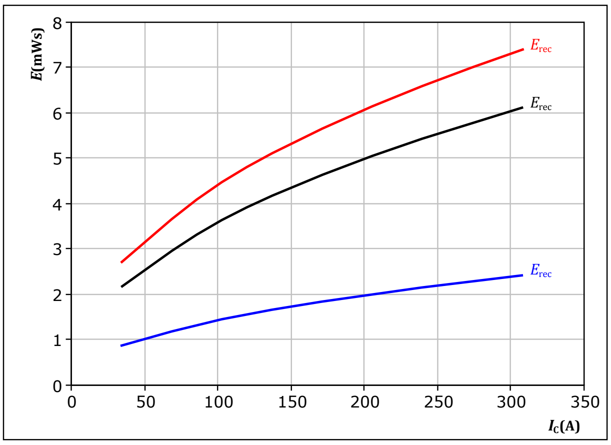
With an inductive load at

V_{CE} =	750	V	
V_{GE} =	±15	V	T_j: 25 °C / 125 °C / 150 °C
I_C =	170	A	

figure 25. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



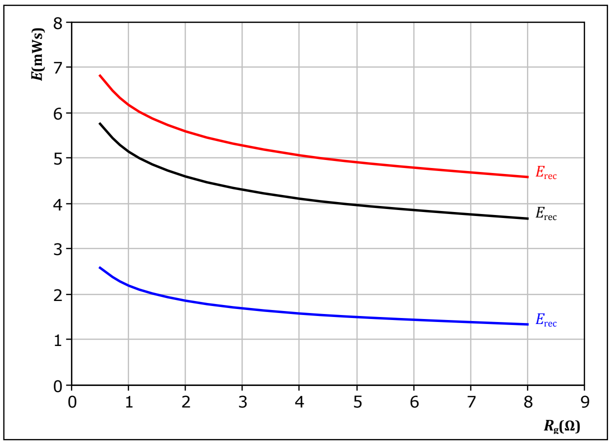
With an inductive load at

V_{CE} =	750	V	
V_{GE} =	±15	V	T_j: 25 °C / 125 °C / 150 °C
R_{gon} =	2	Ω	

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

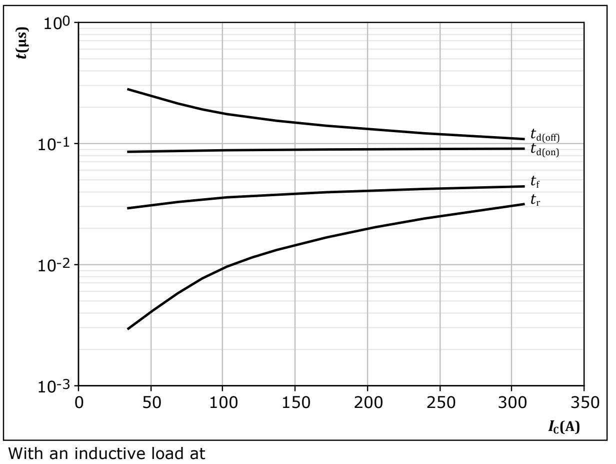
V_{CE} =	750	V	
V_{GE} =	±15	V	T_j: 25 °C / 125 °C / 150 °C
I_C =	170	A	

