10-PZ12NMA027ME-M340F63Y

datasheet

***flow*MNPC 0 SIC** **1200 V / 27 mΩ**

Topology features

- Common Emitter configuration
- Kelvin Emitter for improved switching performance
- Mixed Voltage Neutral Point Clamped Topology (T-Type)
- Temperature sensor

Component features

- High Blocking Voltage with low drain source on state resistance
- High speed SiC-MOSFET technology
- Resistant to Latch-up

Housing features

- Base isolation: Al_2O_3
- Clip-in, reliable mechanical connection, qualified for wave soldering
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Extra features

- with SiC diode

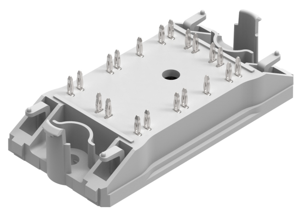
Target applications

- Charging Stations
- Energy Storage Systems
- Solar Inverters

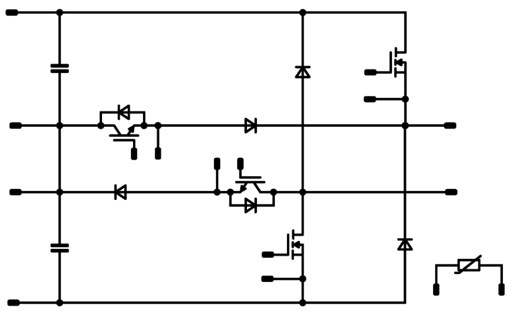
Types

- 10-PZ12NMA027ME-M340F63Y

flow 0 12 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
MNPC BUCK Switch					
Drain-source voltage	V_{DSS}			1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$	T_s = 80 °C	52	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}		240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	133	W
Gate-source voltage	V_{GSS}			-5 / 20	V
		dynamic		-10 / 25	
Maximum Junction Temperature	T_{jmax}			175	°C
MNPC BUCK Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	28	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		112,5	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	213	A
Surge current capability	I^2t			225	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	61	W
Maximum junction temperature	T_{jmax}			175	°C
MNPC BOOST Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	57	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	94	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
MNPC BOOST Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	15	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		47	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	71	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	40	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	15	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		12	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	36	W
Maximum junction temperature	T_{jmax}			175	°C
Capacitor (DC)					
Maximum DC voltage	V_{MAX}			500	V
Operation Temperature	T_{op}			-55 ... 125	°C

Module Properties

Parameter	Symbol	Conditions		Value	Unit
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	4000	V
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				9,17	mm
Comparative Tracking Index	CTI			≥ 200	

*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	
MNPC BUCK Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		20		60	25 125 150		26,7 41,1 46,9	32,7[(1)]	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$	0		0,015	25	2	2,6	4	V
Gate to Source Leakage Current	I_{GSS}		20	0		25			750	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		3	300	µA
Internal gate resistance	r_g							1,53		Ω
Gate charge	Q_g		-5/20	800	60	25		186		nC
Short-circuit input capacitance	C_{iss}	f = 1 Mhz	0	1000	0	25		2850		pF
Short-circuit output capacitance	C_{oss}							240		
Reverse transfer capacitance	C_{rss}							22,8		
Diode forward voltage	V_{SD}		0		30	25		3,3		V
Thermal										
Thermal resistance junction to sink [(2)]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,71		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	-5/15	350	44	25 125 150		18,57 17,59 17,03		ns
Rise time	t_r					25 125 150		7,58 6,48 6,49		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		38,52 41,98 42,76		ns
Fall time	t_f					25 125 150		12,06 10,8 10,7		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,283 µC Q_{rFWD}=0,297 µC Q_{rFWD}=0,297 µC				25 125 150		0,163 0,143 0,141		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,07 0,076 0,079		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	
MNPC BUCK Diode										
Static										
Forward voltage	V_F				24	25 125 150		1,52 1,82 1,93	1,8[1]	V
Reverse leakage current	I_R	V_r = 650 V				25		30	153	µA
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,56		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=6668 A/µs d*i*/d*t*=6839 A/µs d*i*/d*t*=7834 A/µs	-5/15	350	44	25 125 150		28,78 34,08 35,15		A
Reverse recovery time	t_{rr}					25 125 150		16,62 15,84 15,75		ns
Recovered charge	Q_r					25 125 150		0,283 0,297 0,297		µC
Reverse recovered energy	E_{rec}					25 125 150		0,065 0,073 0,074		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		7672,79 9431,05 9470,57		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	
MNPC BOOST Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0008	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		80	25 125		1,67 1,8	2,22(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			80	µA
Gate-emitter leakage current	I_{GES}		20	0		25			240	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		5000		pF
Reverse transfer capacitance	C_{res}	f = 1 Mhz	0	25		25		18		pF
Gate charge	Q_g		20		0	25		190		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,01		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5/15	350	44	25 125 150		19 19,38 19,25		ns
Rise time	t_r	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5/15	350	44	25 125 150		4,58 5,52 5,9		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5/15	350	44	25 125 150		79,29 101,82 107,88		ns
Fall time	t_f	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5/15	350	44	25 125 150		11,97 12,03 13,03		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,346 µC Q_{rFWD}=0,621 µC Q_{rFWD}=0,739 µC	-5/15	350	44	25 125 150		0,146 0,24 0,272		mWs
Turn-off energy (per pulse)	E_{off}		-5/15	350	44	25 125 150		0,251 0,383 0,412		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	
MNPC BOOST Diode										
Static										
Forward voltage	V_F				10	25 125 150		1,49 1,78 1,9	1,8(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25		30	250	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,39		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=9346 A/µs di/dt=7574 A/µs di/dt=7571 A/µs	-5/15	350	44	25 125 150		43,15 53,77 54,13		A
Reverse recovery time	t_{rr}					25 125 150		15,6 21,8 23,93		ns
Recovered charge	Q_r					25 125 150		0,346 0,621 0,739		µC
Reverse recovered energy	E_{rec}					25 125 150		0,061 0,114 0,135		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		9526,24 2867,85 7503,89		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. Protection Diode										
Static										
Forward voltage	V_F				6	25 125 150	1,23	1,72 1,58 1,54	1,87[(1)]	V
Reverse leakage current	I_R	V_r = 650 V				25			0,1	μA
Thermal										
Thermal resistance junction to sink [(2)]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,65		K/W
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		270		nF
Tolerance							-20		20	%
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R_{25}	$\Delta_{R/R}$	R_{25} = 22 kΩ				25	-5		5	%
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-12		14	%
Power dissipation	P							200		mW
Power dissipation constant	d					25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3 %						3950		K
B-value	$B_{(25/100)}$	Tol. ±3 %						3998		K
Vincotech Thermistor Reference									B	

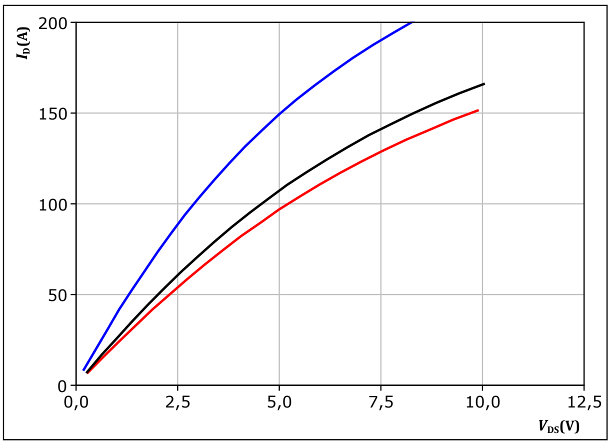
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

