30-E312NMA400H7-PM19F07Z

datasheet

***flow*MNPC E3BP** | **1200 V / 400 A**

Topology features

- Kelvin Emitter for improved switching performance
- Mixed Voltage Neutral Point Clamped Topology (T-Type)
- 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
- Thermo-mechanical push-and-pull force relief
- Solder pin

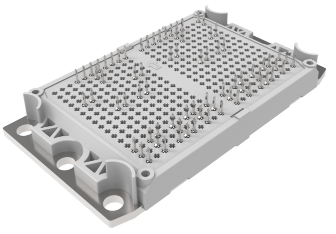
Target applications

- Energy Storage Systems
- Solar Inverters
- UPS

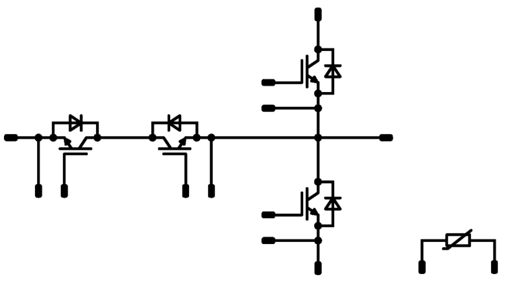
Types

- 30-E312NMA400H7-PM19F07Z

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	290	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		1200	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		1200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	523	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	304	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	429	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	282	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		800	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	457	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
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	197	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	395	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	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	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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0064	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	V_{CEsat}		15		400	25 125 150		1,78 1,94 1,98	2,15(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			16	µA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		52000		pF
Output capacitance	C_{oes}							960		pF
Reverse transfer capacitance	C_{res}							288		pF
Gate charge	Q_g	V_{CC} = 960 V	0/15		400	25		2856		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,18		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2,13 Ω R_{goff} = 2 Ω	±15	350	400	25 125 150		163,54 166,53 167,08		ns
Rise time	t_r					25 125 150		23,35 25,4 26,18		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		150,59 175,22 181,85		ns
Fall time	t_f					25 125 150		35,83 59,96 65,61		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=9,33 µC Q_{rFWD}=20,18 µC Q_{rFWD}=23,36 µC				25 125 150		7,84 9,58 10,03		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		6,26 11,39 12,76		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		1,65 1,6 1,58	1,92(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			21,2	μA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,22		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=14181 A/μs di/dt=16927 A/μs di/dt=16036 A/μs	±15	350	400	25 125 150		252,33 369,87 396,69		A
Reverse recovery time	t_{rr}					25 125 150		71,69 98,02 109,2		ns
Recovered charge	Q_r					25 125 150		9,33 20,18 23,36		μC
Reverse recovered energy	E_{rec}					25 125 150		1,39 3,73 4,46		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3908,85 4241,9 4306,97		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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,004	25	3,25	4	4,75	V
Collector-emitter saturation voltage	V_{CEsat}		15		400	25 125 150	1,15	1,24 1,7 1,75	1,8(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			100	μA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		22800		pF
Output capacitance	C_{oes}							660		pF
Reverse transfer capacitance	C_{res}							77,2		pF
Gate charge	Q_g	V_{CC} = 400 V	±15		400	25		1680		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,21		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2,13 Ω R_{goff} = 2 Ω	±15	350	400	25 125 150		53,14 53,8 54,13		ns
Rise time	t_r					25 125 150		11,9 13,63 13,92		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		68,03 83,55 87,89		ns
Fall time	t_f					25 125 150		10,82 27,24 32,85		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=8,88 μC Q_{rFWD}=19,69 μC Q_{rFWD}=22,54 μC				25 125 150		2,59 4,02 4,42		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,49 5,92 6,65		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				400	25 125 150		3,11 2,96 2,88	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			16	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,24		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=32542 A/µs di/dt=27583 A/µs di/dt=26872 A/µs	±15	350	400	25 125 150		533,44 639,85 663,43		A
Reverse recovery time	t_{rr}					25 125 150		30 96,31 102,03		ns
Recovered charge	Q_r					25 125 150		8,88 19,69 22,54		µC
Reverse recovered energy	E_{rec}					25 125 150		1,49 4,19 4,82		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		71583,58 49801,89 43067,13		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	
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	

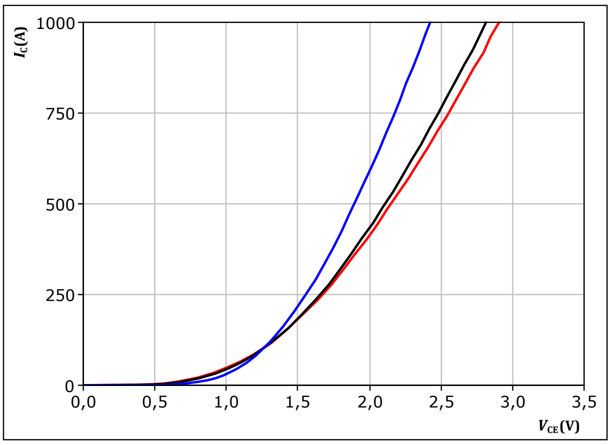
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

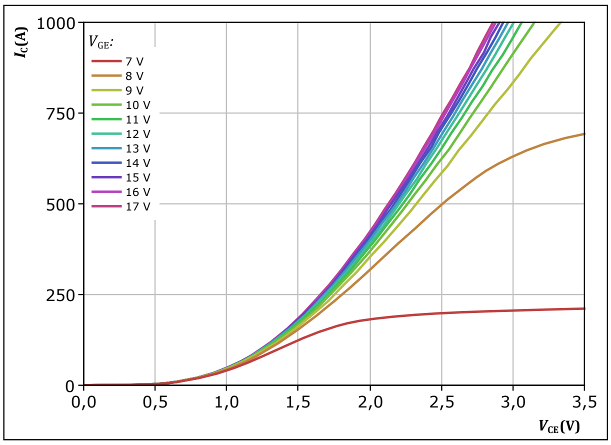


t_p =	250	μs		
V_{GE} =	15	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



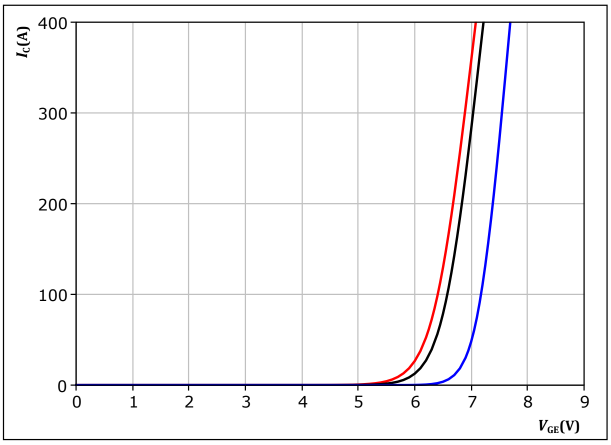
t_p =	250	μs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

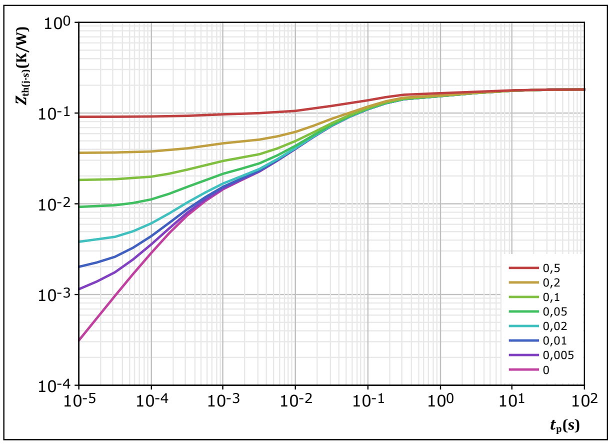


t_p =	250	μs		
V_{CE} =	48	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,182	K/W