Neutral Point Switching Characteristics

figure 27. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



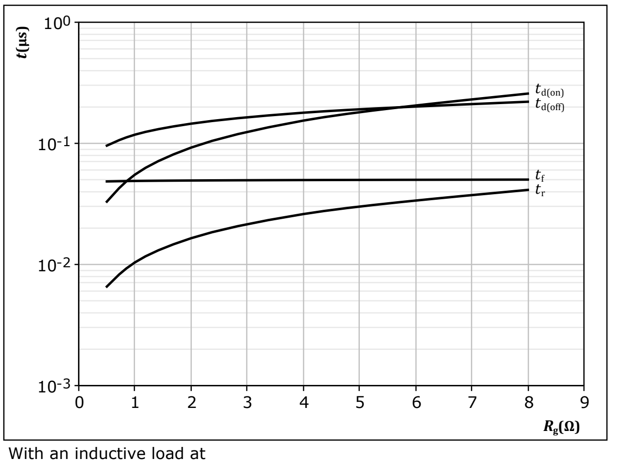
With an inductive load at

T_j =	150	°C
V_{CE} =	750	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

$t = f(R_g)$



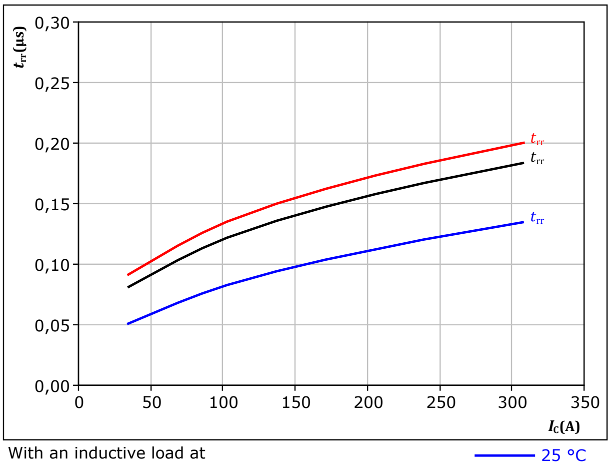
With an inductive load at

T_j =	150	°C
V_{CE} =	750	V
V_{GE} =	±15	V
I_C =	170	A

figure 29. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

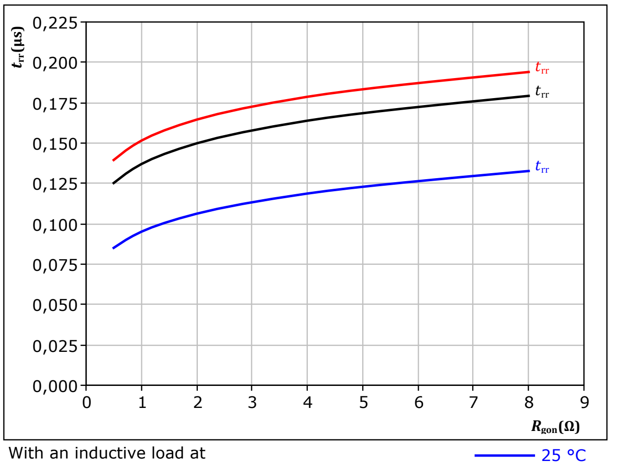
V_{CE} =	750	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

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} =	750	V
V_{GE} =	±15	V
I_C =	170	A

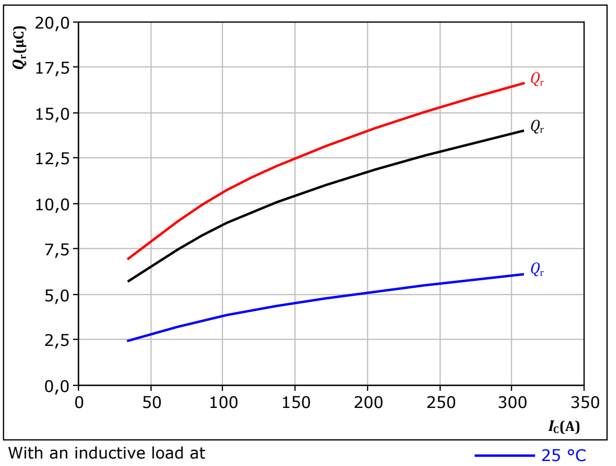
T_j: 25 °C, 125 °C, 150 °C

Neutral Point Switching Characteristics

figure 31. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



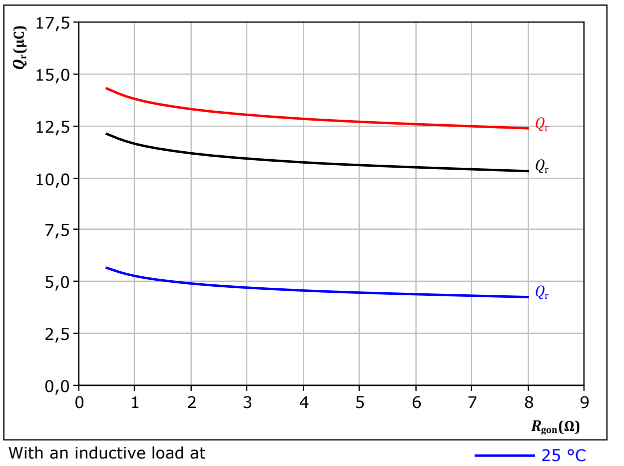
With an inductive load at

V_{CE} =	750	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

figure 32. **FWD**

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

Q_r = f(R_{gon})