MNPC BUCK Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})



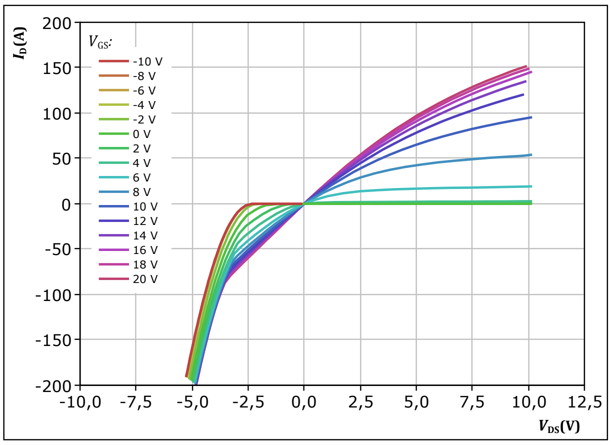
t_p =	250	μs
V_{GS} =	20	V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})



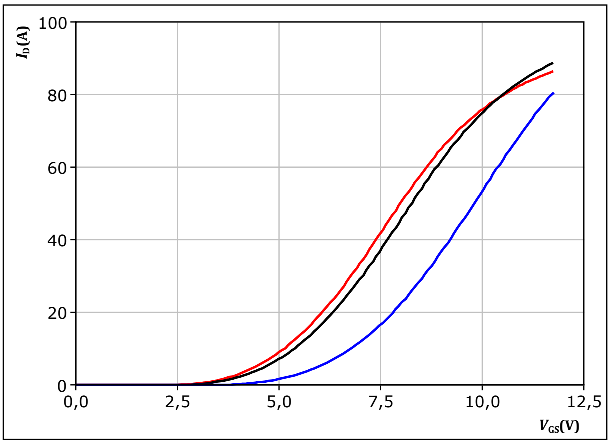
t_p =	250	μs
T_j =	150	°C

V_{GS} from -10 V to 20 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

I_D = f(V_{GS})



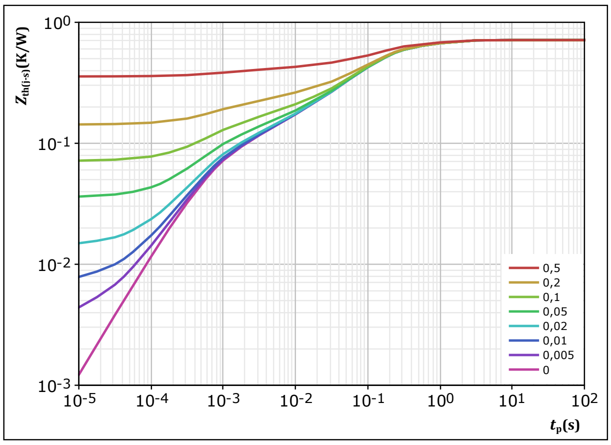
t_p =	250	μs
V_{DS} =	10	V

T_j: 25 °C, 125 °C, 150 °C

figure 4. **MOSFET**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,714	K/W

MOSFET thermal model values

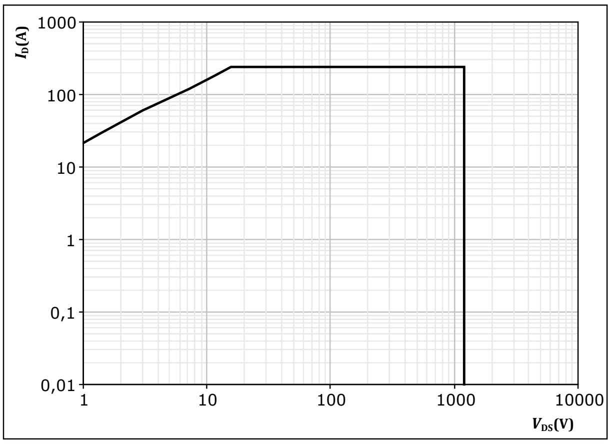
R (K/W)	τ (s)
1,23E-01	9,22E-01
3,61E-01	1,32E-01
8,99E-02	4,36E-02
6,32E-02	6,10E-03
7,67E-02	7,13E-04

MNPC BUCK Switch Characteristics

figure 5. **MOSFET**

Safe operating area

$I_D = f(V_{DS})$



D = single pulse

T_s = 80 °C

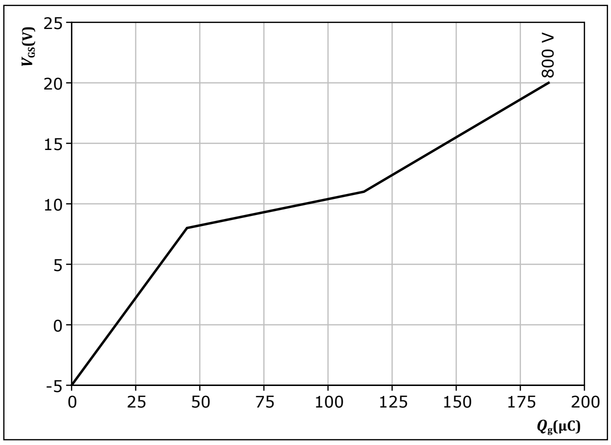
V_{GS} = 20 V

T_j = T_{jmax}

figure 6. **MOSFET**

Gate voltage vs gate charge

$V_{GS} = f(Q_g)$



I_D = 20 A

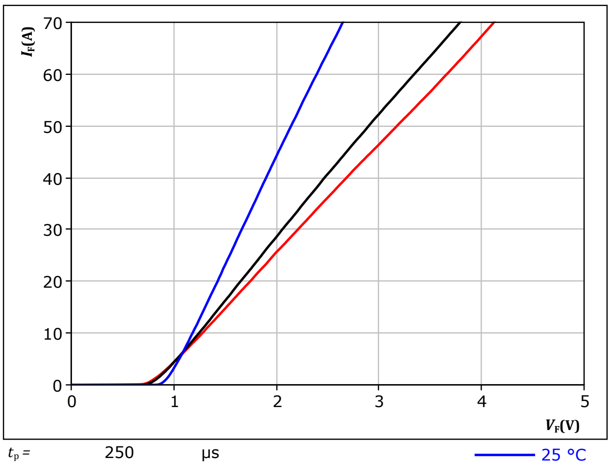
T_j = 25 °C

MNPC BUCK Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

I_F = f(V_F)