IGBT thermal model values

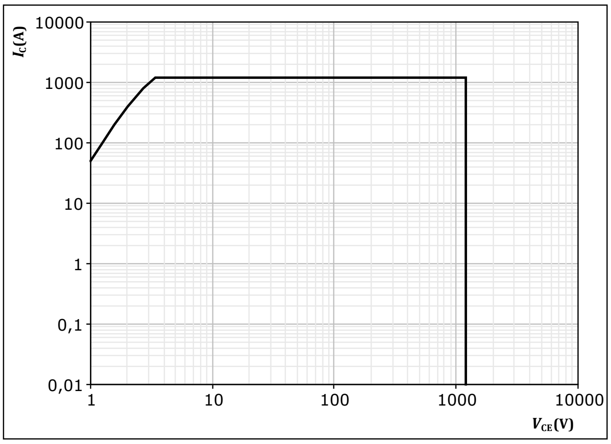
R (K/W)	τ (s)
1,41E-02	9,72E+00
2,56E-02	1,95E+00
8,76E-02	1,03E-01
4,21E-02	1,58E-02
1,24E-02	4,42E-04

Buck Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

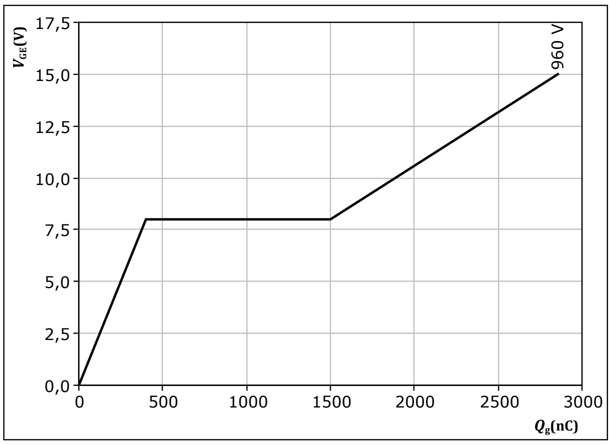


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



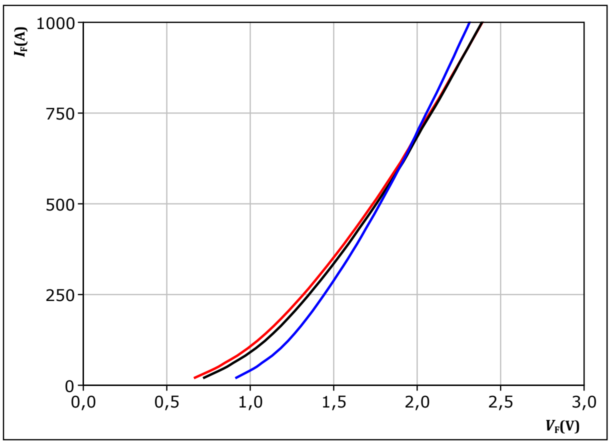
I_C =	400	A
T_j =	25	°C

Buck Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



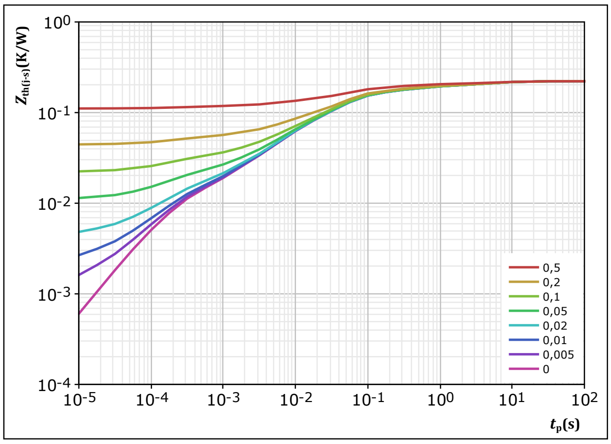
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,222 K/W

FWD thermal model values

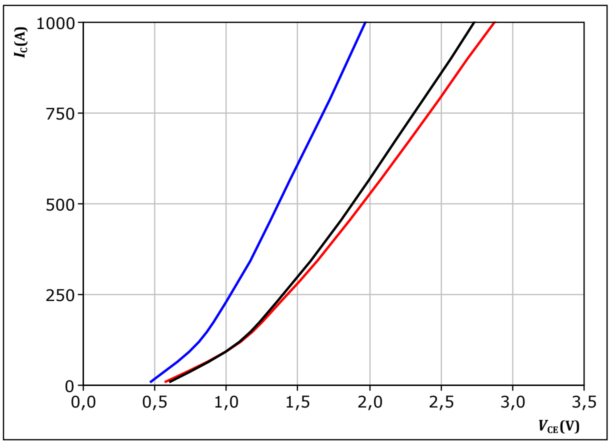
R (K/W)	τ (s)
2,97E-02	5,14E+00
3,36E-02	3,91E-01
1,15E-01	4,51E-02
3,29E-02	5,21E-03
1,08E-02	2,04E-04

Boost Switch Characteristics

figure 9. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

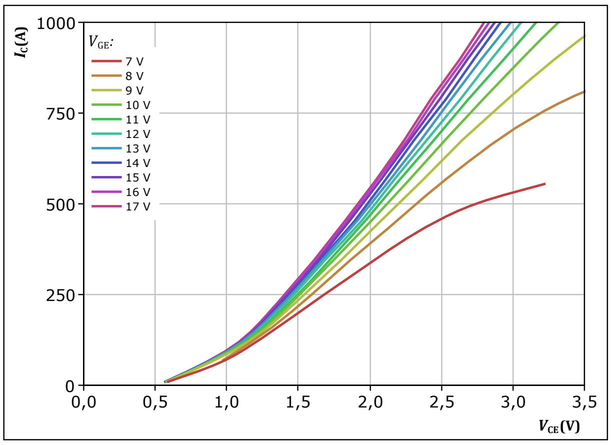


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 10. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

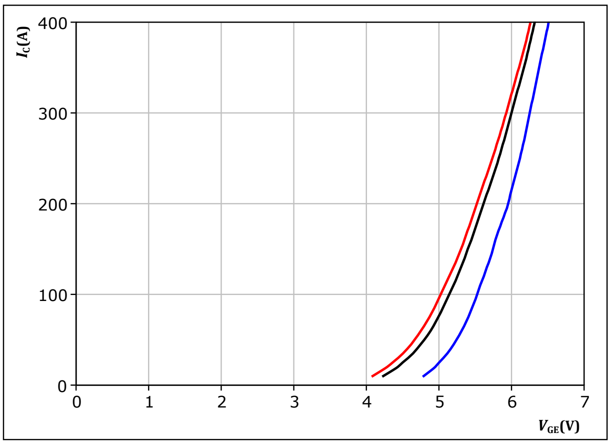


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 11. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

