30-EP12NIA600H702-PM00F85T

datasheet

***flow*NPC E3BP** **1200 V / 600 A**

Topology features

- Low side Kelvin Emitter for improved switching performance
- Neutral Point Clamped Topology (I-Type)
- Split topology
- Temperature sensor

Component features

- High speed switching
- Low collector emitter saturation voltage
- Low turn-off losses
- Optimized for hard switching topologies
- Positive temperature coefficient

Housing features

- Base isolation: Al_2O_3
- Cu baseplate
- Convex shaped baseplate for superior thermal contact
- CTI600 housing material
- Baseplate with rough surface
- Press-fit pin
- Reliable cold welding connection
- Thermo-mechanical push-and-pull force relief

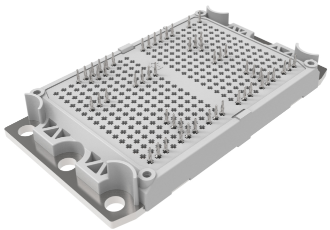
Target applications

- Solar Inverters

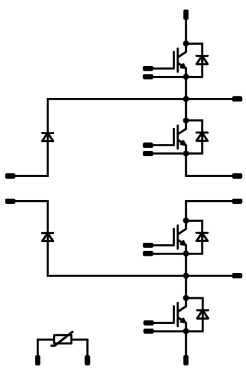
Types

- 30-EP12NIA600H702-PM00F85T

flow E3BP 12 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Buck Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	375	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		1800	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		1800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	708	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	240	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		1200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	470	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	298	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	551	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	110	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	196	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Inv. Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	110	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	196	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 s	6800	V
Creepage distance				>12,7	mm
Clearance				>12,7	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

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
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0096	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	V_{CEsat}		15		600	25 125 150		1,84 2,12 2,2	2,15(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			32	µA
Gate-emitter leakage current	I_{GES}		20	0		25			800	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		76800		pF
Output capacitance	C_{oes}							1472		pF
Reverse transfer capacitance	C_{res}							432		pF
Gate charge	Q_g	V_{CC} = 960 V	0/15		600	25		4400		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,13		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	600	25 125 150		434,93 435,69 440,71		ns
Rise time	t_r					25 125 150		38,15 38,05 37,94		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		345,89 384,06 395,75		ns
Fall time	t_f					25 125 150		32,21 61,55 67,3		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=9,45 µC Q_{rFWD}=27,62 µC Q_{rFWD}=30,85 µC				25 125 150		27,13 29,4 29,86		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		16,78 33,3 38,27		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	
Buck Diode										
Static										
Forward voltage	V_F				400	25 125 150		2,86 2,62 2,52	3[(1)]	V
Reverse leakage current	I_R	V_r = 1200 V				25			32	µA
Thermal										
Thermal resistance junction to sink[(2)]	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,2		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=15588 A/µs d*i*/d*t*=16616 A/µs d*i*/d*t*=18557 A/µs	±15	600	600	25 125 150		362,1 545,6 577,7		A
Reverse recovery time	t_{rr}					25 125 150		50,69 150,32 160,7		ns
Recovered charge	Q_r					25 125 150		9,45 27,62 30,85		µC
Reverse recovered energy	E_{rec}					25 125 150		4,2 13 14,39		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		22984,2 20327,3 19077,38		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
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,04	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		400	25 125 150		1,74 2,01 2,08	1,85(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			200	μA
Gate-emitter leakage current	I_{GES}		20	0		25			1000	nA
Internal gate resistance	r_g							1		Ω
Input capacitance	C_{ies}		0	10		25		74000		pF
Output capacitance	C_{oes}							2200		pF
Reverse transfer capacitance	C_{res}							840		pF
Gate charge	Q_g	V_{CC} = 600 V	0/15		400	25		2400		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,17		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	400	25 125 150		428,28 435,05 436,05		ns
Rise time	t_r					25 125 150		103,05 115,9 120,93		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		283,52 320,34 331,2		ns
Fall time	t_f					25 125 150		67,91 89,59 96,53		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=5,97 μC Q_{rFWD}=13,28 μC Q_{rFWD}=15,74 μC				25 125 150		34,02 44,84 47,91		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		30,36 41,66 44,65		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	
Boost Diode										
Static										
Forward voltage	V_F				200	25 125 150		2,72 2,42 2,34	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			8	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,48		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=3256 A/µs d*i*/d*t*=3499 A/µs d*i*/d*t*=2911 A/µs	±15	600	400	25 125 150		96,99 113,85 119,02		A
Reverse recovery time	t_{rr}					25 125 150		157,94 255,7 291,62		ns
Recovered charge	Q_r					25 125 150		5,97 13,28 15,74		µC
Reverse recovered energy	E_{rec}					25 125 150		1,11 2,95 3,62		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3387,9 943,29 472,79		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	
Boost Sw. Inv. Diode										
Static										
Forward voltage	V_F				200	25 125 150		2,72 2,42 2,34	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			8	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,48		K/W
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

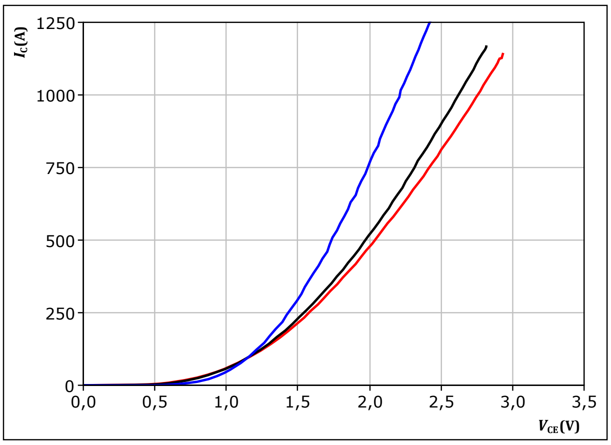
(2) Only valid with pre-applied Vincotech thermal interface material.

Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

I_C = f(V_{CE})

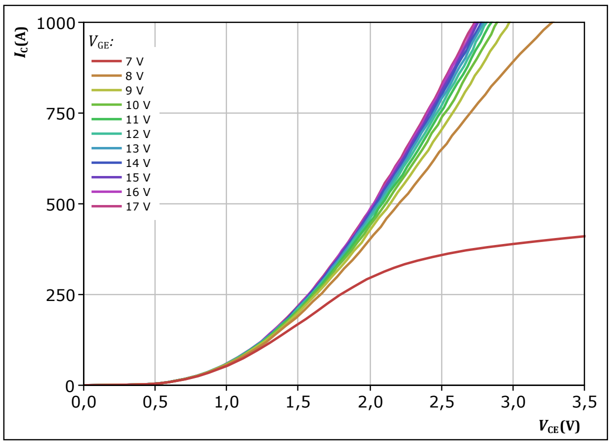


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 2. IGBT

Typical output characteristics

I_C = f(V_{CE})

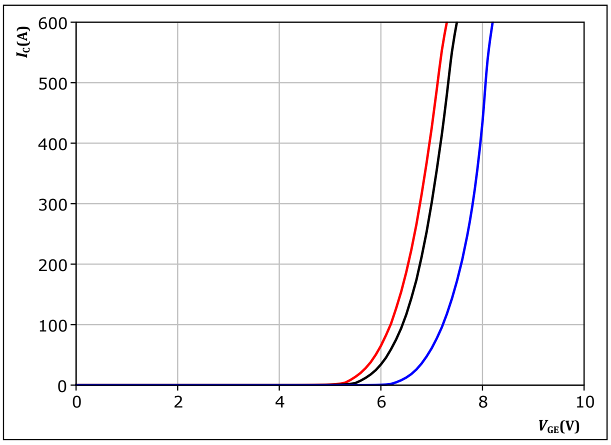


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

I_C = f(V_{GE})