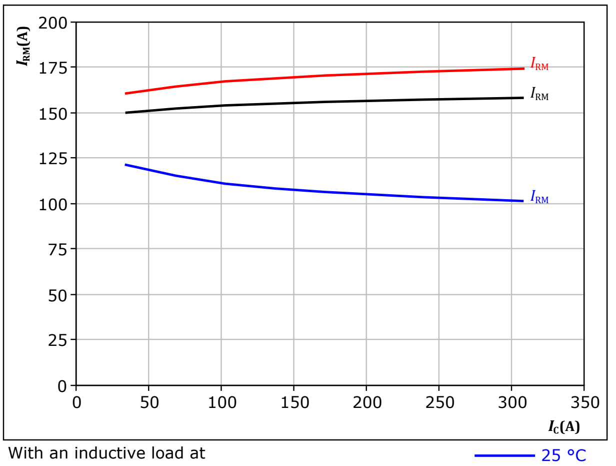
With an inductive load at

V_{CE} =	750	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	170	A	

figure 33. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



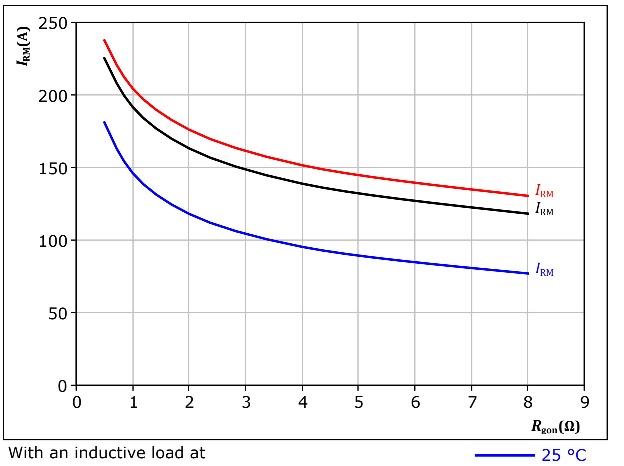
With an inductive load at

V_{CE} =	750	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

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

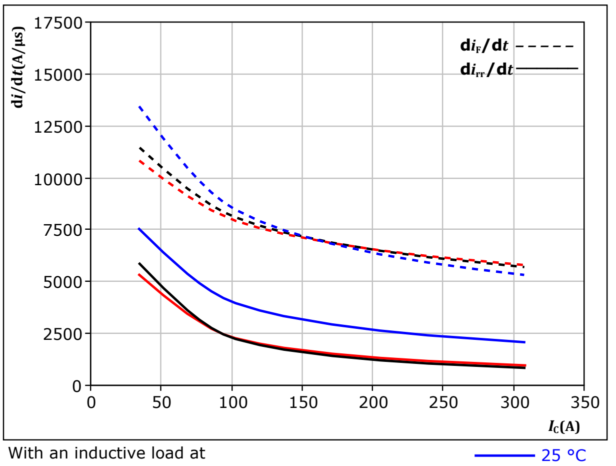
V_{CE} =	750	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	170	A	

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)



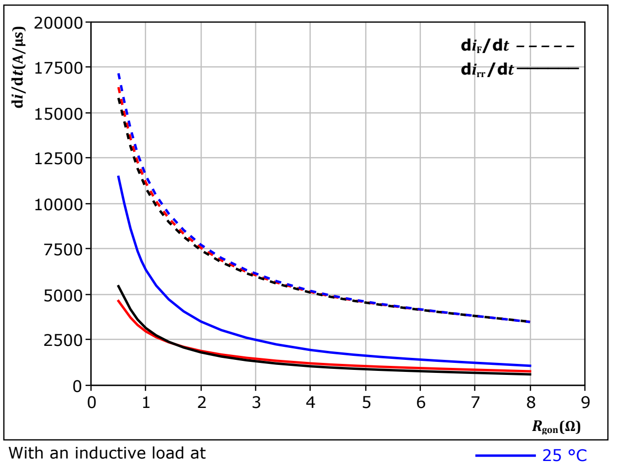
With an inductive load at

V_{CE} =	750	V	T_j:	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})



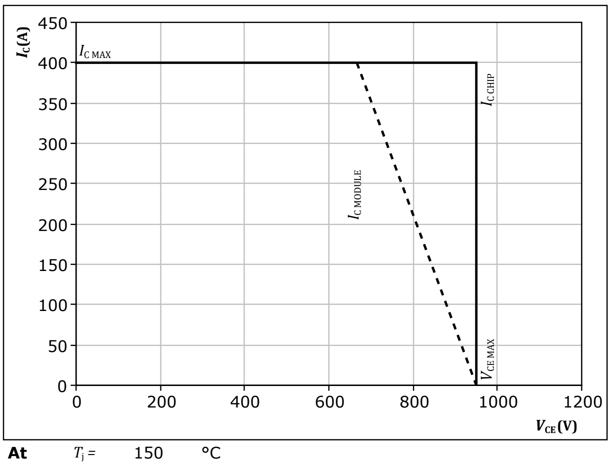
With an inductive load at

V_{CE} =	750	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	170	A		150 °C

figure 37. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



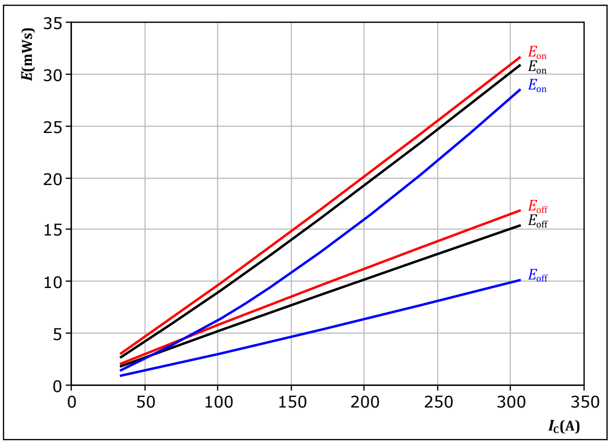
At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