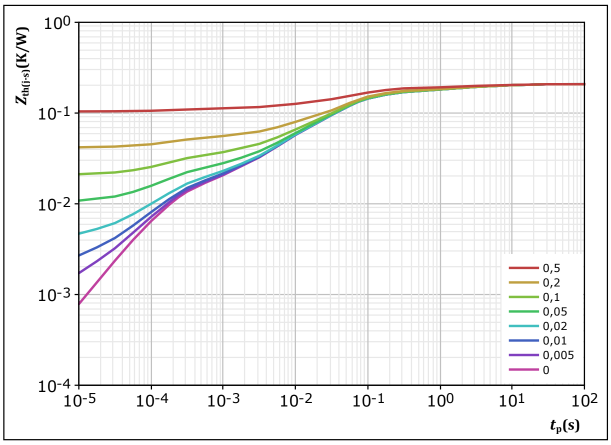


t_p = 250 µs
V_{CE} = 10 V
T_j: 25 °C, 125 °C, 150 °C

figure 12. **IGBT**

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 0,208 K/W

IGBT thermal model values

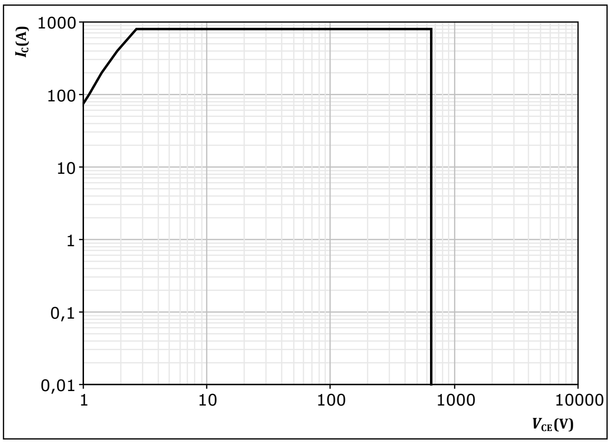
R (K/W)	τ (s)
1,97E-02	7,27E+00
2,56E-02	9,80E-01
1,18E-01	5,85E-02
3,10E-02	6,51E-03
1,44E-02	1,96E-04

Boost Switch Characteristics

figure 13.	IGBT

Safe operating area

I_C = f(V_{CE})



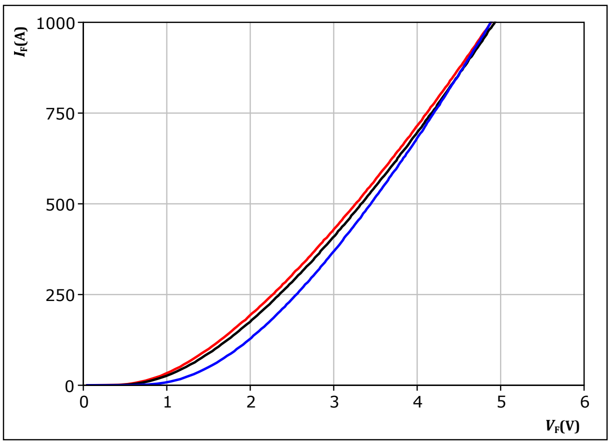
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 14. **FWD**

Typical forward characteristics

I_F = f(V_F)



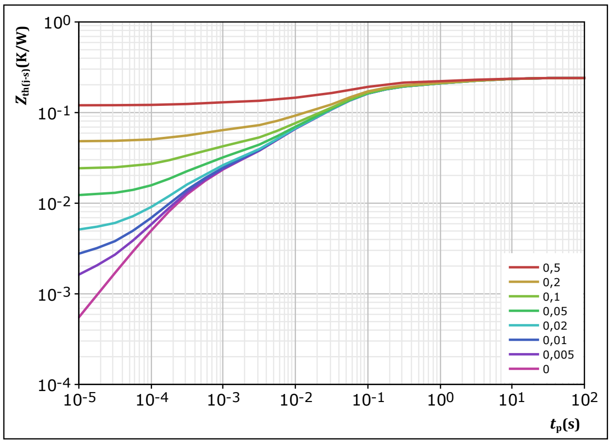
t_p = 250 μs

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

$R_{th(j-s)}$ = 0,24 K/W

FWD thermal model values

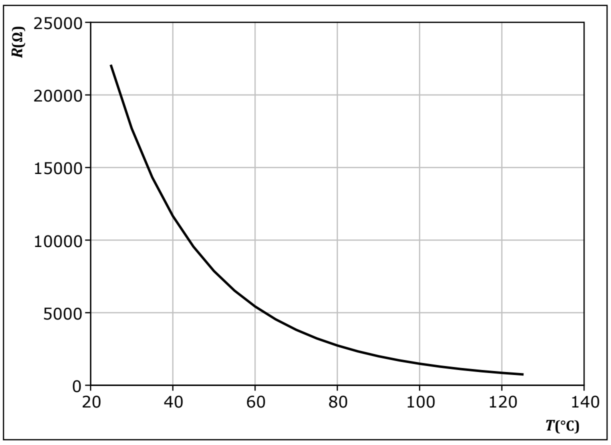
R (K/W)	τ (s)
2,57E-02	6,18E+00
3,31E-02	7,29E-01
1,25E-01	6,10E-02
3,91E-02	7,17E-03
1,76E-02	3,66E-04

Thermistor Characteristics

figure 16.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

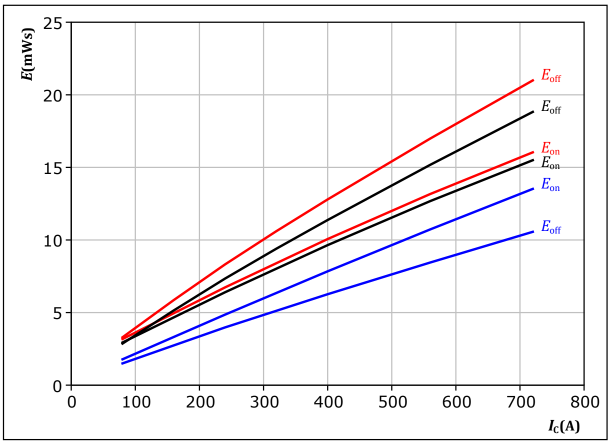


Buck Switching Characteristics

figure 17. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



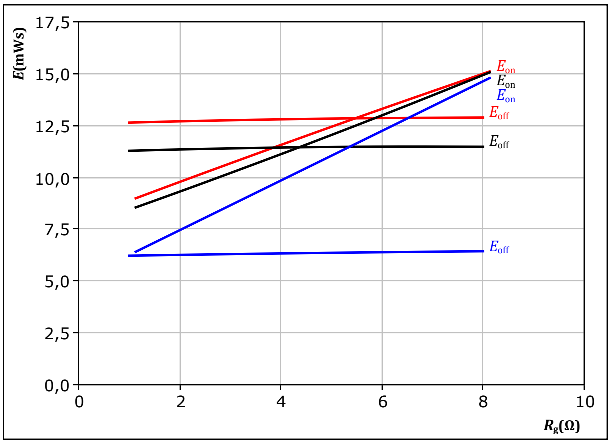
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2,13	Ω		150 °C
R_{goff} =	2	Ω		

figure 18. **IGBT**

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

E = f(R_g)