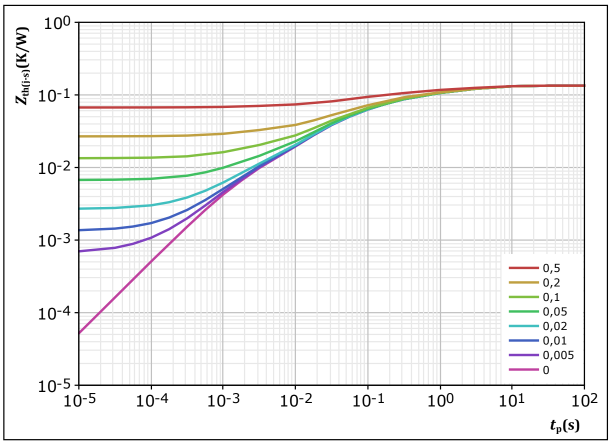


t_p = 250 µs
V_{CE} = 10 V
T_j: 25 °C, 125 °C, 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 0,134 K/W

IGBT thermal model values

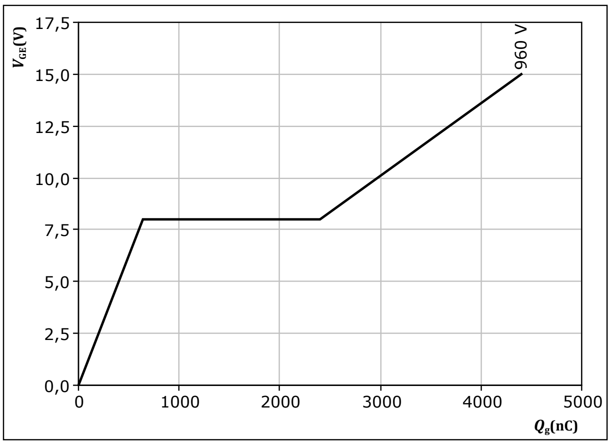
R (K/W)	τ (s)
1,79E-02	5,14E+00
2,60E-02	1,43E+00
4,74E-02	1,95E-01
3,68E-02	2,86E-02
6,13E-03	1,70E-03

Buck Switch Characteristics

figure 5.	IGBT

Gate voltage vs gate charge

$V_{GE} = f(Q_g)$



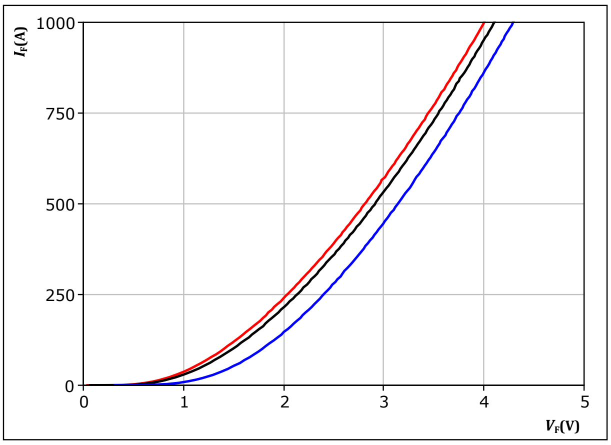
I_C =	600	A
T_j =	25	°C

Buck Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



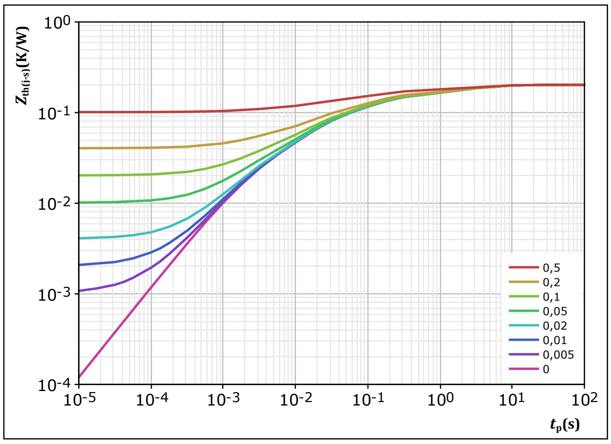
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,202 K/W

FWD thermal model values

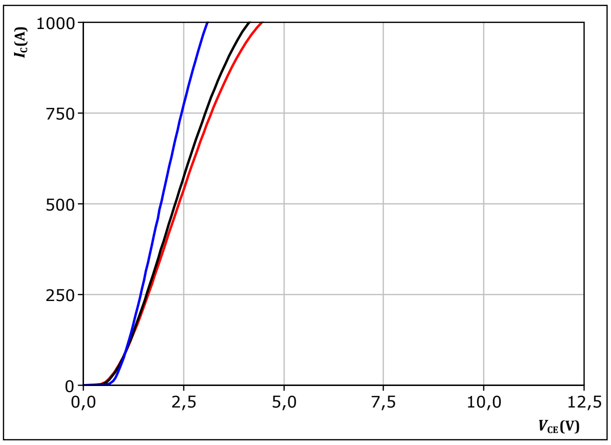
R (K/W)	τ (s)
1,01E-02	6,63E+00
4,38E-02	2,17E+00
7,49E-02	1,27E-01
5,75E-02	1,74E-02
1,59E-02	1,98E-03

Boost Switch Characteristics

figure 8. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

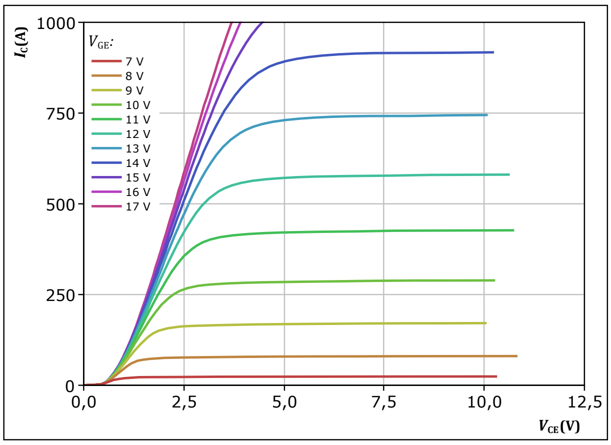


t_p = 250 μs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 9. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