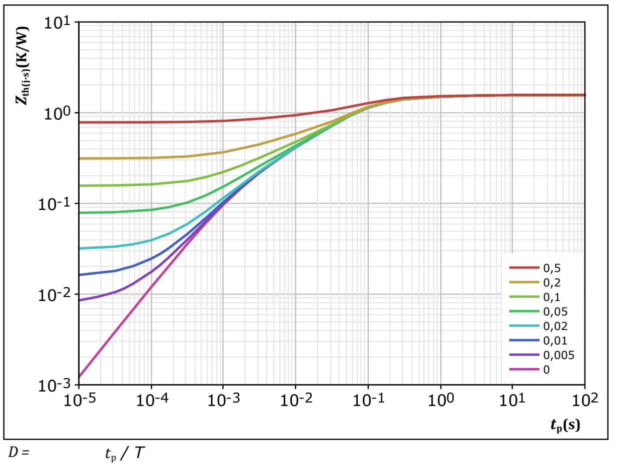
t_p = 250 µs

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

$R_{th(j-s)}$ = 1,565 K/W

FWD thermal model values

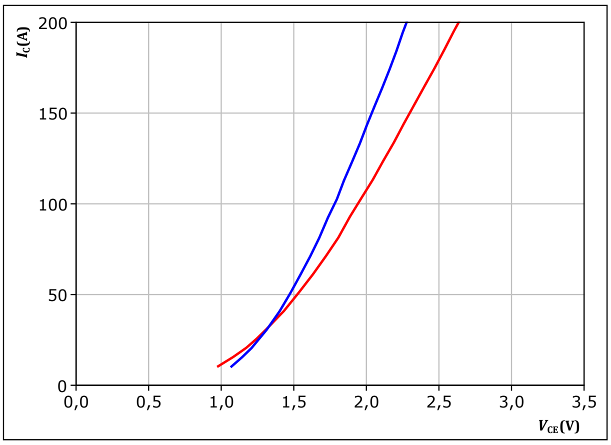
R (K/W)	τ (s)
1,04E-01	1,96E+00
2,58E-01	2,34E-01
8,80E-01	5,94E-02
2,30E-01	6,92E-03
9,23E-02	1,26E-03

MNPC BOOST Switch Characteristics

figure 9. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

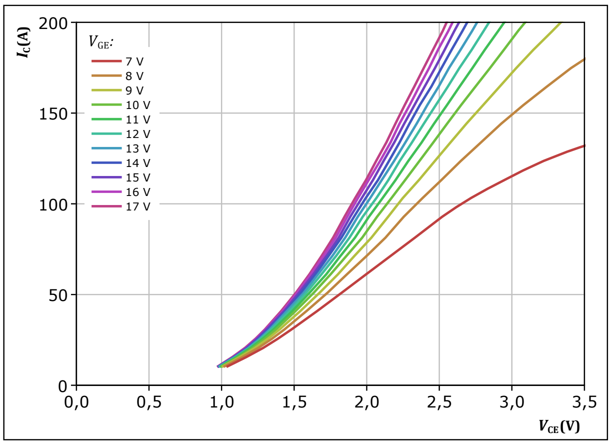


t_p =	250	µs	T_j:	25 °C
V_{GE} =	15	V		125 °C

figure 10. IGBT

Typical output characteristics

$I_C = f(V_{CE})$



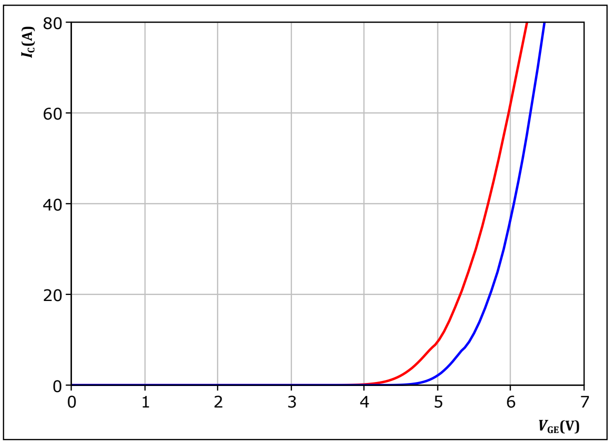
t_p =	250	µs
T_j =	125	°C

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

figure 11. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

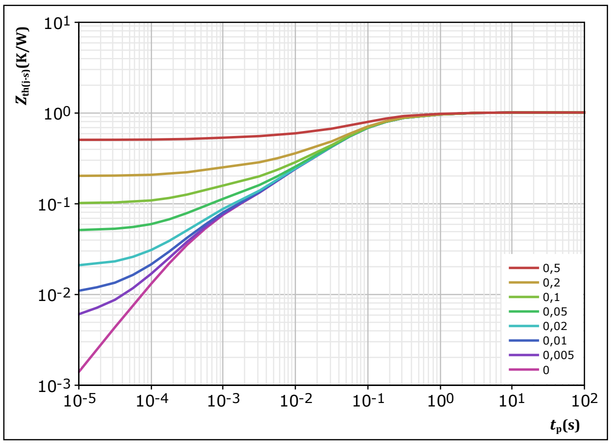


t_p =	250	µs	T_j:	25 °C
V_{CE} =	10	V		125 °C

figure 12. IGBT

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,014	K/W

IGBT thermal model values

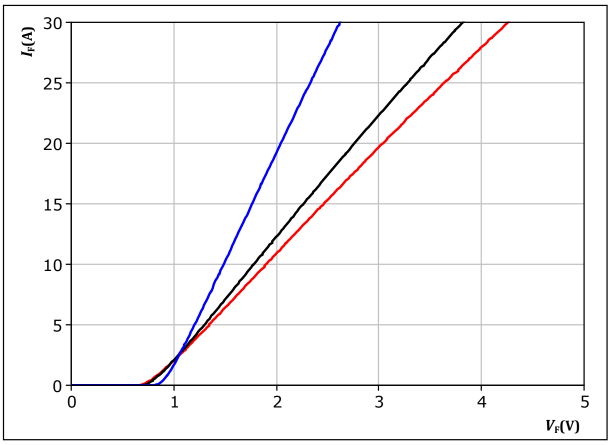
R (K/W)	τ (s)
9,43E-02	1,39E+00
2,11E-01	2,21E-01
5,17E-01	6,27E-02
1,34E-01	7,49E-03
5,81E-02	5,09E-04

MNPC BOOST Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

I_F = f(V_F)



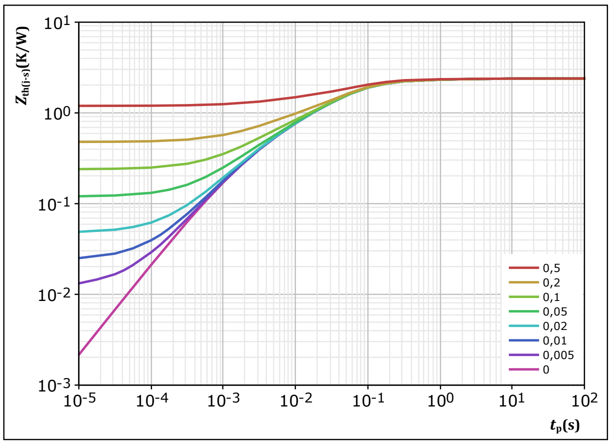
t_p =	250	µs

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	
$R_{th(j-s)}$ =	2,392	K/W

FWD thermal model values

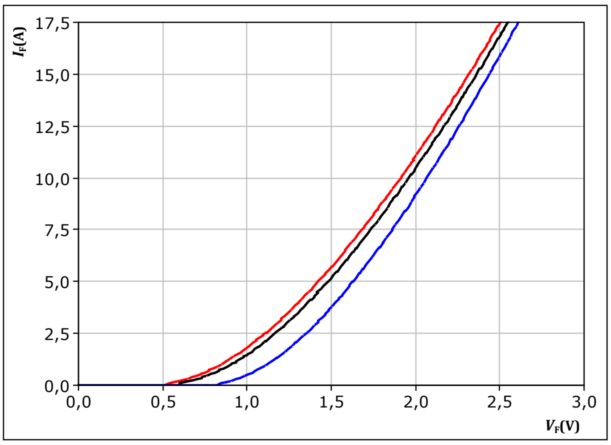
R (K/W)	τ (s)
7,48E-02	2,91E+00
2,03E-01	3,58E-01
1,24E+00	6,46E-02
4,88E-01	1,70E-02
3,16E-01	3,69E-03
7,23E-02	8,74E-04