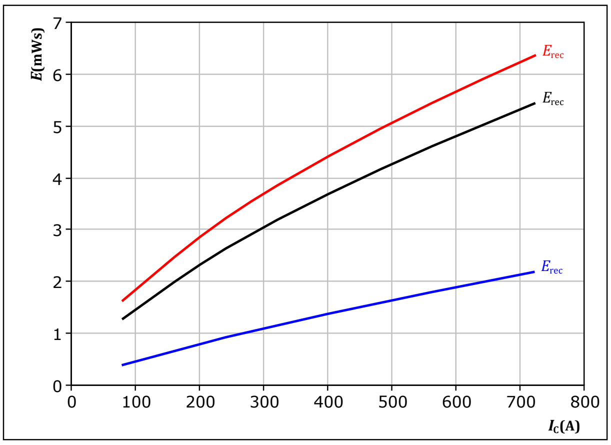
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

figure 19. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



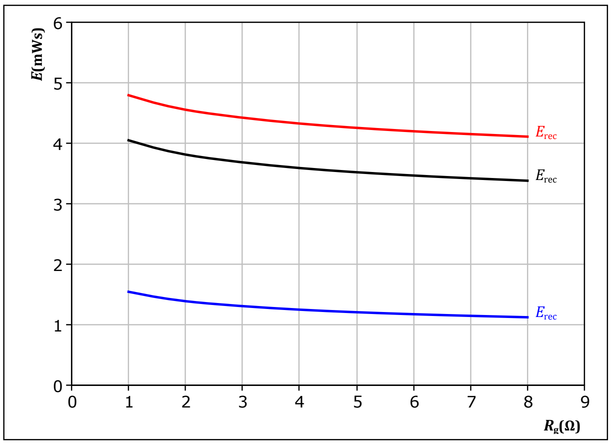
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2,13	Ω		150 °C

figure 20. **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

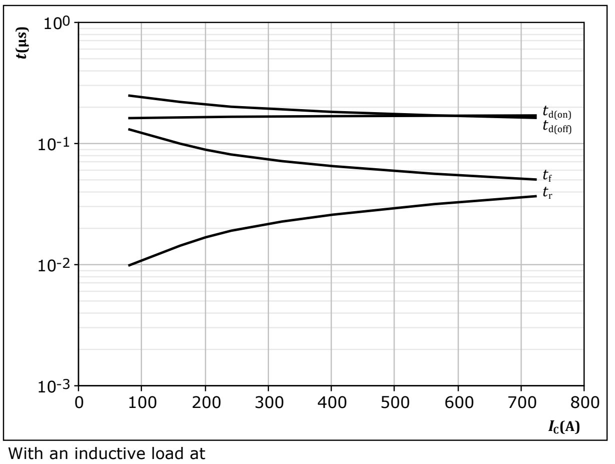
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

Buck Switching Characteristics

figure 21. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



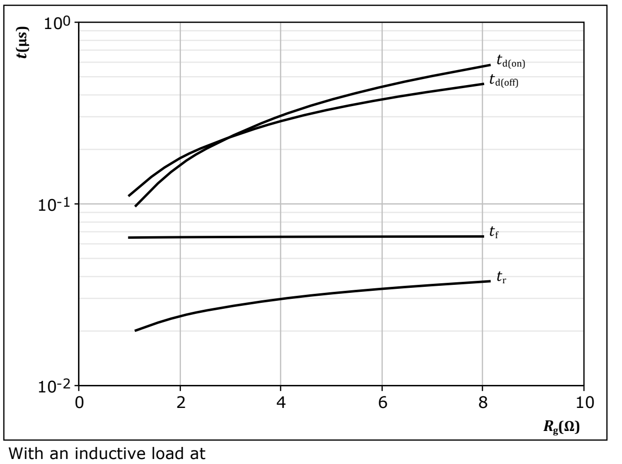
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2,13	Ω
R_{goff} =	2	Ω

figure 22. **IGBT**

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

t = f(R_g)



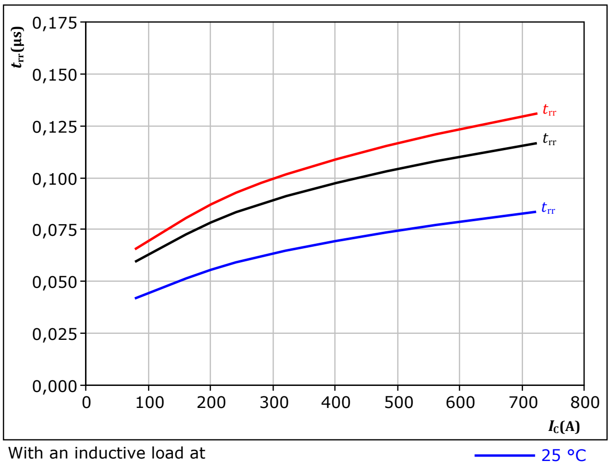
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	400	A

figure 23. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

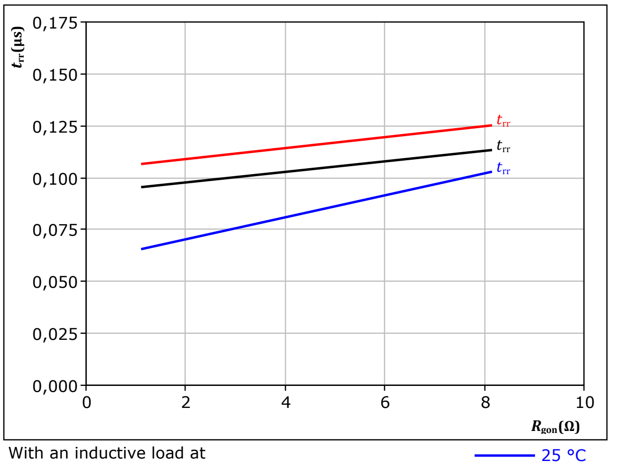
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2,13	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 24. **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} =	350	V
V_{GE} =	±15	V
I_C =	400	A

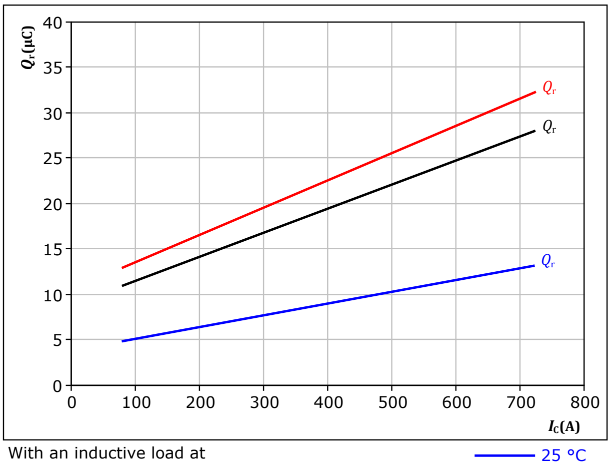
T_j: 25 °C, 125 °C, 150 °C

Buck Switching Characteristics

figure 25. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



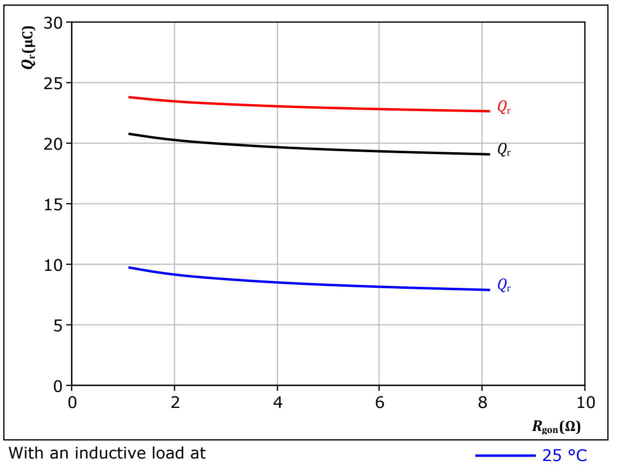
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	2,13	Ω	