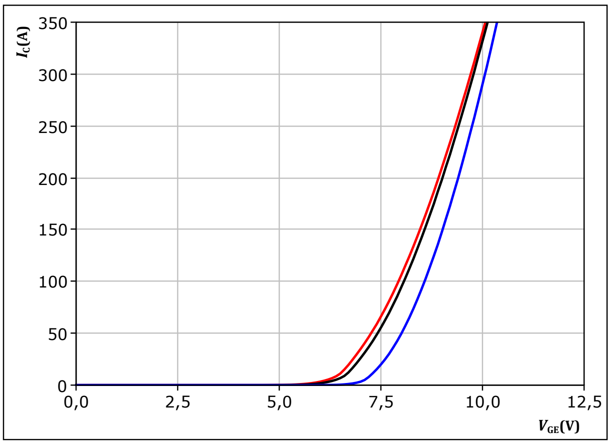


t_p = 250 μs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

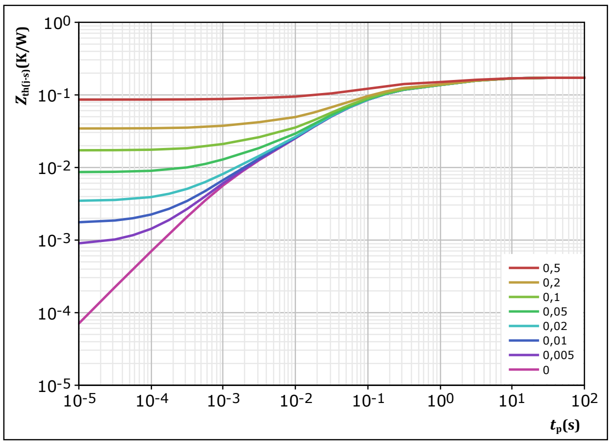


t_p = 250 μs
V_{CE} = 10 V
T_j: 25 °C, 125 °C, 150 °C

figure 11. **IGBT**

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 0,172 K/W

IGBT thermal model values

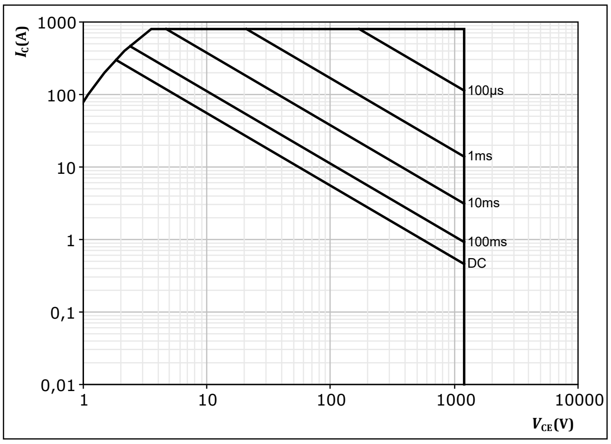
R (K/W)	τ (s)
2,18E-02	5,31E+00
3,84E-02	1,27E+00
7,42E-02	1,08E-01
3,10E-02	2,16E-02
6,97E-03	1,39E-03

Boost Switch Characteristics

figure 12. **IGBT**

Safe operating area

I_C = f(V_{CE})



D = single pulse

T_s = 80 °C

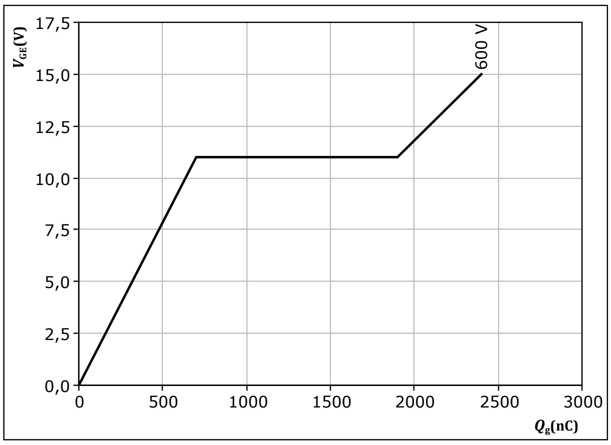
V_{GE} = 15 V

T_j = T_{jmax}

figure 13. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



I_C = 400 A

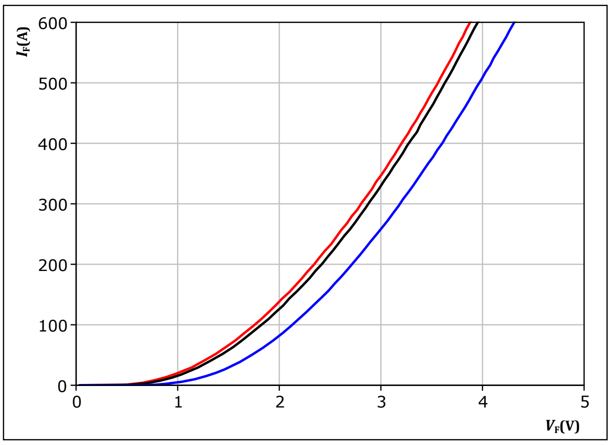
T_j = 25 °C

Boost Diode Characteristics

figure 14. **FWD**

Typical forward characteristics

I_F = f(V_F)



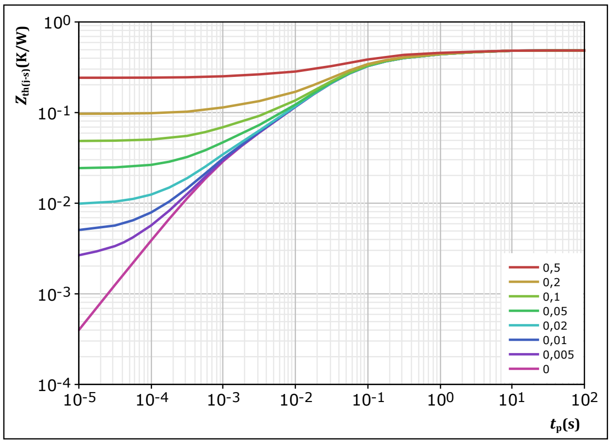
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 15. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,484 K/W

FWD thermal model values

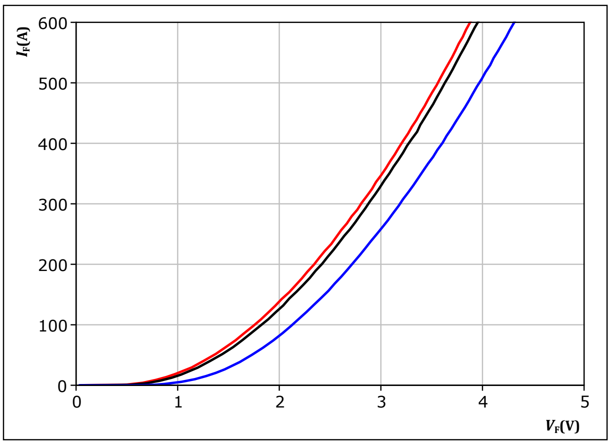
R (K/W)	τ (s)
4,96E-02	3,28E+00
7,95E-02	4,30E-01
2,38E-01	6,16E-02
8,86E-02	1,21E-02
2,86E-02	9,94E-04

Boost Sw. Inv. Diode Characteristics

figure 16. **FWD**

Typical forward characteristics

I_F = f(V_F)



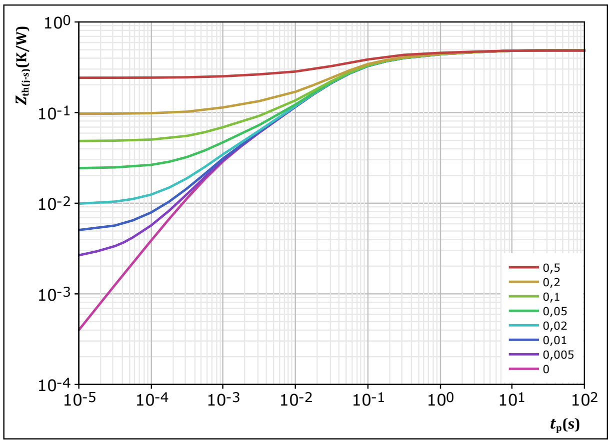
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 17. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,484 K/W

FWD thermal model values

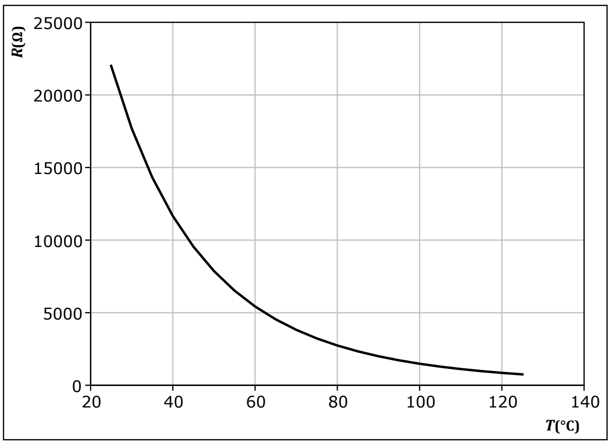
R (K/W)	τ (s)
4,96E-02	3,28E+00
7,95E-02	4,30E-01
2,38E-01	6,16E-02
8,86E-02	1,21E-02
2,86E-02	9,94E-04