Boost Sw. Protection Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

I_F = f(V_F)



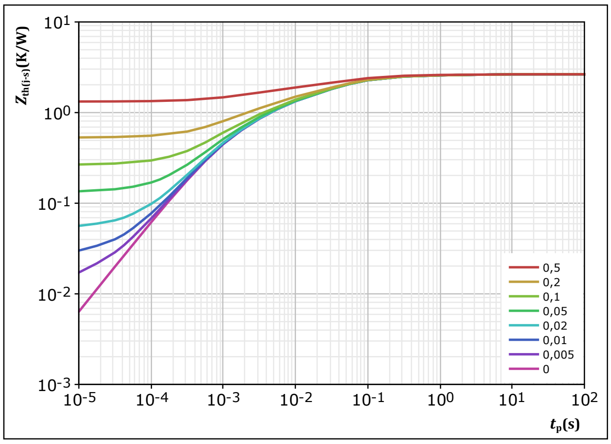
t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,646 K/W

FWD thermal model values

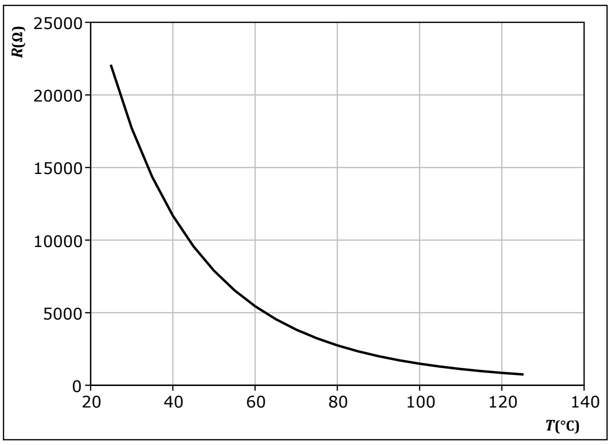
R (K/W)	τ (s)
1,02E-01	2,56E+00
3,50E-01	1,72E-01
9,53E-01	3,96E-02
7,66E-01	5,83E-03
4,76E-01	9,87E-04

Thermistor Characteristics

figure 17.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

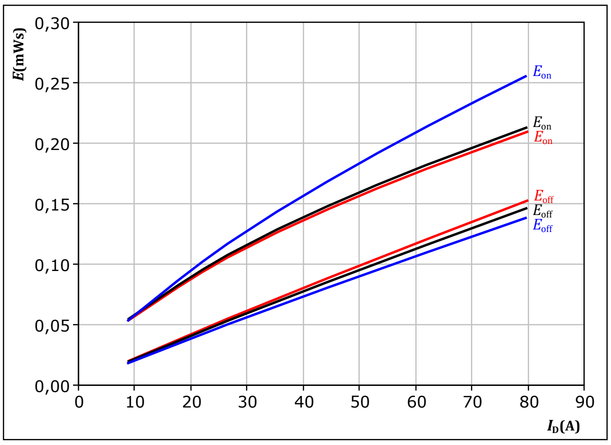


MNPC BUCK Switching Characteristics

figure 18. **MOSFET**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



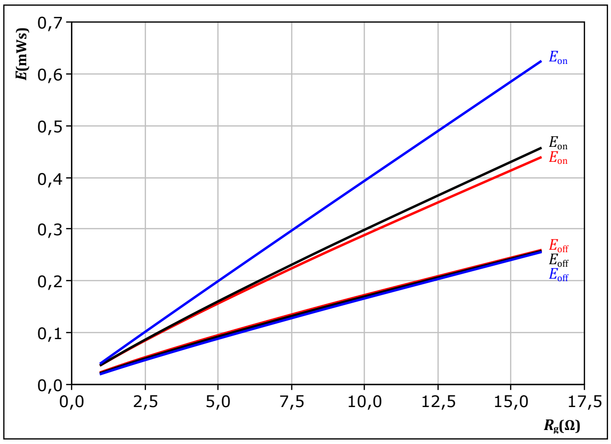
With an inductive load at

V_{DS} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GS} =	-5/15	V	
R_{gon} =	4	Ω	
R_{goff} =	4	Ω	

figure 19. **MOSFET**

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

$E = f(R_g)$



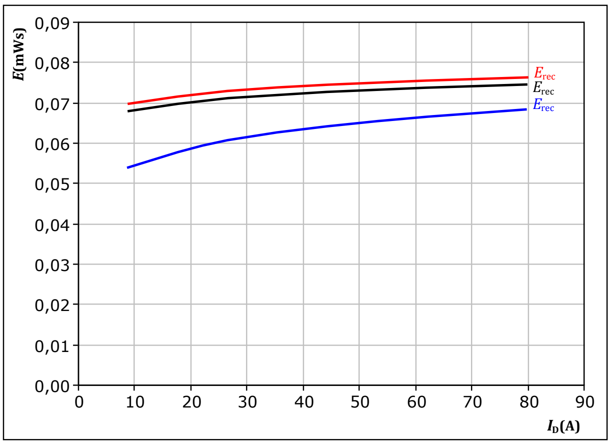
With an inductive load at

V_{DS} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GS} =	-5/15	V	
I_D =	44	A	

figure 20. **FWD**

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



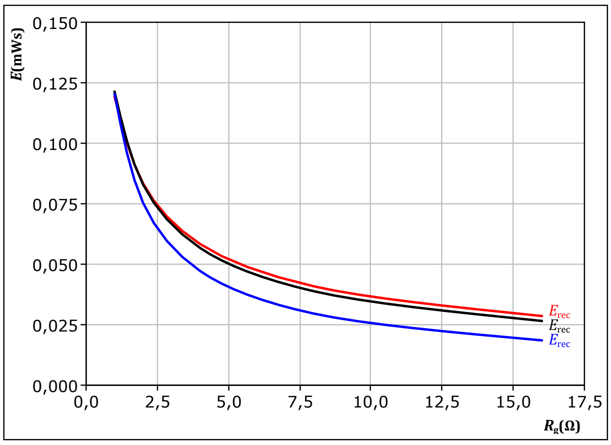
With an inductive load at

V_{DS} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GS} =	-5/15	V	
R_{gon} =	4	Ω	

figure 21. **FWD**

Typical reverse recovered energy loss as a function of MOSFET turn on gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

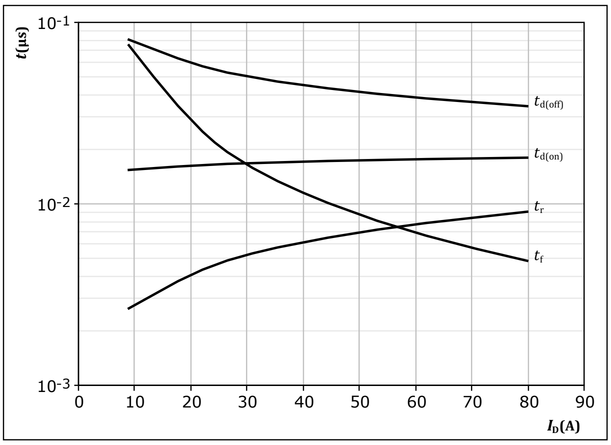
V_{DS} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GS} =	-5/15	V	
I_D =	44	A	