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

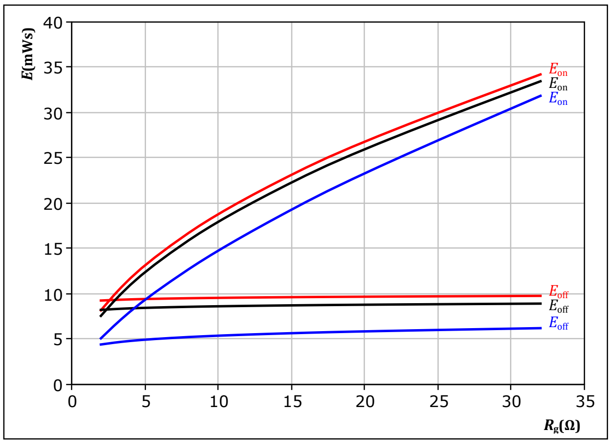
V_{CE} =	750	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

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

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

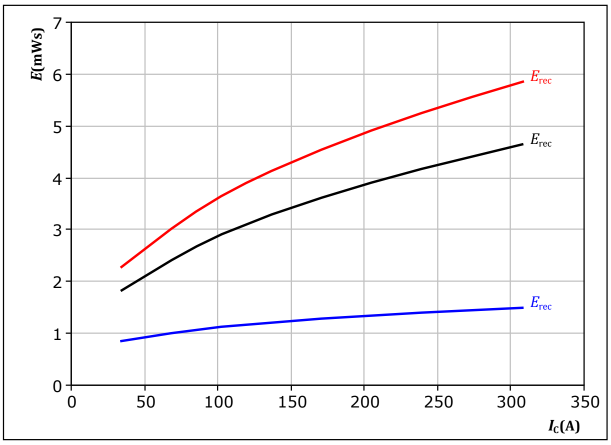
V_{CE} =	750	V
V_{GE} =	±15	V
I_C =	170	A

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

figure 40. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

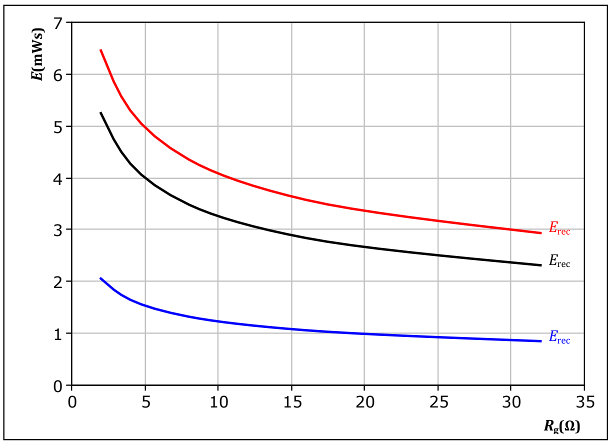
V_{CE} =	750	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

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

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} =	750	V
V_{GE} =	±15	V
I_C =	170	A

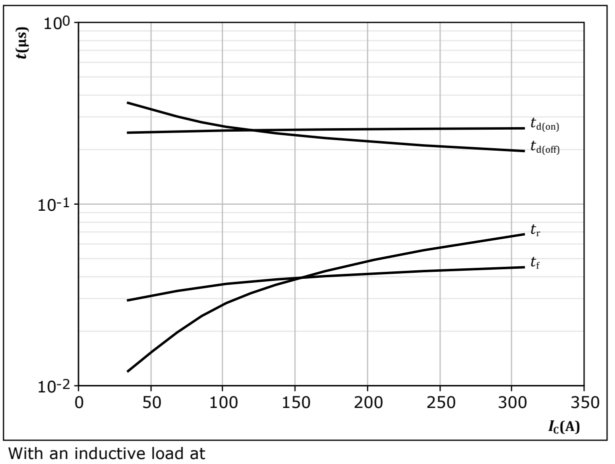
T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

DC-Link Switching Characteristics

figure 42. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



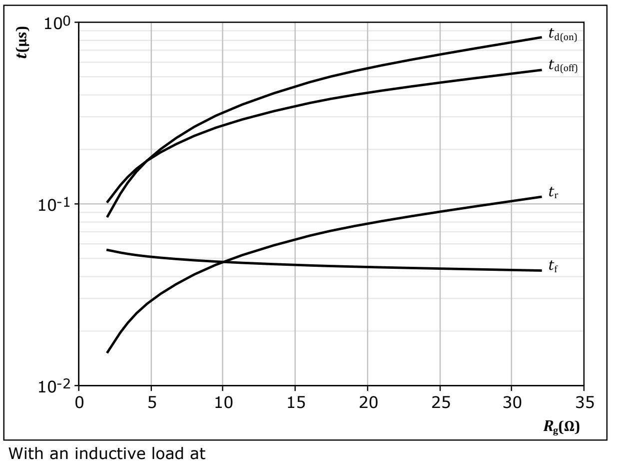
With an inductive load at

T_j =	150	°C
V_{CE} =	750	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 43. **IGBT**