Thermistor Characteristics

figure 18. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

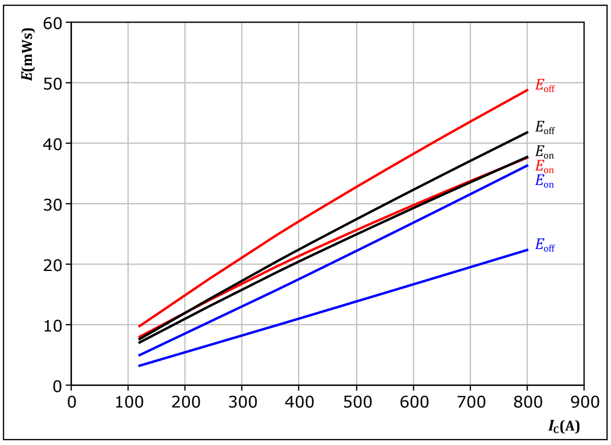


Buck Switching Characteristics

figure 19. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



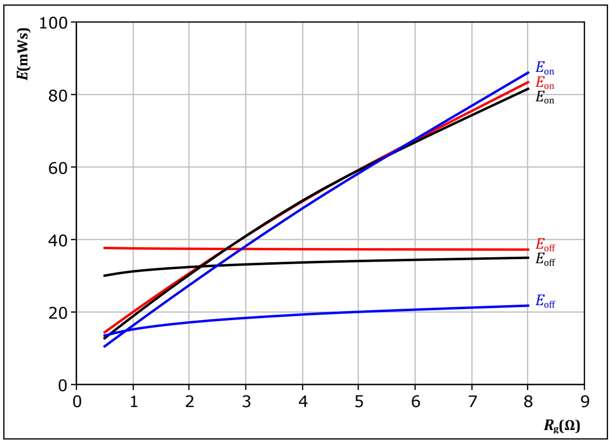
With an inductive load at

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 20. **IGBT**

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

E = f(R_g)



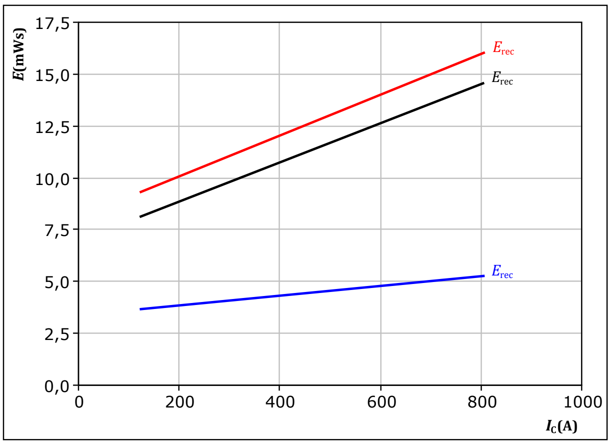
With an inductive load at

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

figure 21. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



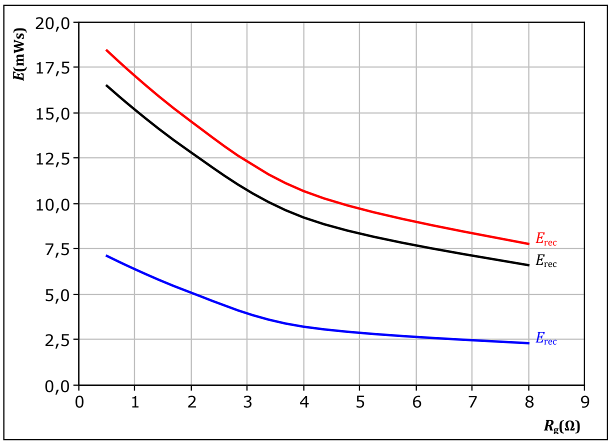
With an inductive load at

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

figure 22. **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

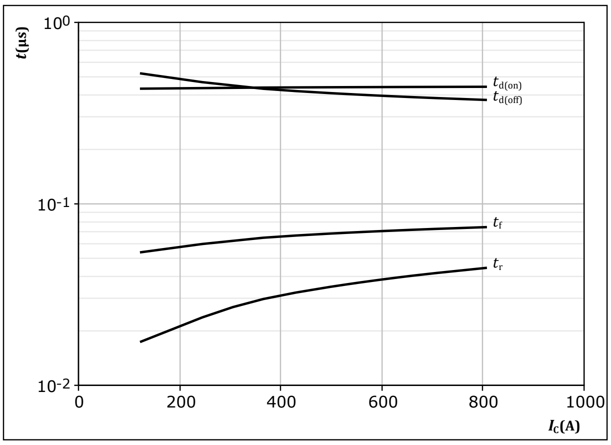
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	600	A		150 °C

Buck Switching Characteristics

figure 23. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



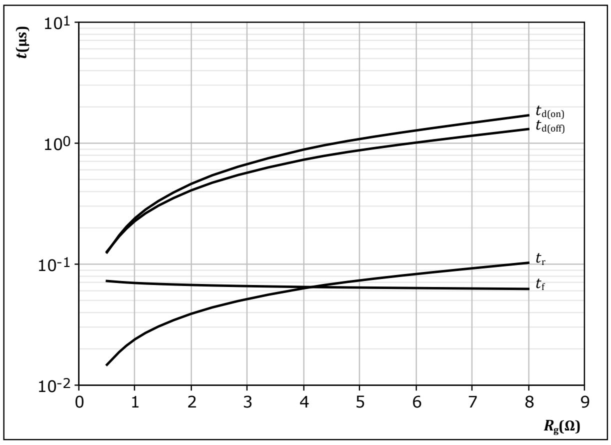
With an inductive load at

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

figure 24. **IGBT**

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

t = f(R_g)



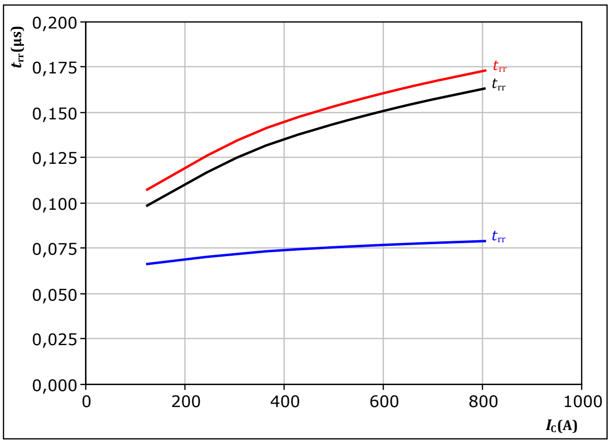
With an inductive load at

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

figure 25. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

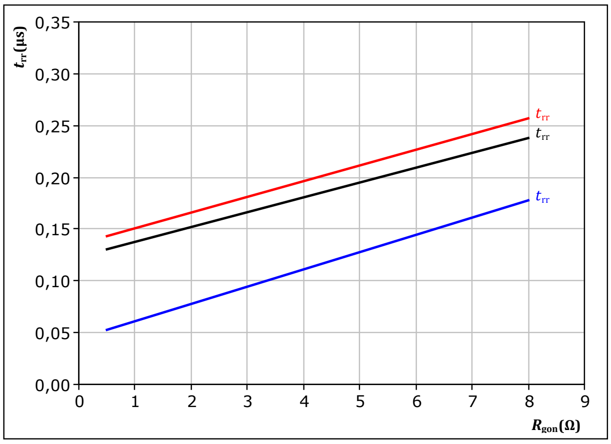
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 26. **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 =	600	A