MNPC BUCK Switching Characteristics

figure 22. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



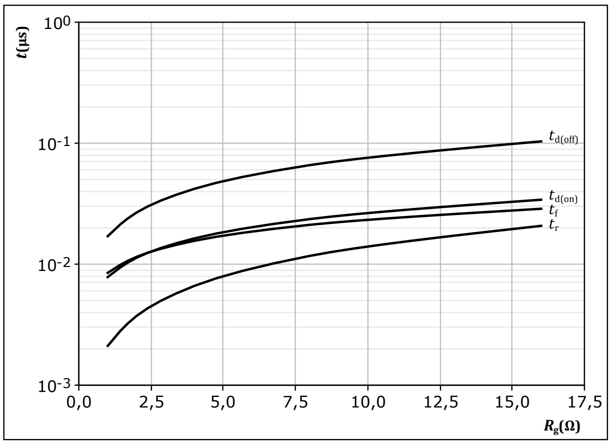
With an inductive load at

T_j =	150	°C
V_{DS} =	350	V
V_{GS} =	-5/15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 23. **MOSFET**

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

$t = f(R_g)$



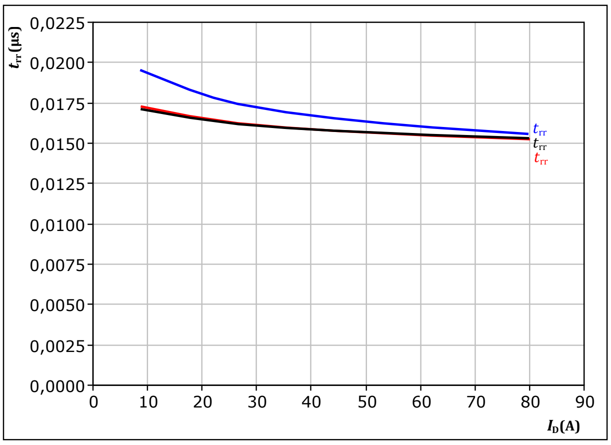
With an inductive load at

T_j =	150	°C
V_{DS} =	350	V
V_{GS} =	-5/15	V
I_D =	44	A

figure 24. **FWD**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



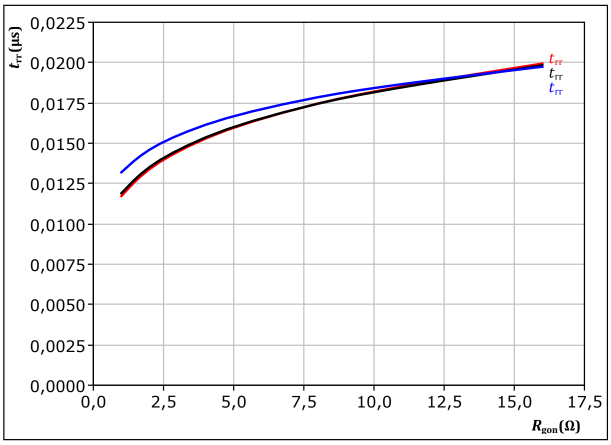
At			
	V_{DS} =	350	V
	V_{GS} =	-5/15	V
	R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 25. **FWD**

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

$t_{rr} = f(R_{gon})$



At			
	V_{DS} =	350	V
	V_{GS} =	-5/15	V
	I_D =	44	A

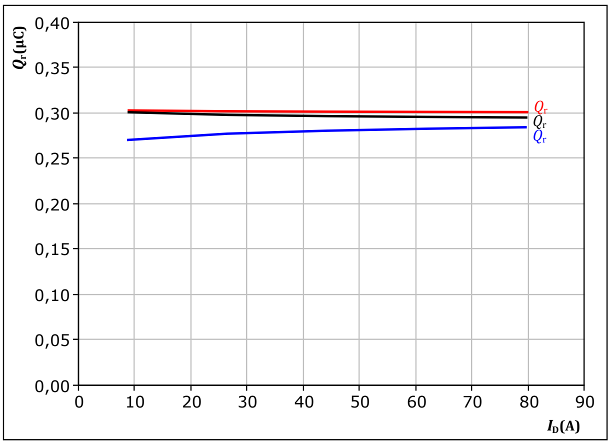
T_j: 25 °C, 125 °C, 150 °C

MNPC BUCK Switching Characteristics

figure 26. **FWD**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

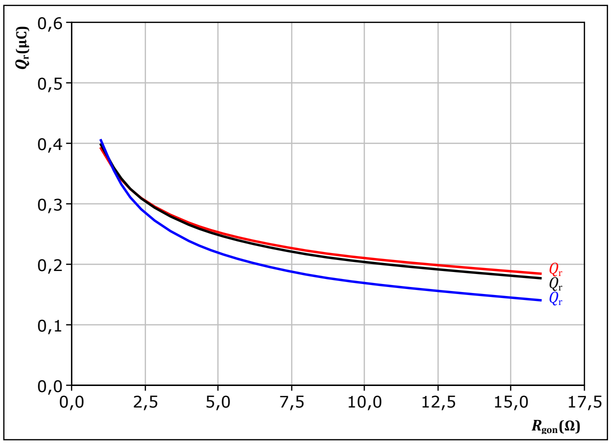


At					
V_{DS} =	350	V			25 °C
V_{GS} =	-5/15	V	T_j:		125 °C
R_{gon} =	4	Ω			150 °C

figure 27. **FWD**

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

$Q_r = f(R_{gon})$

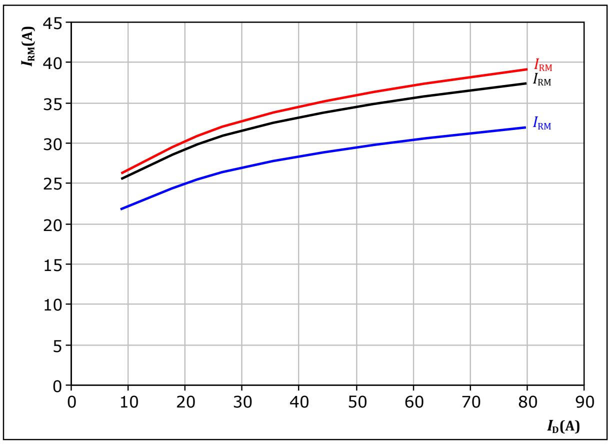


At					
V_{DS} =	350	V			25 °C
V_{GS} =	-5/15	V	T_j:		125 °C
I_D =	44	A			150 °C

figure 28. **FWD**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

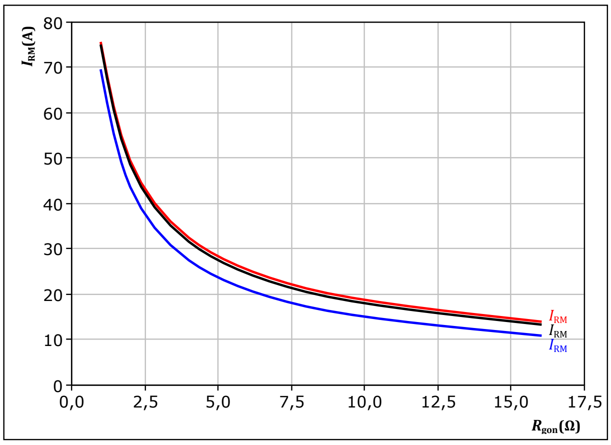


At					
V_{DS} =	350	V			25 °C
V_{GS} =	-5/15	V	T_j:		125 °C
R_{gon} =	4	Ω			150 °C

figure 29. **FWD**

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

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



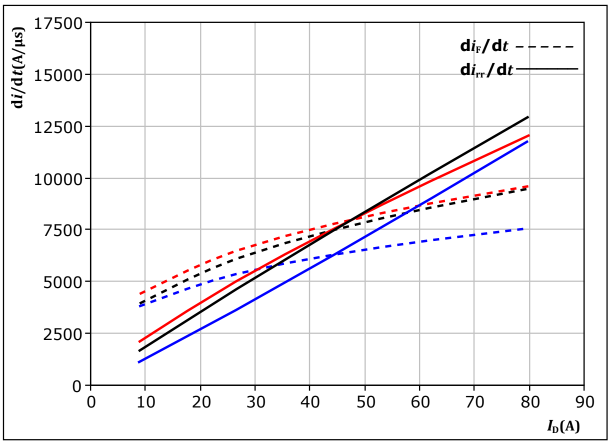
At					
V_{DS} =	350	V			25 °C
V_{GS} =	-5/15	V	T_j:		125 °C
I_D =	44	A			150 °C