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

$t = f(R_g)$



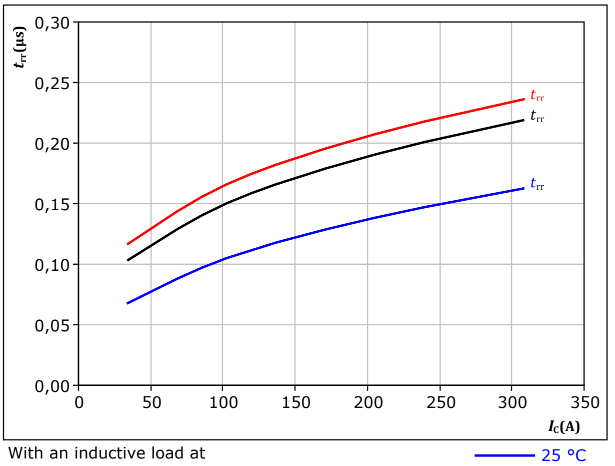
With an inductive load at

T_j =	150	°C
V_{CE} =	750	V
V_{GE} =	±15	V
I_C =	170	A

figure 44. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

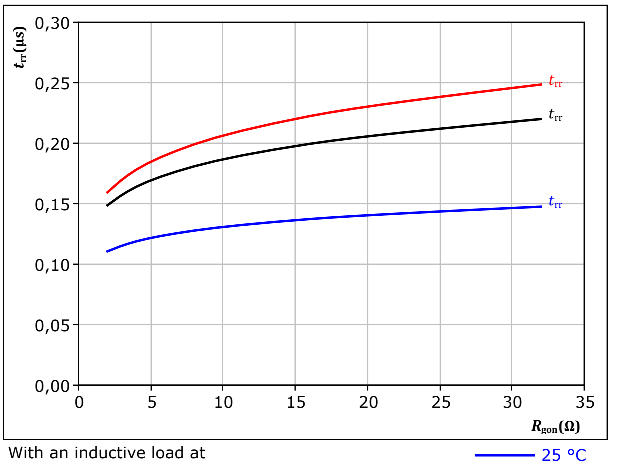
V_{CE} =	750	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

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} =	750	V
V_{GE} =	±15	V
I_C =	170	A

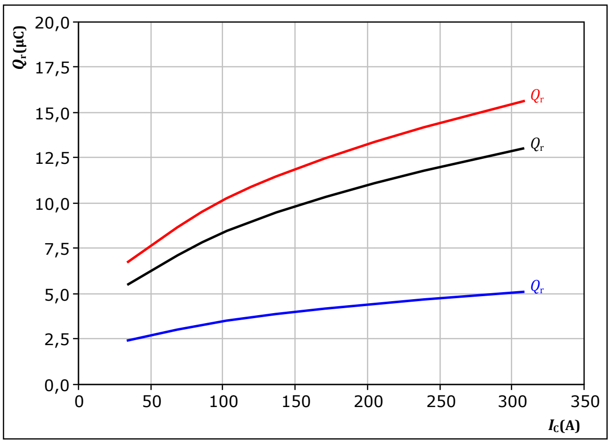
T_j: 25 °C, 125 °C, 150 °C

DC-Link Switching Characteristics

figure 46. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



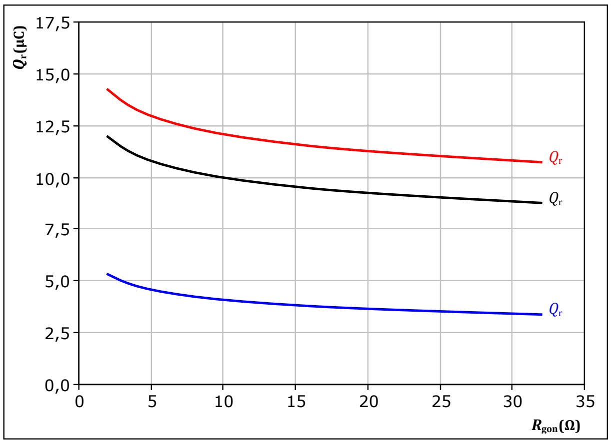
With an inductive load at

V_{CE} =	750	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 47. **FWD**

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

Q_r = f(R_{gon})