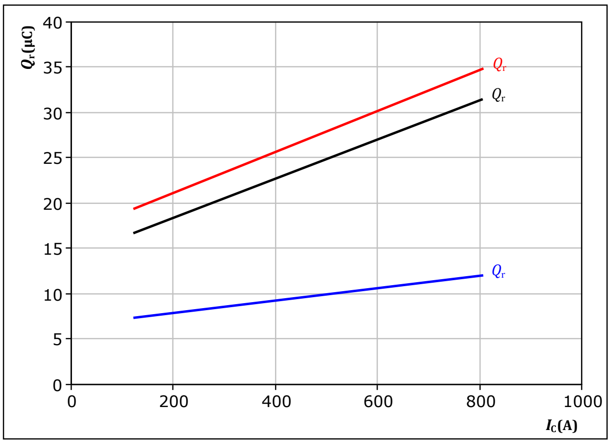
T_j: 25 °C, 125 °C, 150 °C

Buck Switching Characteristics

figure 27. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



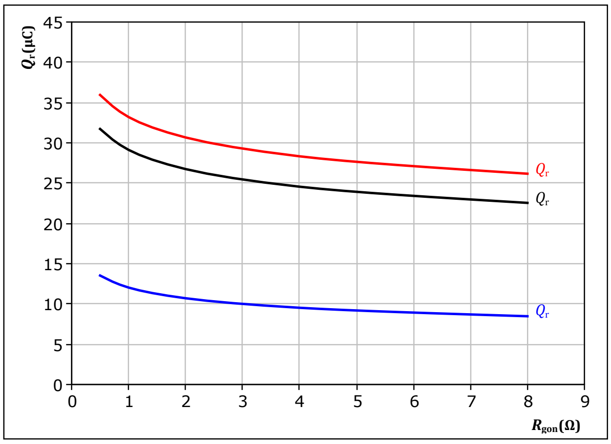
With an inductive load at

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

figure 28. **FWD**

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

Q_r = f(R_{gon})



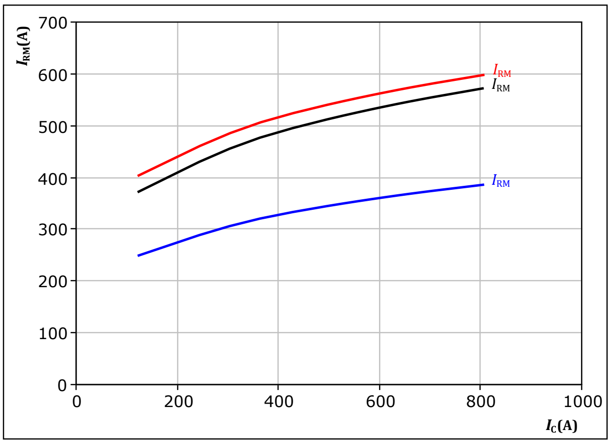
With an inductive load at

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

figure 29. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



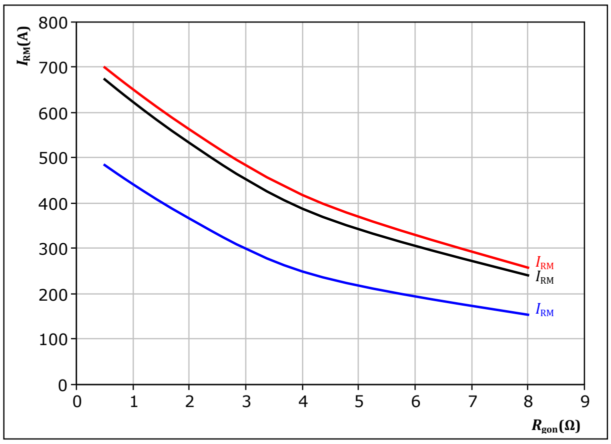
With an inductive load at

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

figure 30. **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

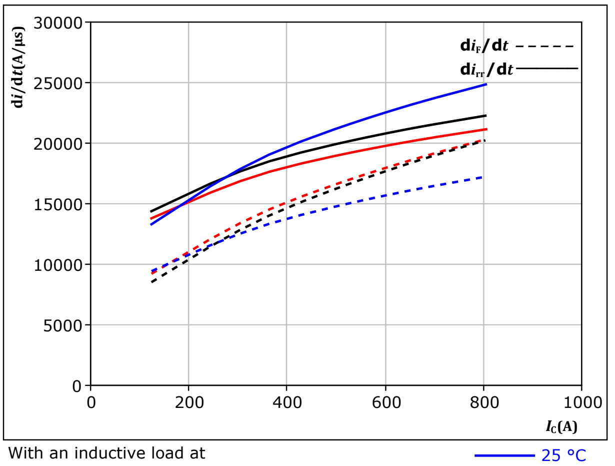
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	600	A		150 °C

Buck Switching Characteristics

figure 31. **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

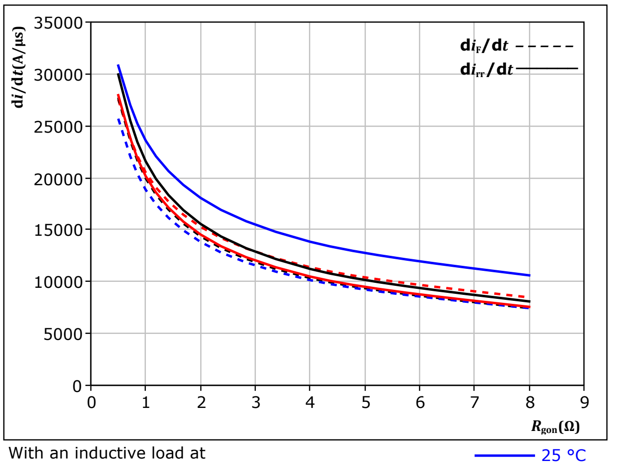
V_{CE} =	600	V	
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

T_j:

figure 32. **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

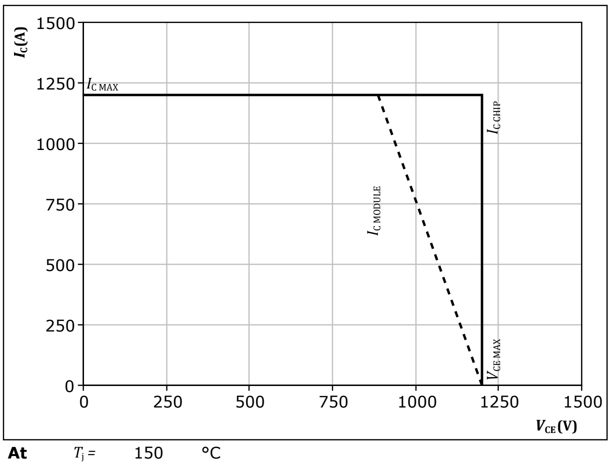
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	600	A

T_j:

figure 33. **IGBT**

Reverse bias safe operating area

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



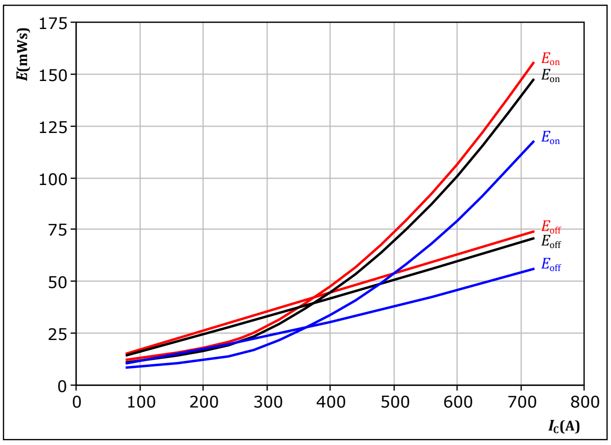
At			
	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

Boost Switching Characteristics

figure 34. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

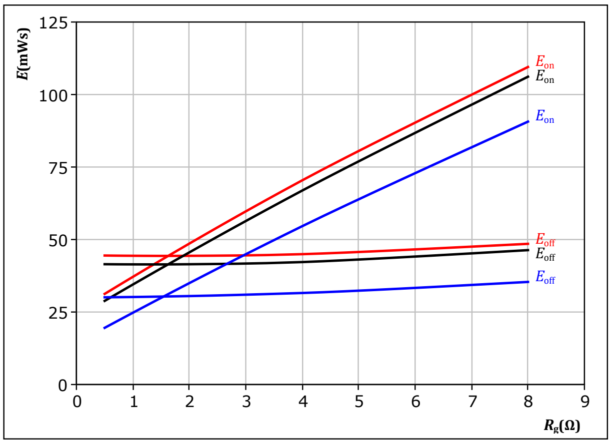
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
R_{goff} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 35. **IGBT**