MNPC BUCK Switching Characteristics

figure 30. FWD

Typical rate of fall of forward and reverse recovery current as a function of drain current

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

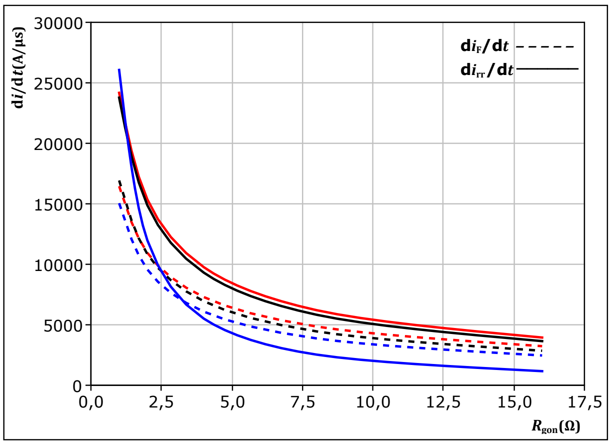


At					
V_{DS} =	350	V			25 °C
V_{GS} =	-5/15	V	T_j:		125 °C
R_{gon} =	4	Ω			150 °C

figure 31. 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})

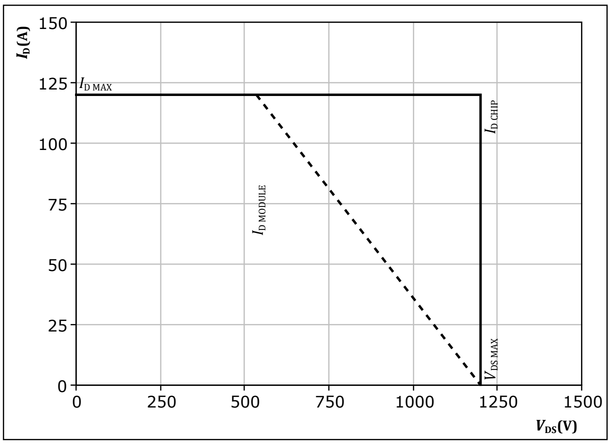


At					
V_{DS} =	350	V			25 °C
V_{GS} =	-5/15	V	T_j:		125 °C
I_D =	44	A			150 °C

figure 32. MOSFET

Reverse bias safe operating area

I_D = f(V_{DS})



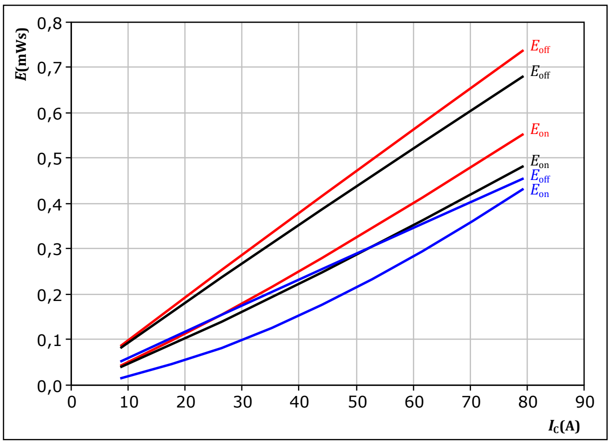
At			
	T_j =	150	°C
	R_{gon} =	4	Ω
	R_{goff} =	4	Ω

MNPC BOOST Switching Characteristics

figure 33. **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} = -5/15 V

R_{gon} = 2 Ω

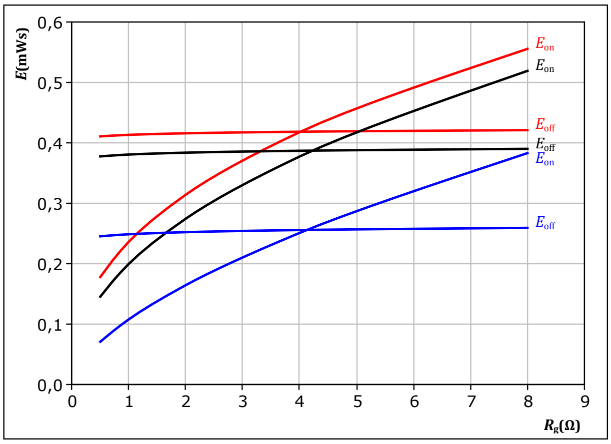
R_{goff} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 34. **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} = -5/15 V

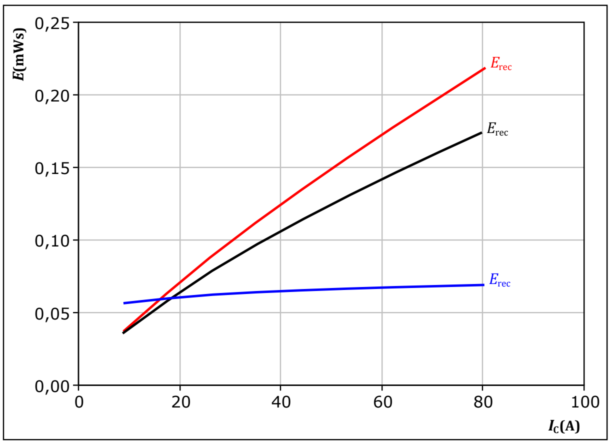
I_C = 44 A

T_j: 25 °C, 125 °C, 150 °C

figure 35. **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} = -5/15 V

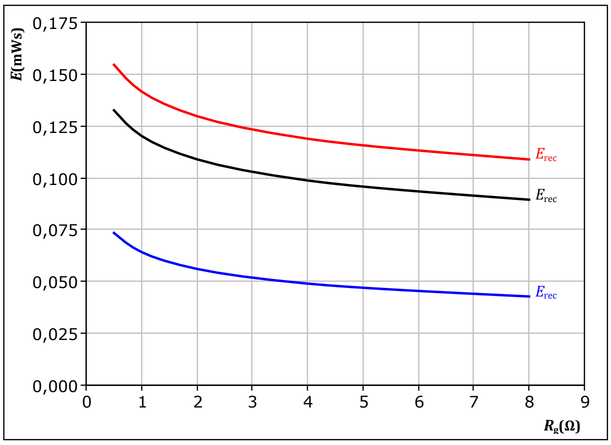
R_{gon} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 36. **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} = -5/15 V