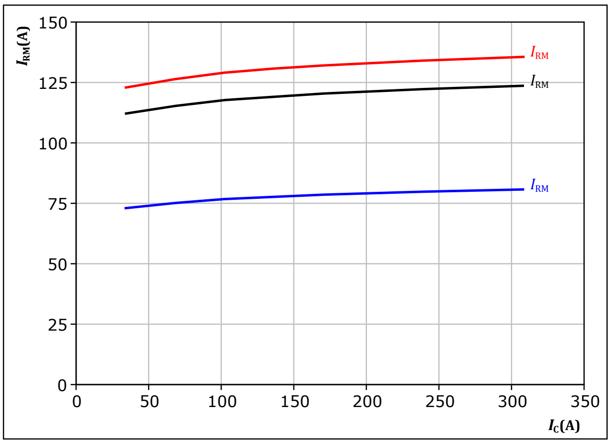
With an inductive load at

V_{CE} =	750	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	170	A		150 °C

figure 48. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



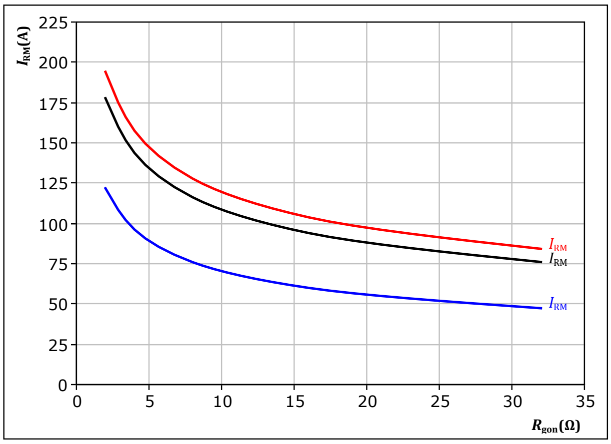
With an inductive load at

V_{CE} =	750	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	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

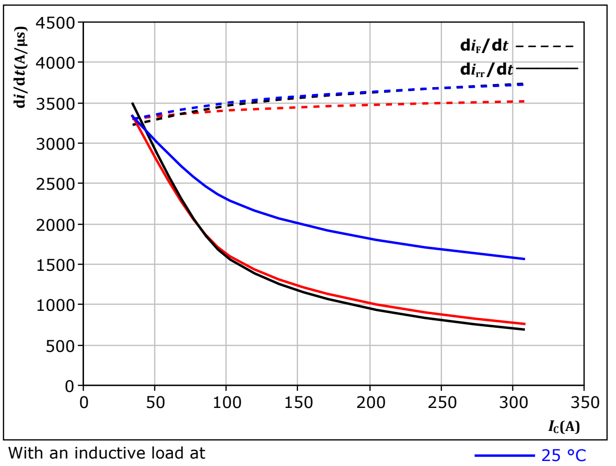
V_{CE} =	750	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	170	A		150 °C

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)



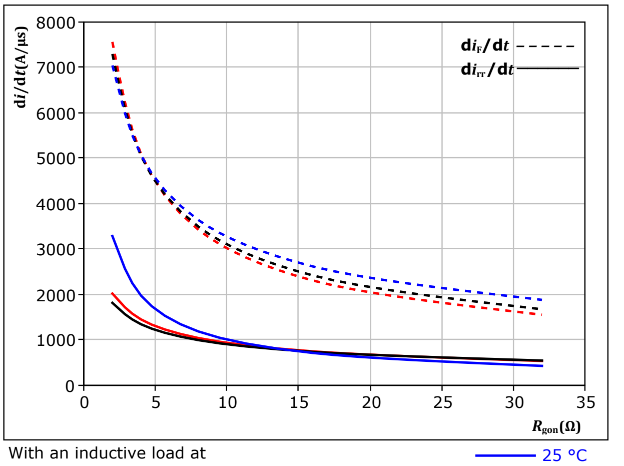
With an inductive load at

V_{CE} =	750	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	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})



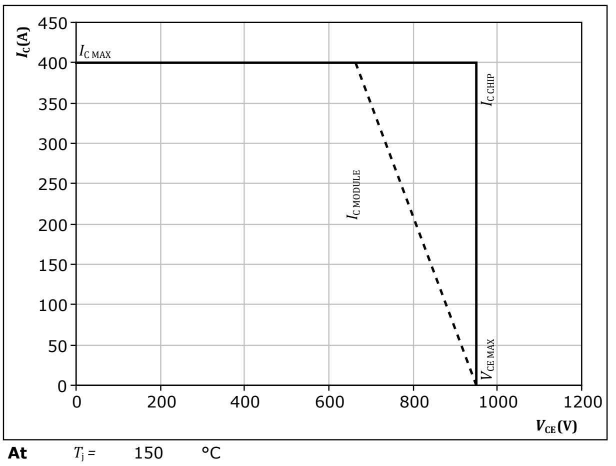
With an inductive load at

V_{CE} =	750	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	170	A		150 °C

figure 52. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At	T_j =	150	°C
	R_{gon} =	8	Ω
	R_{goff} =	8	Ω