figure 26. **FWD**

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

$Q_r = f(R_{gon})$



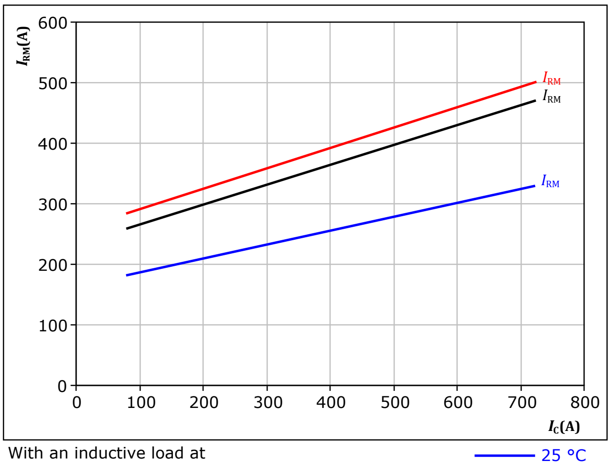
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	400	A	

figure 27. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



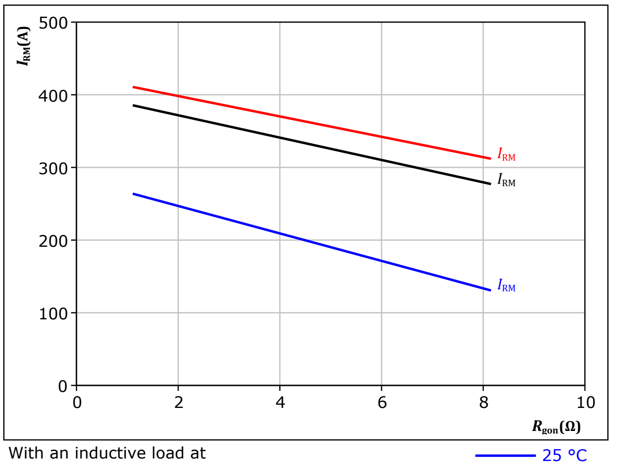
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	2,13	Ω	

figure 28. **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

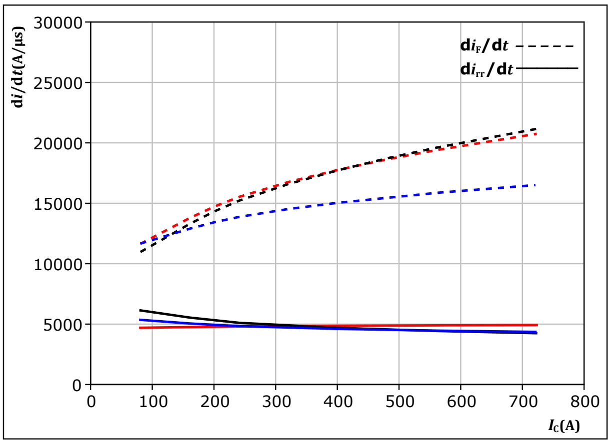
V_{CE} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	400	A	

Buck Switching Characteristics

figure 29. **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

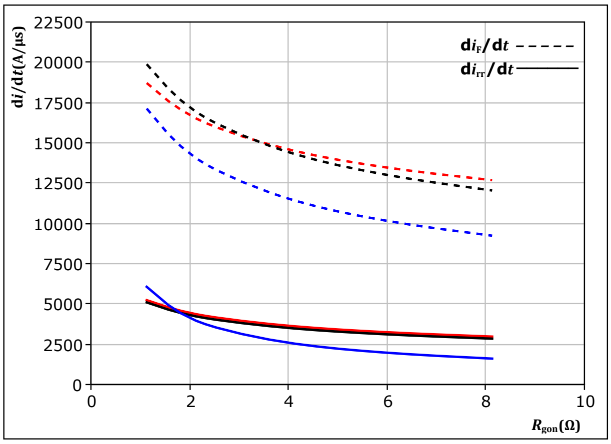
T_j:

V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2,13	Ω

figure 30. **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

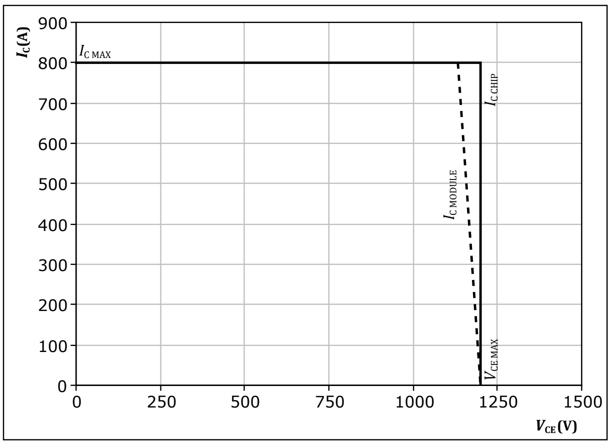
T_j:

V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	400	A

figure 31. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



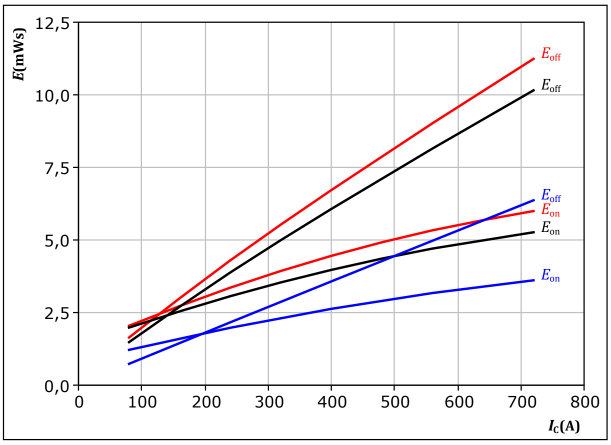
At			
	T_j =	150	°C
	R_{gon} =	2,13	Ω
	R_{goff} =	2	Ω

Boost Switching Characteristics

figure 32. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

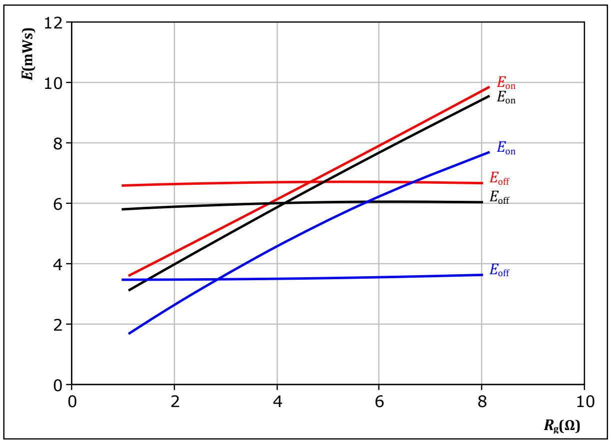
V_{CE} =	350	V	
V_{GE} =	±15	V	
R_{gon} =	2,13	Ω	
R_{goff} =	2	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 33. **IGBT**

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

E = f(R_g)



With an inductive load at

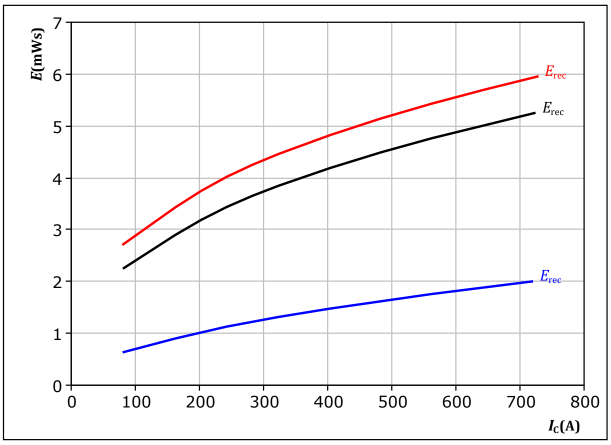
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	400	A