I_C = 44 A

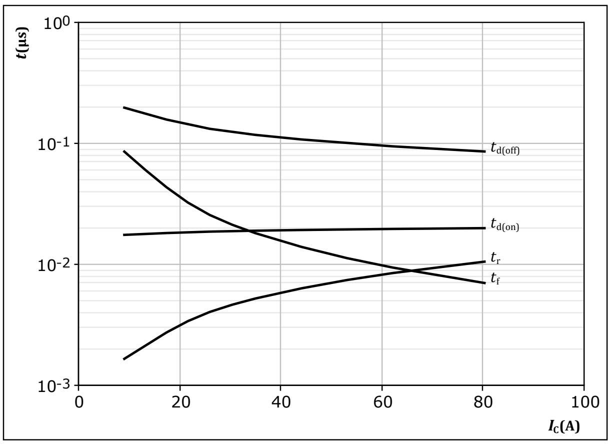
T_j: 25 °C, 125 °C, 150 °C

MNPC BOOST Switching Characteristics

figure 37. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



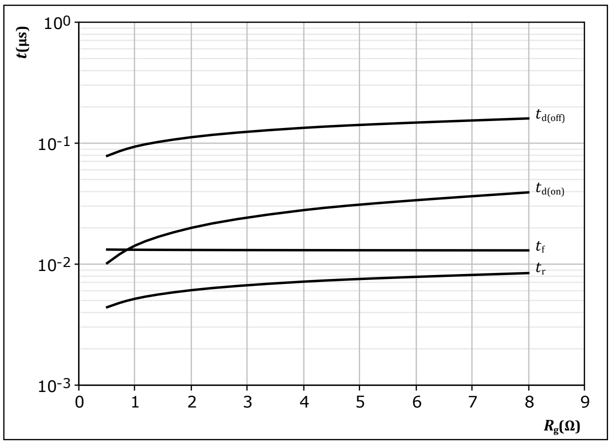
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 38. **IGBT**

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

t = f(R_g)



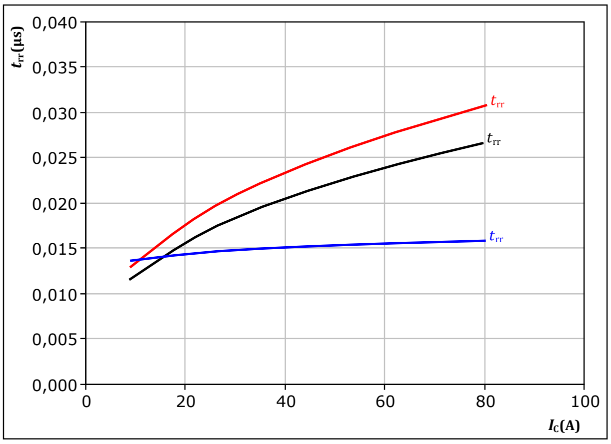
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
I_C =	44	A

figure 39. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

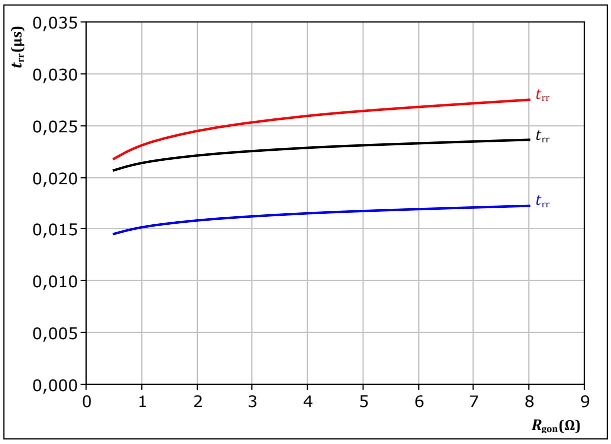
V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 40. **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} =	-5/15	V
I_C =	44	A

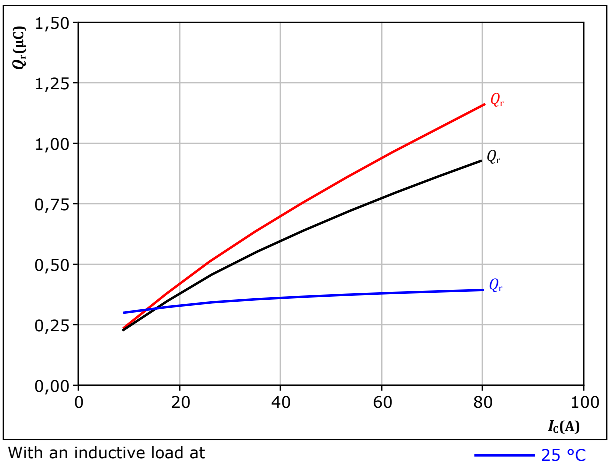
T_j: 25 °C, 125 °C, 150 °C

MNPC BOOST Switching Characteristics

figure 41. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



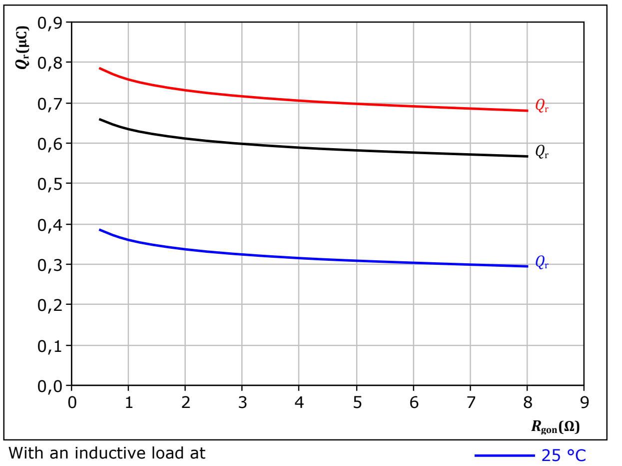
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 42. **FWD**

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

Q_r = f(R_{gon})



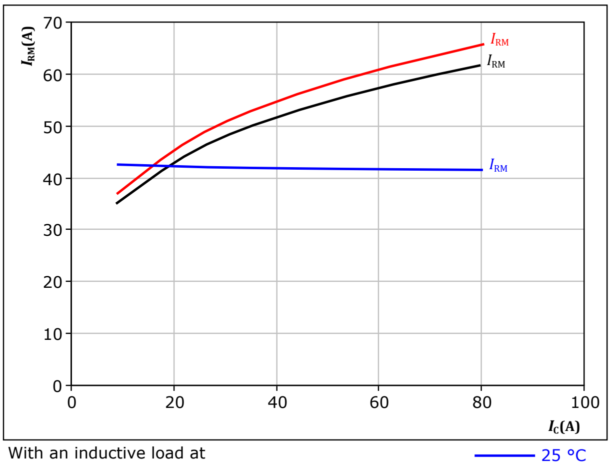
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	44	A		150 °C

figure 43. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



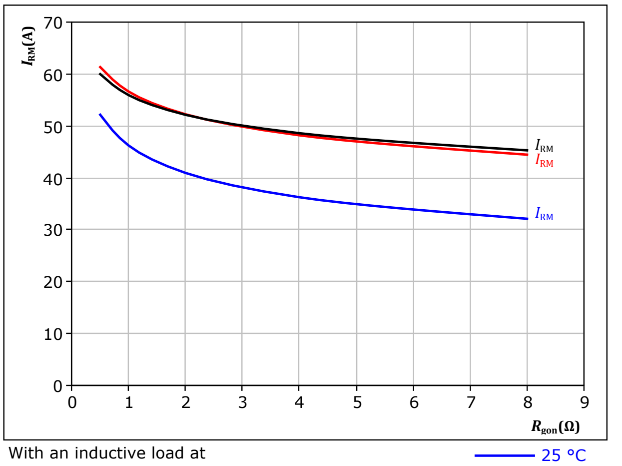
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 44. **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