Switching Definitions

figure 53. **IGBT**

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

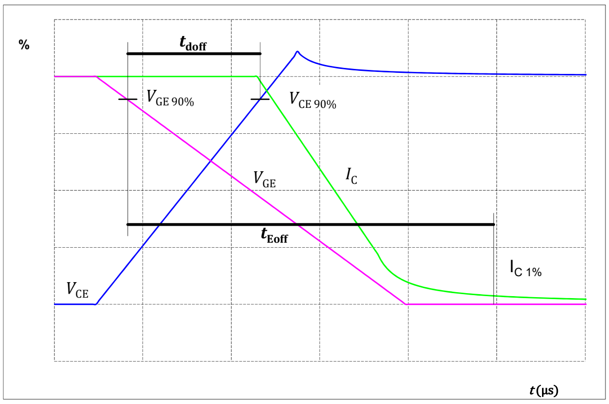


figure 54. **IGBT**

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

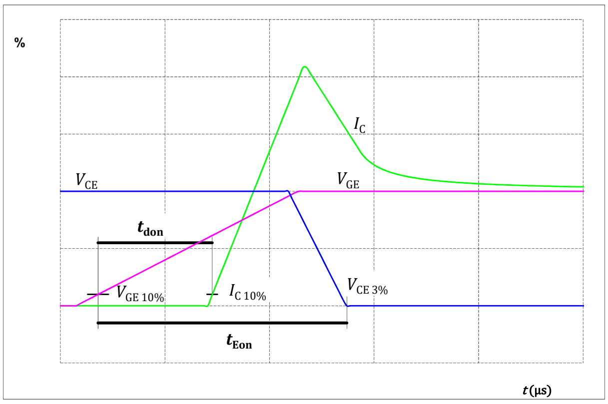


figure 55. **IGBT**

Turn-off Switching Waveforms & definition of t_f

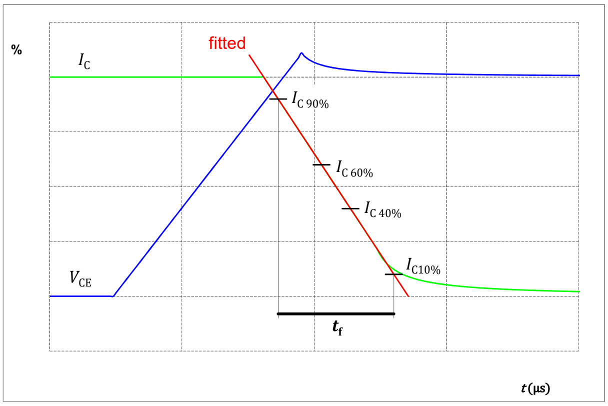
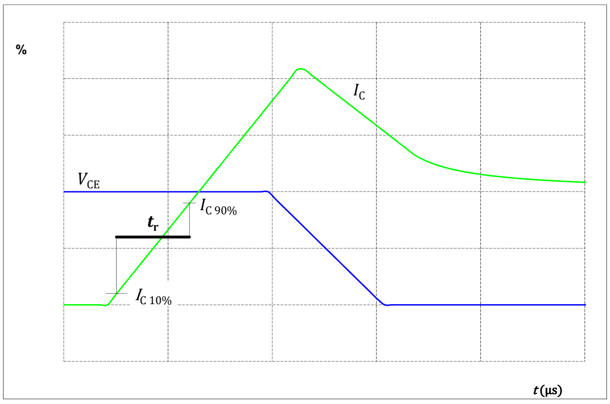


figure 56. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 57. **FWD**

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

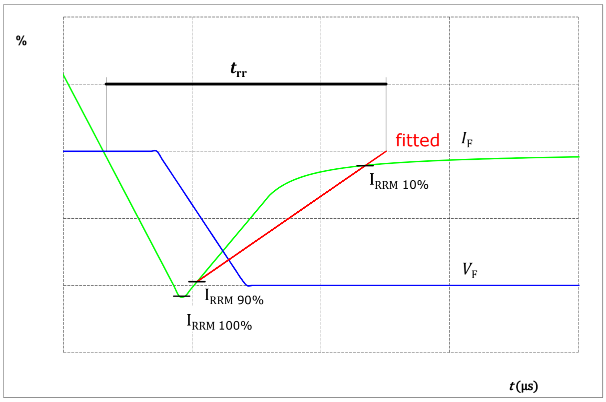
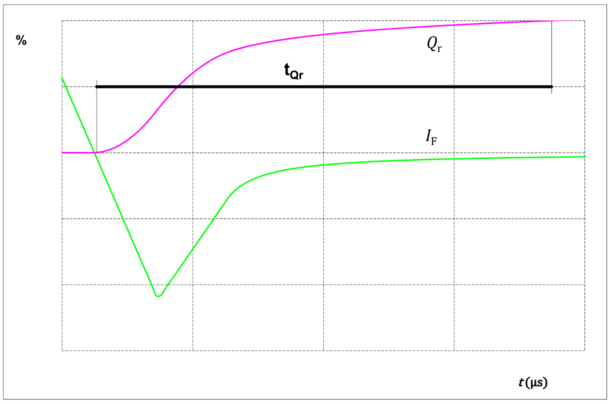


figure 58. **FWD**

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



Ordering Code

Version	Ordering Code
Without thermal paste	30-PT10NAA200S701-PE59F08Y
With thermal paste (3,4 W/mK, PSX-P7)	30-PT10NAA200S701-PE59F08Y-/3/