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

E = f(R_g)



With an inductive load at

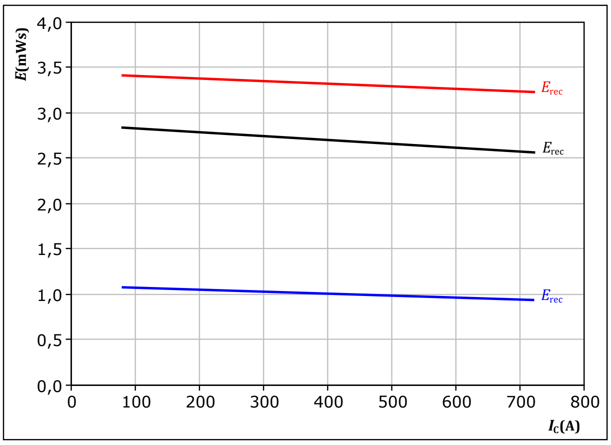
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 400 A

T_j: 25 °C, 125 °C, 150 °C

figure 36. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

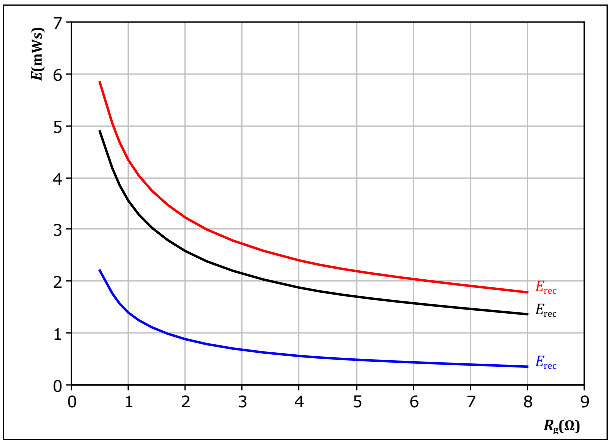
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 37. **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 = 400 A

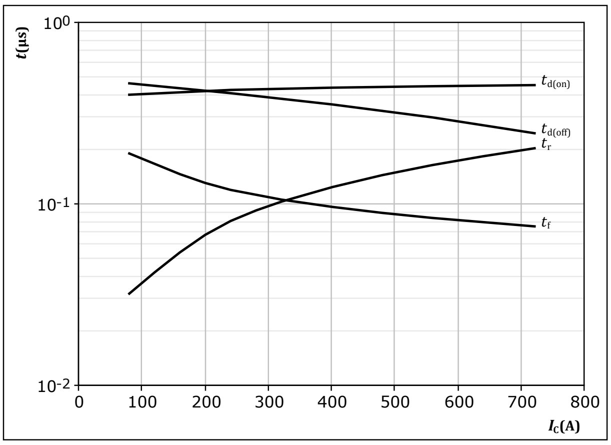
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 38. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



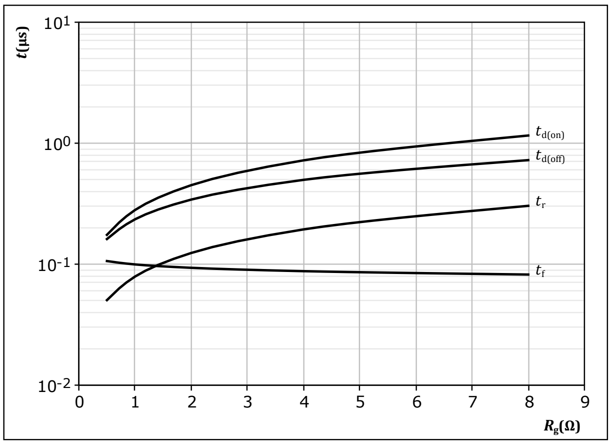
With an inductive load at

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

figure 39. **IGBT**

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

t = f(R_g)



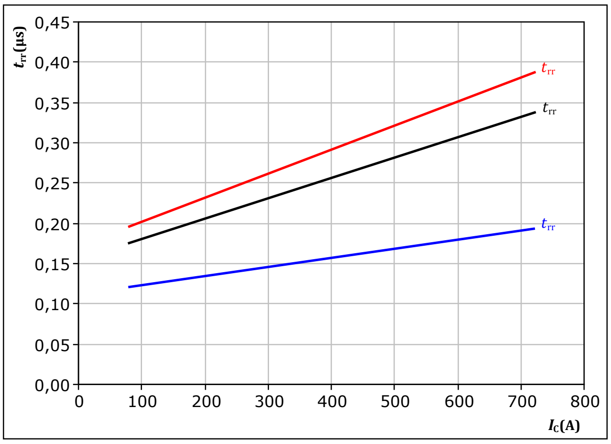
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	400	A

figure 40. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

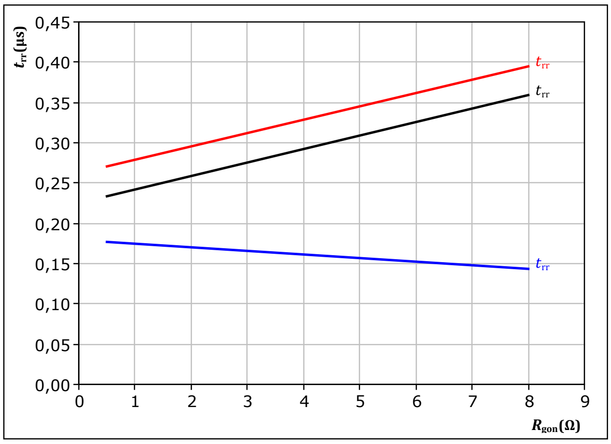
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 41. **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 =	400	A

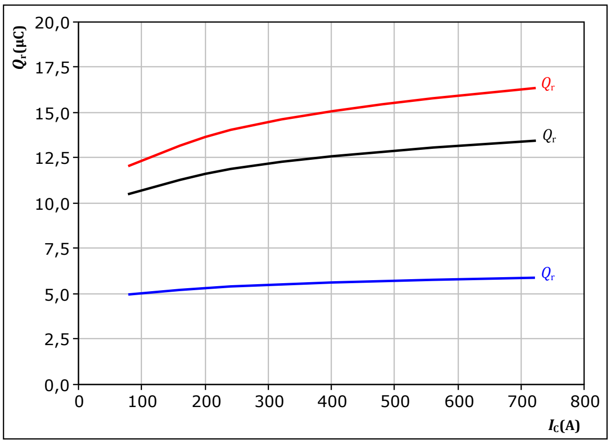
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 42. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



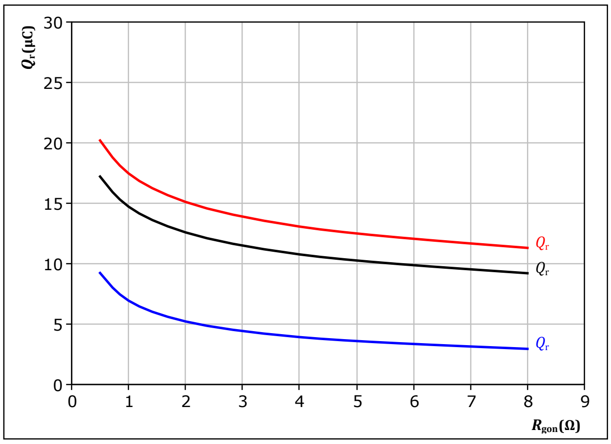
With an inductive load at

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

figure 43. **FWD**

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

Q_r = f(R_{gon})