T_j: 25 °C, 125 °C, 150 °C

figure 34. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

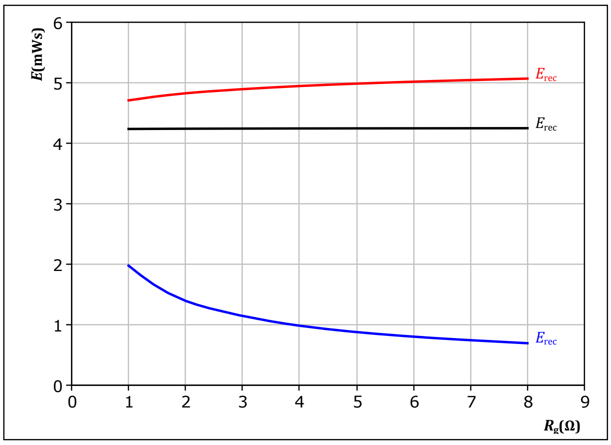
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2,13	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 35. **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} =	350	V
V_{GE} =	±15	V
I_C =	400	A

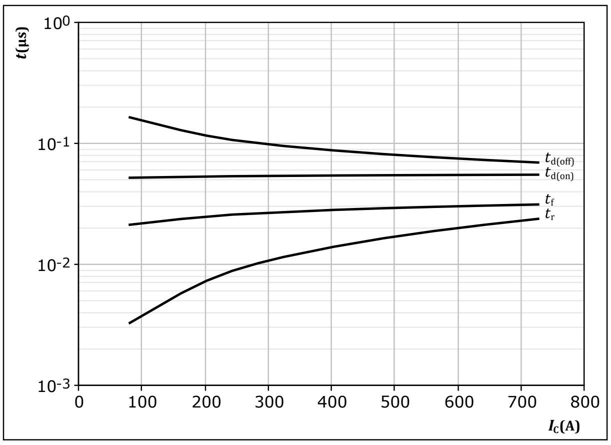
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 36. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



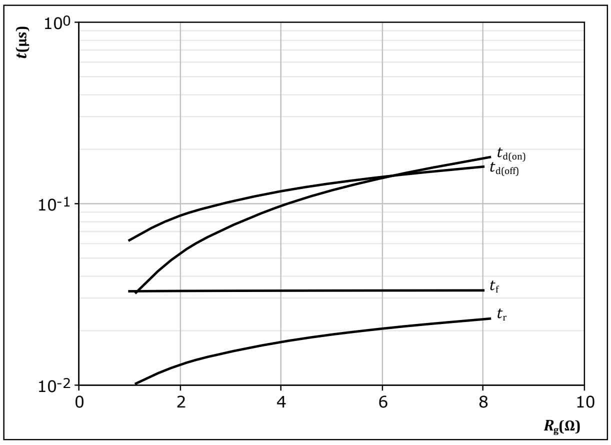
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2,13	Ω
R_{goff} =	2	Ω

figure 37. **IGBT**

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

t = f(R_g)



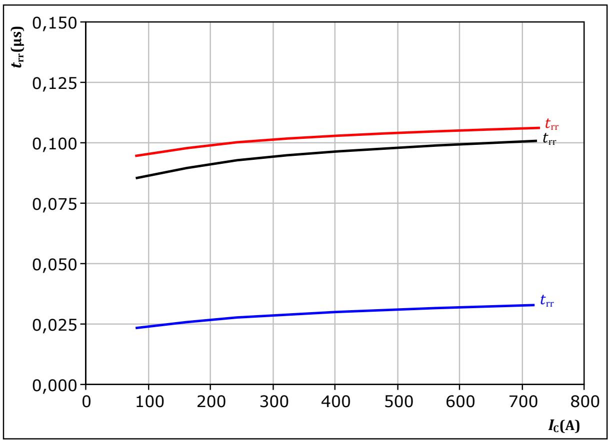
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	400	A

figure 38. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

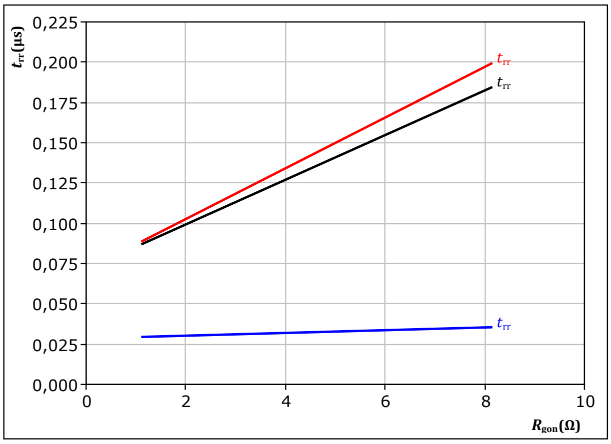
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2,13	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 39. **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} =	350	V
V_{GE} =	±15	V
I_C =	400	A

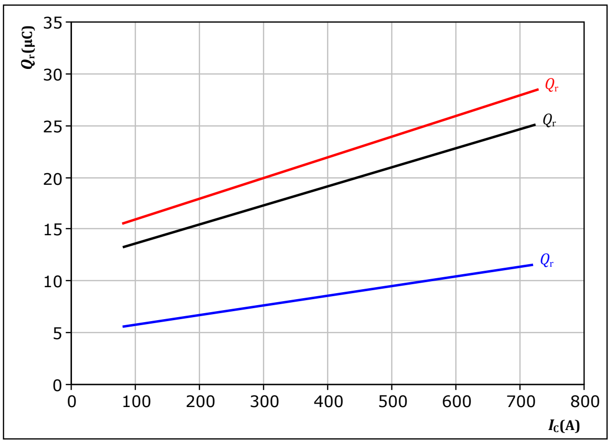
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 40. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



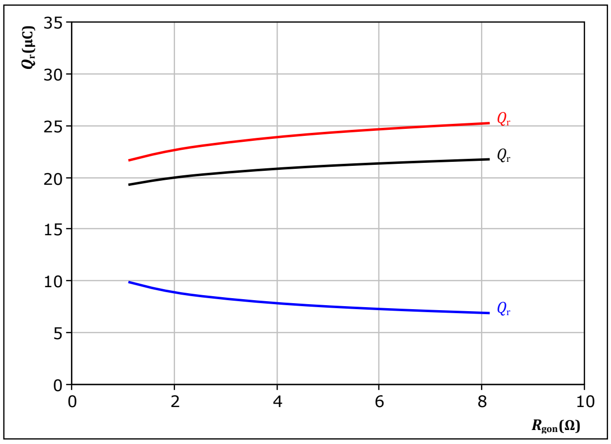
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2,13	Ω		150 °C

figure 41. **FWD**

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

Q_r = f(R_{gon})