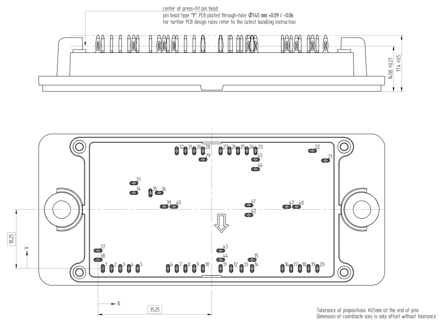
Marking

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

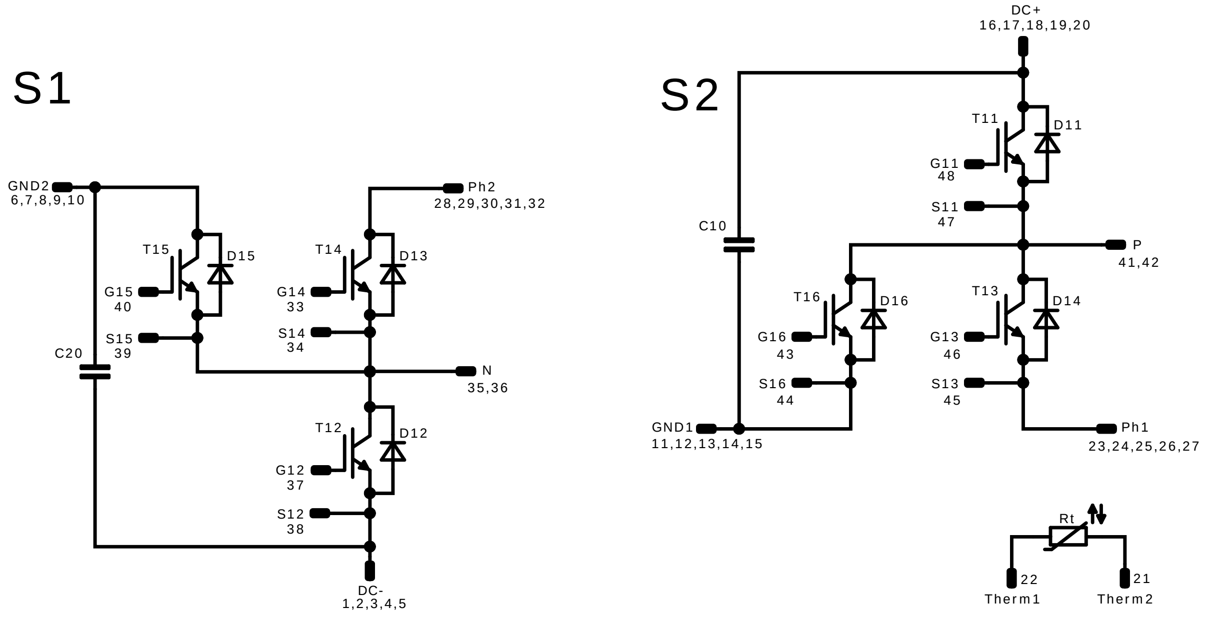
Outline

Pin table [mm]

Pin	X	Y	Function	25	43,4	36,5	Ph1
1	1,5	0	DC-	26	40,7	36,5	Ph1
2	4,2	0	DC-	27	38	36,5	Ph1
3	6,9	0	DC-	28	32,5	36,5	Ph2
4	9,6	0	DC-	29	32,5	33,8	Ph2
5	12,3	0	DC-	30	29,8	36,5	Ph2
6	21,7	0	GND2	31	27,1	36,5	Ph2
7	24,4	0	GND2	32	24,4	36,5	Ph2
8	27,1	0	GND2	33	11,1	26,45	G14
9	29,8	0	GND2	34	11,1	23,45	S14
10	32,5	0	GND2	35	16,25	23,45	N
11	38	0	GND1	36	18,95	23,45	N
12	41,25	0	GND1	37	0	5,55	G12
13	44,5	0	GND1	38	0	2,7	S12
14	47,75	0	GND1	39	20,5	19,2	S15
15	47,75	2,7	GND1	40	23,5	19,2	G15
16	57,15	0	DC+	41	46,75	19,6	P
17	59,85	0	DC+	42	46,75	16,6	P
18	62,55	0	DC+	43	38	5,55	G16
19	65,25	0	DC+	44	38	2,7	S16
20	67,95	0	DC+	45	48,8	33,8	S13
21	70,5	33,5	Therm2	46	48,8	30,8	G13
22	66,45	36,5	Therm1	47	58,5	19,15	S11
23	48,8	36,5	Ph1	48	61,5	19,15	G11
24	46,1	36,5	Ph1				



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T13, T14	IGBT	950 V	200 A	AC Switch	
D13, D14	FWD	950 V	200 A	AC Diode	
T15, T16	IGBT	950 V	200 A	Neutral Point Switch	
D12, D11	FWD	950 V	200 A	DC-Link Diode	
T11, T12	IGBT	950 V	200 A	DC-Link Switch	
D16, D15	FWD	950 V	200 A	Neutral Point Diode	
C10, C20	Capacitor	1000 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 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
30-PT10NAA200S701-PE59F08Y-D1-14	23 Aug. 2022		