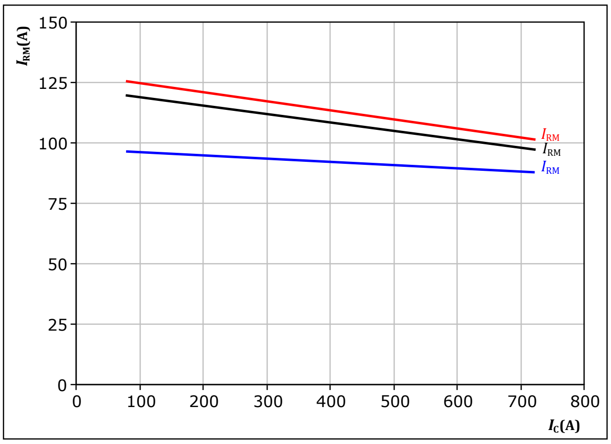
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

figure 44. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



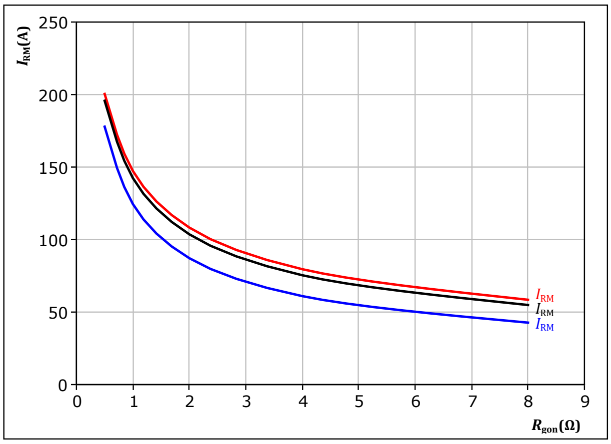
With an inductive load at

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

figure 45. **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

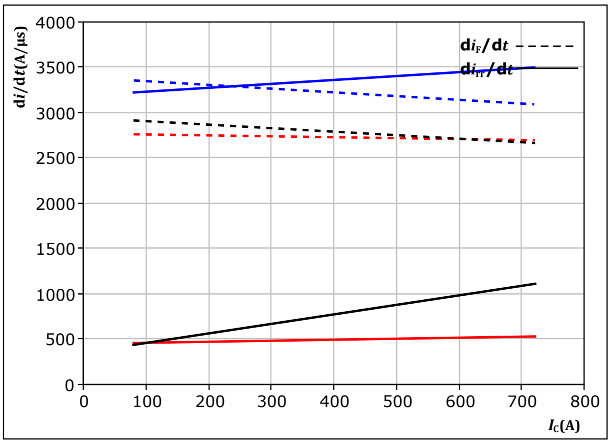
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

Boost Switching Characteristics

figure 46. **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)



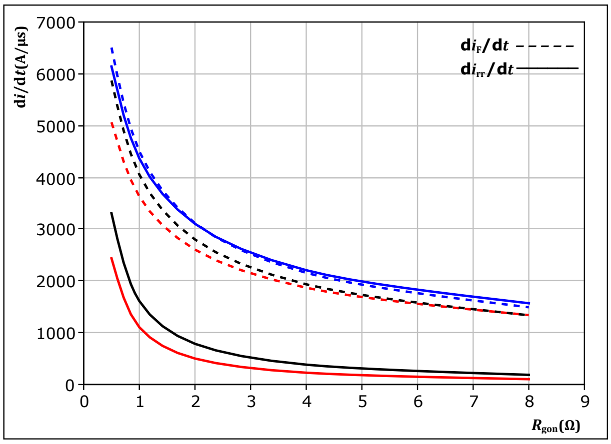
With an inductive load at

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

figure 47. **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})



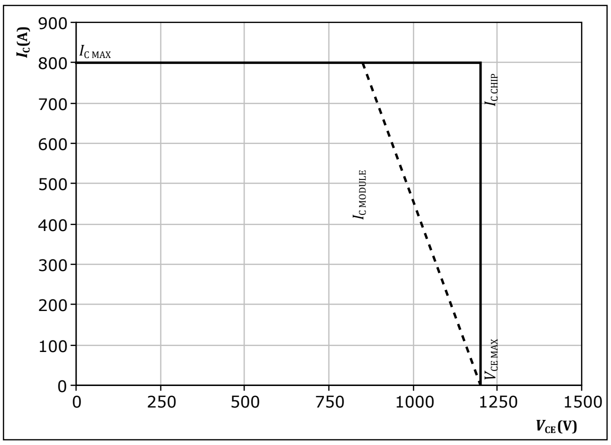
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	400	A	150 °C

figure 48. **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 49. **IGBT**

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

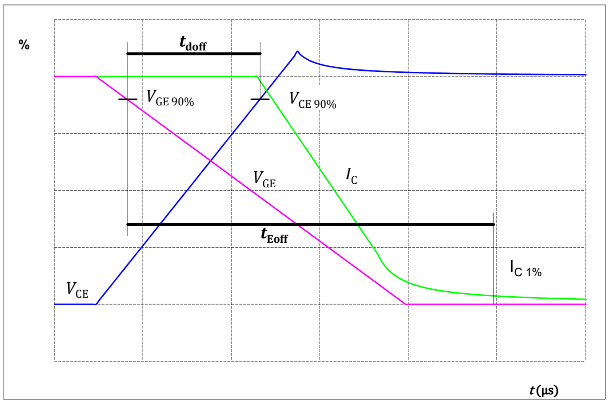


figure 50. **IGBT**

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

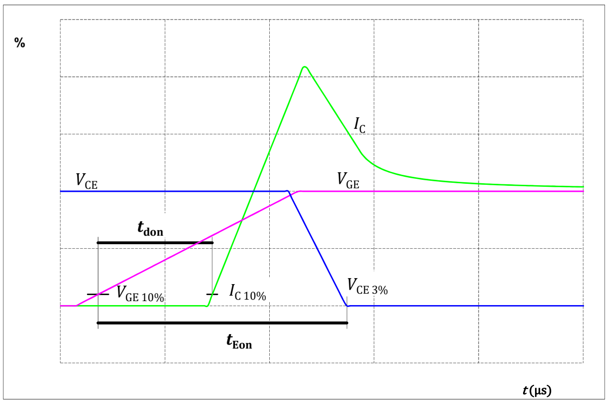


figure 51. **IGBT**

Turn-off Switching Waveforms & definition of t_f

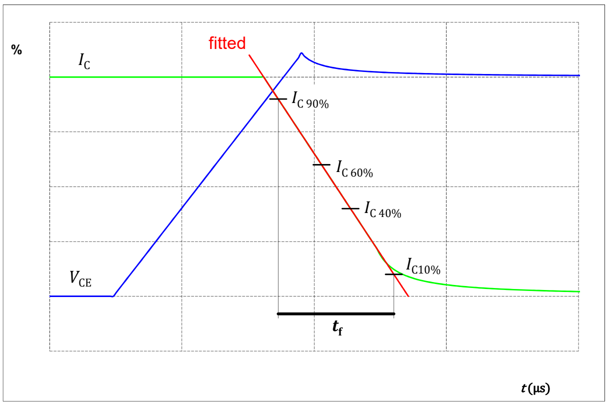
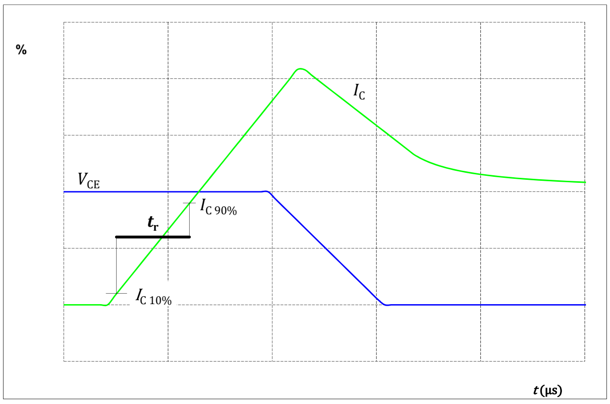