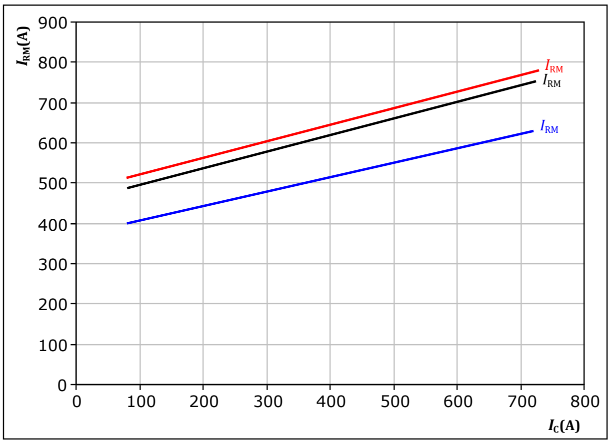
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

figure 42. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



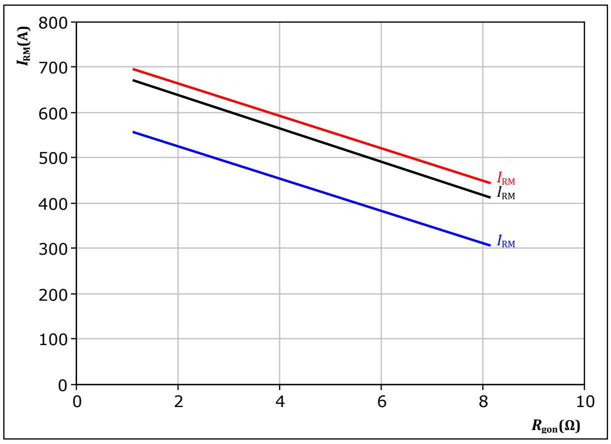
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2,13	Ω		150 °C

figure 43. **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

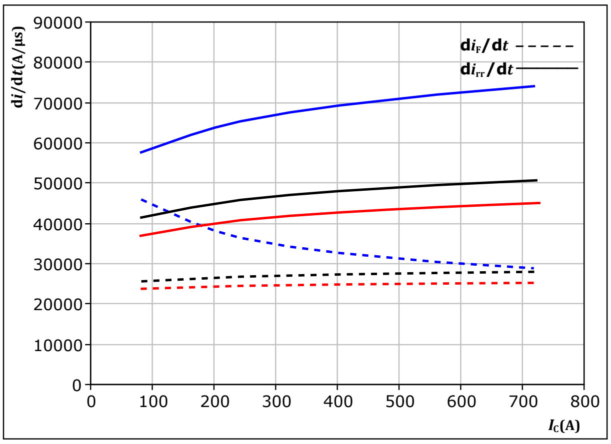
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

Boost Switching Characteristics

figure 44. **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)



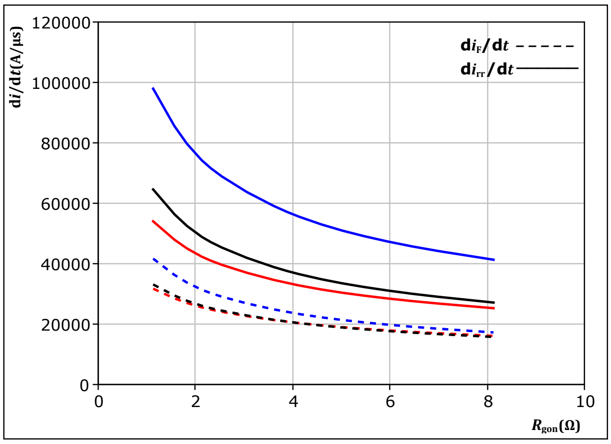
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2,13	Ω		150 °C

figure 45. **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})



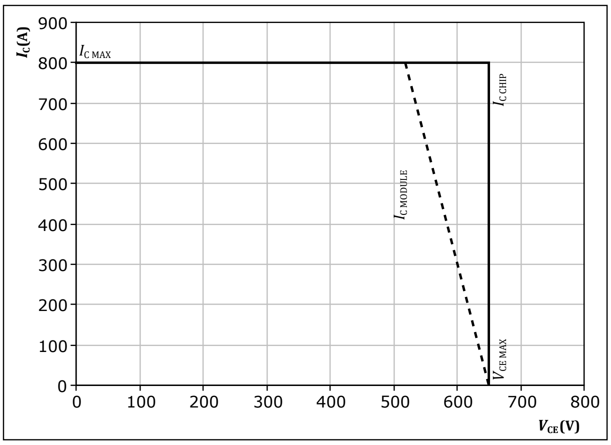
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	400	A		150 °C

figure 46. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At	T_j =	150	°C
	R_{gon} =	2,13	Ω
	R_{goff} =	2	Ω

Switching Definitions

figure 47. **IGBT**

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

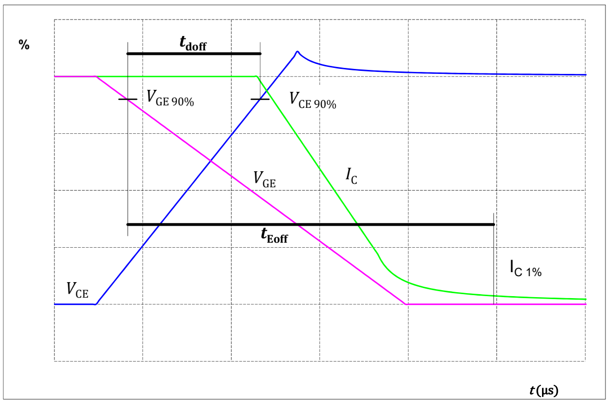


figure 48. **IGBT**

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

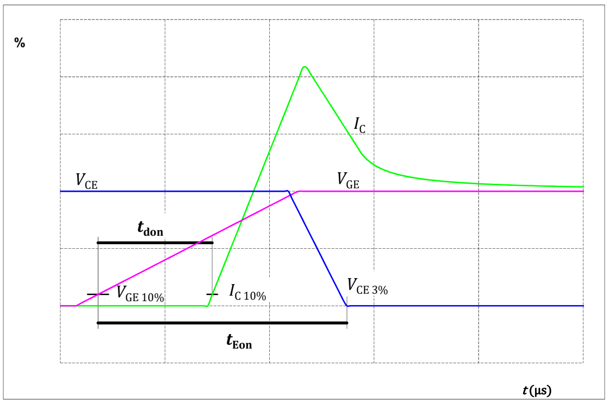


figure 49. **IGBT**

Turn-off Switching Waveforms & definition of t_f

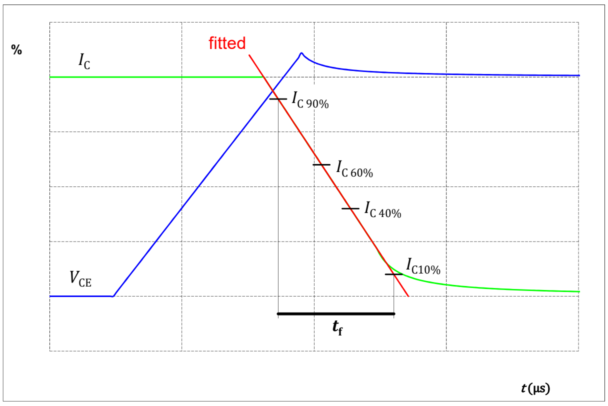
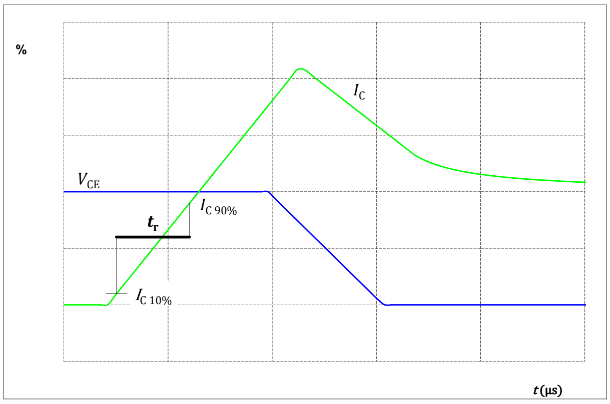