figure 52. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 53.	FWD

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

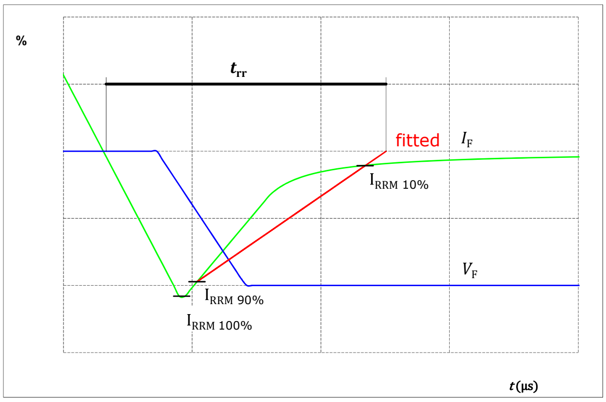
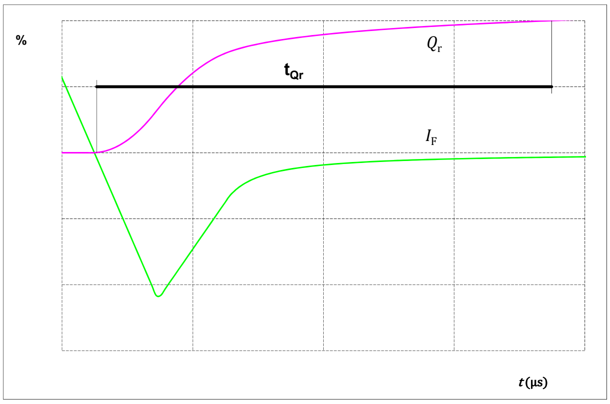


figure 54.	FWD

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



Ordering Code

Version	Ordering Code
Without thermal paste	30-EP12NIA600H702-PM00F85T
With thermal paste (5,2 W/mK, PTM6000HV)	30-EP12NIA600H702-PM00F85T-/7/

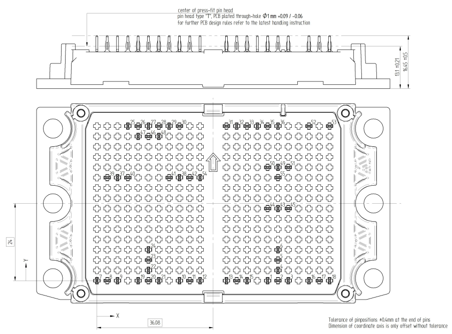
Marking

	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		

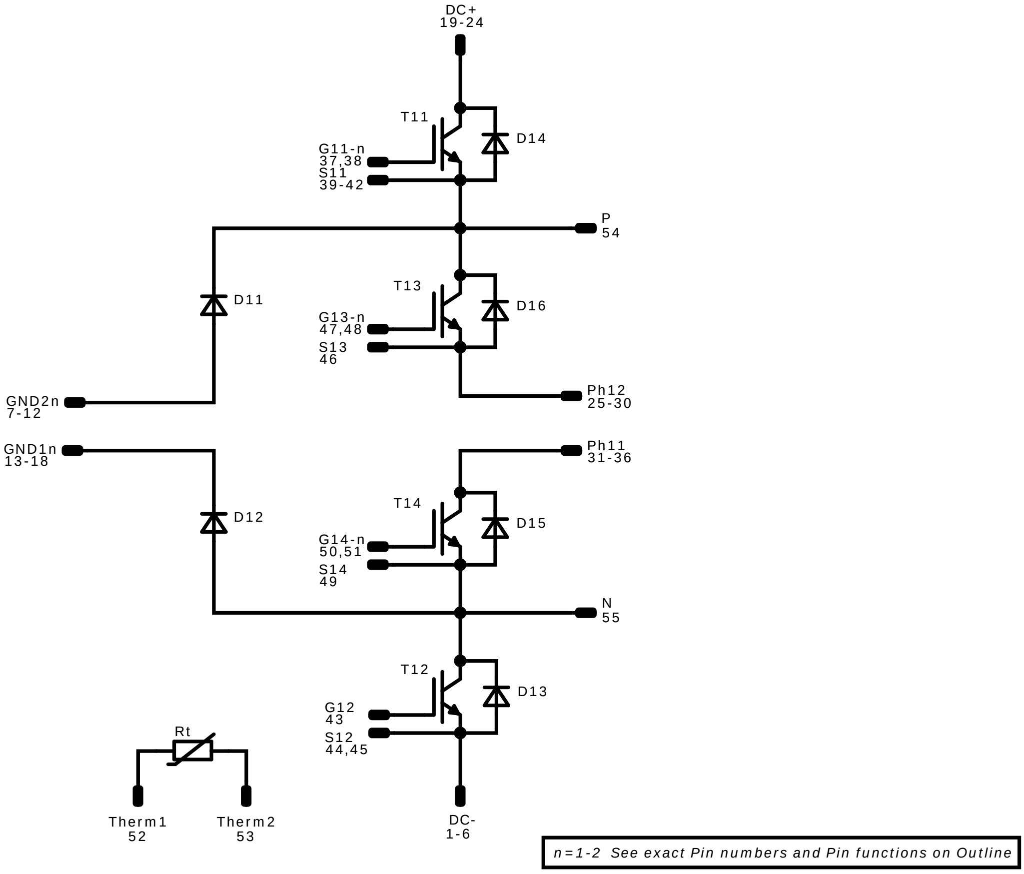
Outline

Pin table [mm]

Pin	X	Y	Function	Pin	X	Y	Function
1	52,96	0	DC-	29	22,4	48	Ph12
2	56,16	0	DC-	30	25,6	48	Ph12
3	59,36	0	DC-	31	40,16	48	Ph11
4	56,16	3,2	DC-	32	43,36	48	Ph11
5	56,16	6,4	DC-	33	46,56	48	Ph11
6	56,16	9,6	DC-	34	49,76	48	Ph11
7	0	0	GND21	35	52,96	48	Ph11
8	3,2	0	GND21	36	56,16	48	Ph11
9	6,4	0	GND21	37	6,4	32	G11-1
10	25,6	0	GND22	38	25,6	32	G11-2
11	28,8	0	GND22	39	3,2	32	S11
12	32	0	GND22	40	9,6	32	S11
13	40,16	0	GND12	41	22,4	32	S11
14	43,36	0	GND12	42	28,8	32	S11
15	46,56	0	GND12	43	56,16	22,4	G12
16	65,76	0	GND11	44	52,96	22,4	S12
17	68,96	0	GND11	45	59,36	22,4	S12
18	72,16	0	GND11	46	16	44,8	S13
19	12,8	0	DC+	47	12,8	44,8	G13-1
20	16	0	DC+	48	19,2	44,8	G13-2
21	19,2	0	DC+	49	56,16	35,2	S14
22	16	3,2	DC+	50	52,96	35,2	G14-2
23	16	6,4	DC+	51	59,36	35,2	G14-1
24	16	9,6	DC+	52	65,76	48	Therm1
25	9,6	48	Ph12	53	72,16	48	Therm2
26	12,8	48	Ph12	54	32	32	P
27	16	48	Ph12	55	56,16	32	N
28	19,2	48	Ph12				



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	600 A	Buck Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12	FWD	1200 V	400 A	Buck Diode	Parallel devices. Values apply to complete device.
T13, T14	IGBT	1200 V	400 A	Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D14	FWD	1200 V	200 A	Boost Diode	Parallel devices. Values apply to complete device.
D16, D15	FWD	1200 V	200 A	Boost Sw. Inv. Diode	
Rt	Thermistor			Thermistor	

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

Handling instruction
Handling instructions for *flow* E3BP packages see vincotech.com website.

Package data
Package data for *flow* E3BP 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 UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}$=175°C and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-EP12NIA600H702-PM00F85T-D3-14	10 Jul. 2025	Update Isolation Voltage	