figure 50. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 51. **FWD**

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

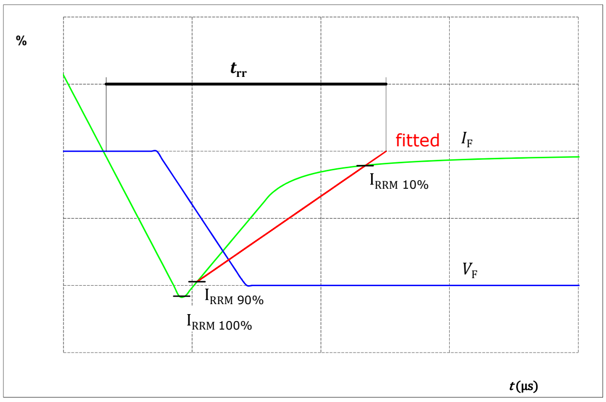
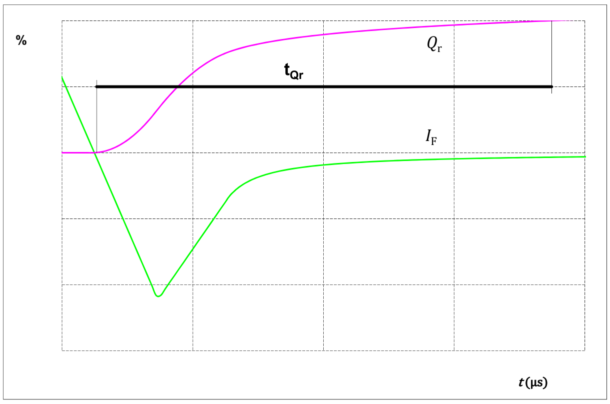


figure 52. **FWD**

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



30-E312NMA400H7-PM19F07Z

datasheet

Ordering Code

Version	Ordering Code
Without thermal paste	30-E312NMA400H7-PM19F07Z
With thermal paste (5,2 W/mK, PTM6000HV)	30-E312NMA400H7-PM19F07Z-/7/

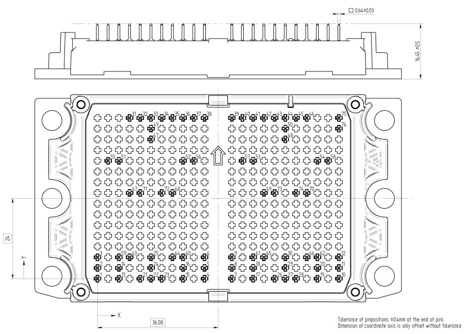
Marking

	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		

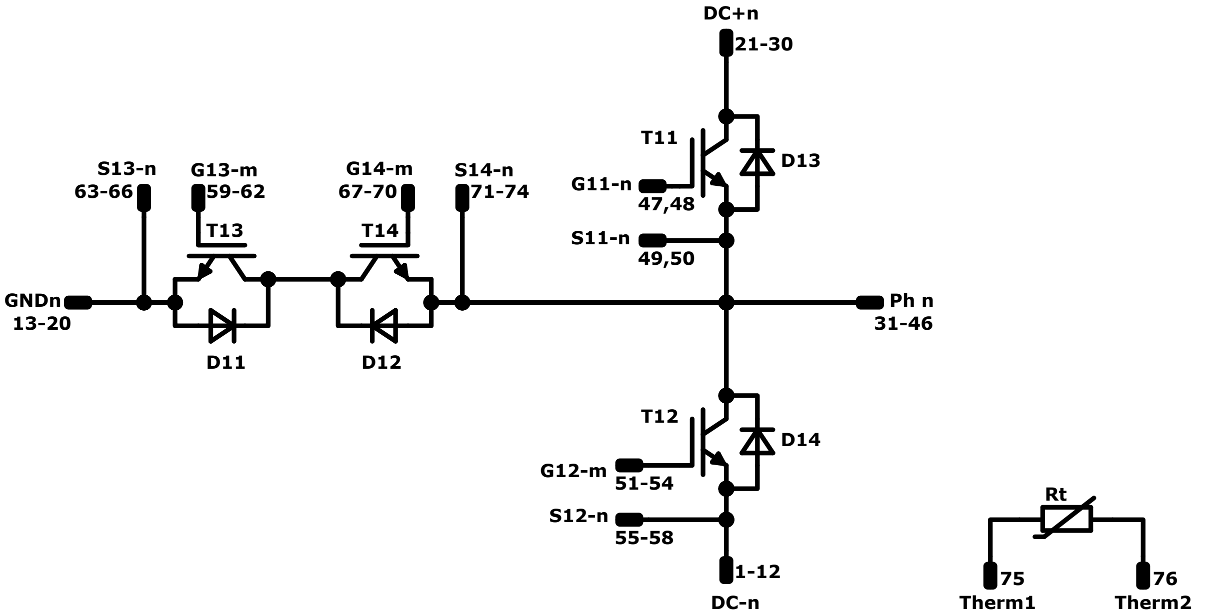
Outline

Pin table [mm]

Pin	X	Y	Function	39	40,16	48	Ph2
1	0	0	DC-1	40	43,36	48	Ph2
2	0	3,2	DC-1	41	46,56	48	Ph2
3	0	6,4	DC-1	42	49,76	48	Ph2
4	32	0	DC-1	43	52,96	48	Ph2
5	32	3,2	DC-1	44	56,16	48	Ph2
6	32	6,4	DC-1	45	59,36	48	Ph2
7	40,16	0	DC-2	46	62,56	48	Ph2
8	40,16	3,2	DC-2	47	16	41,6	G11-1
9	40,16	6,4	DC-2	48	56,16	41,6	G11-2
10	72,16	0	DC-2	49	16	44,8	S11-1
11	72,16	3,2	DC-2	50	56,16	44,8	S11-2
12	72,16	6,4	DC-2	51	6,4	35,2	G12-11
13	6,4	0	GND1	52	25,6	35,2	G12-12
14	6,4	3,2	GND1	53	46,56	35,2	G12-21
15	25,6	0	GND1	54	65,76	35,2	G12-22
16	25,6	3,2	GND1	55	3,2	35,2	S12-1
17	46,56	0	GND2	56	28,8	35,2	S12-1
18	46,56	3,2	GND2	57	43,36	35,2	S12-2
19	65,76	0	GND2	58	68,96	35,2	S12-2
20	65,76	3,2	GND2	59	6,4	6,4	G13-11
21	12,8	0	DC+1	60	25,6	6,4	G13-12
22	16	0	DC+1	61	46,56	6,4	G13-21
23	19,2	0	DC+1	62	65,76	6,4	G13-22
24	16	3,2	DC+1	63	9,6	6,4	S13-1
25	16	6,4	DC+1	64	22,4	6,4	S13-1
26	52,96	0	DC+2	65	49,76	6,4	S13-2
27	56,16	0	DC+2	66	62,56	6,4	S13-2
28	59,36	0	DC+2	67	9,6	25,6	G14-11
29	56,16	3,2	DC+2	68	22,4	25,6	G14-12
30	56,16	6,4	DC+2	69	49,76	25,6	G14-21
31	9,6	48	Ph1	70	62,56	25,6	G14-22
32	12,8	48	Ph1	71	12,8	25,6	S14-1
33	16	48	Ph1	72	19,2	25,6	S14-1
34	19,2	48	Ph1	73	52,96	25,6	S14-2
35	22,4	48	Ph1	74	59,36	25,6	S14-2
36	25,6	48	Ph1	75	72,16	48	Therm1
37	28,8	48	Ph1	76	72,16	44,8	Therm2
38	32	48	Ph1				



Pinout



n=1,2 ***m=11,12,21,22***	***See exact Pin numbers and Pin functions on Outline***

Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	400 A	Buck Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12	FWD	650 V	400 A	Buck Diode	Parallel devices. Values apply to complete device.
T13, T14	IGBT	650 V	400 A	Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D14	FWD	1200 V	400 A	Boost Diode	Parallel devices. Values apply to complete device.
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 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-E312NMA400H7-PM19F07Z-D1-14	31 Jan. 2025	Initial Release	