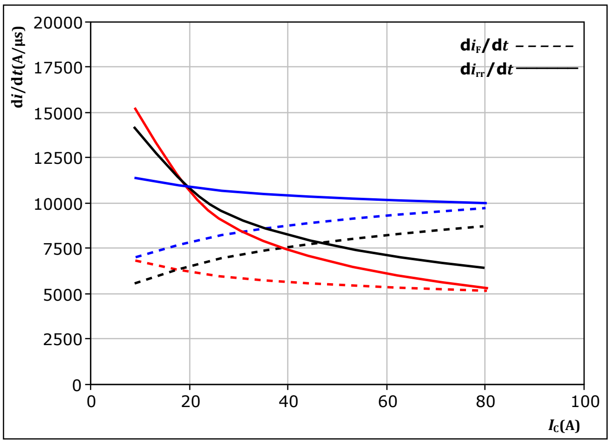
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	44	A		150 °C

MNPC BOOST Switching Characteristics

figure 45. **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)



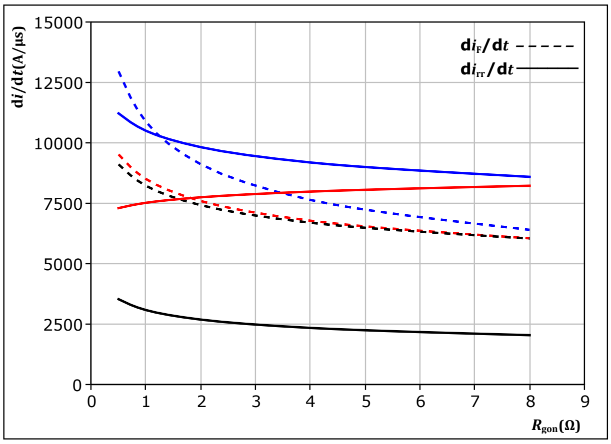
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 46. **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})



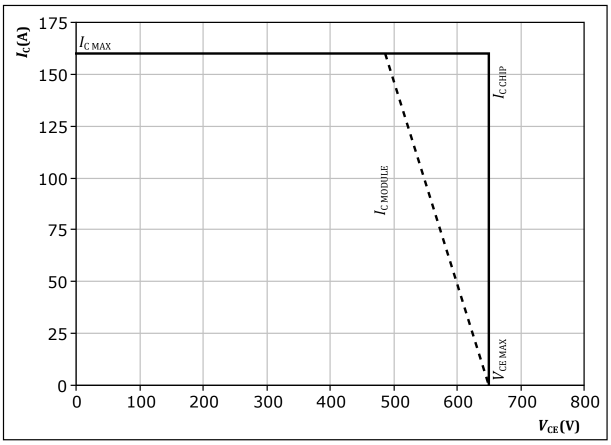
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	44	A		150 °C

figure 47. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



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

MNPC BOOST Switching Definitions

figure 48. **IGBT**

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

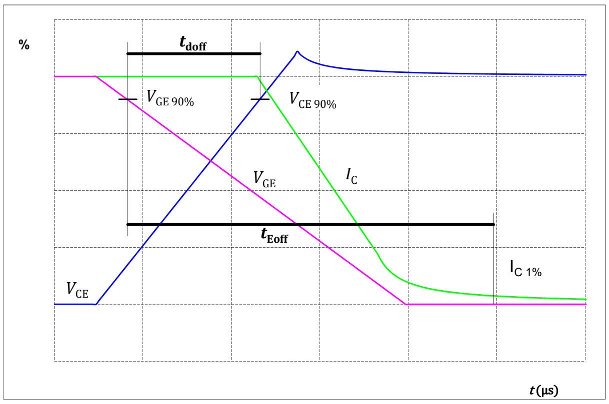


figure 49. **IGBT**

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

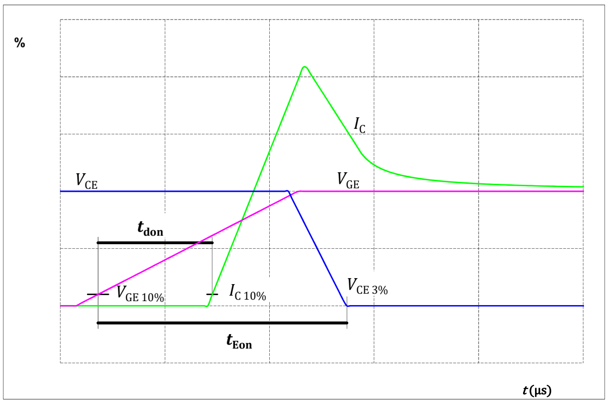


figure 50. **IGBT**

Turn-off Switching Waveforms & definition of t_f

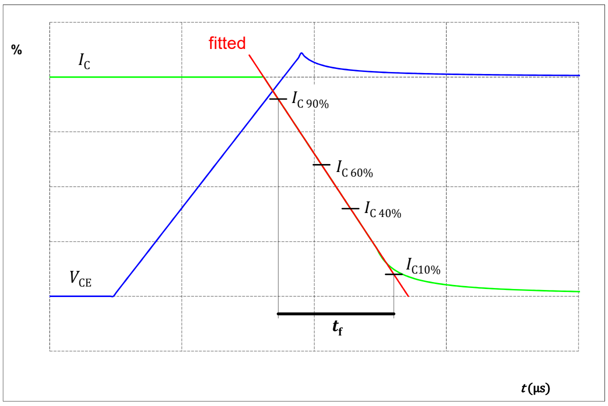
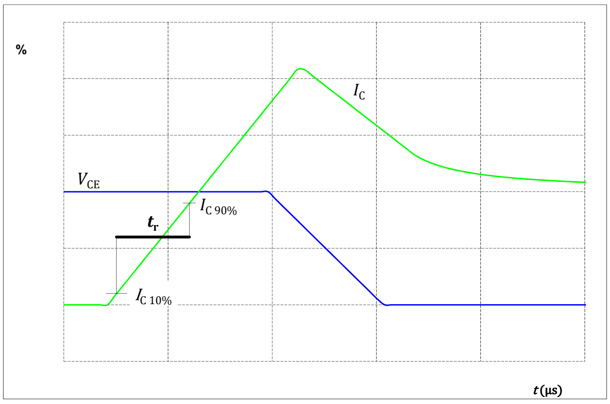


figure 51. **IGBT**

Turn-on Switching Waveforms & definition of t_r



MNPC BOOST Switching Definitions

figure 52.	FWD

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

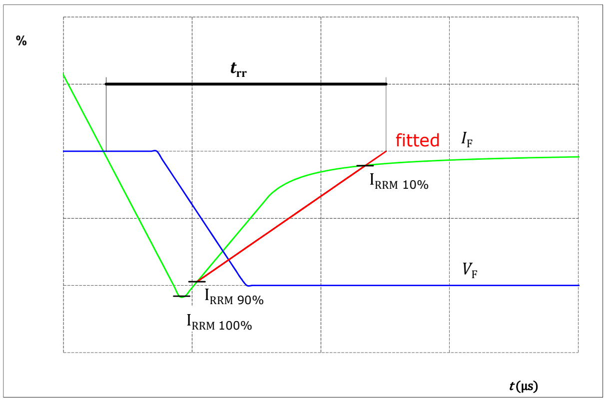
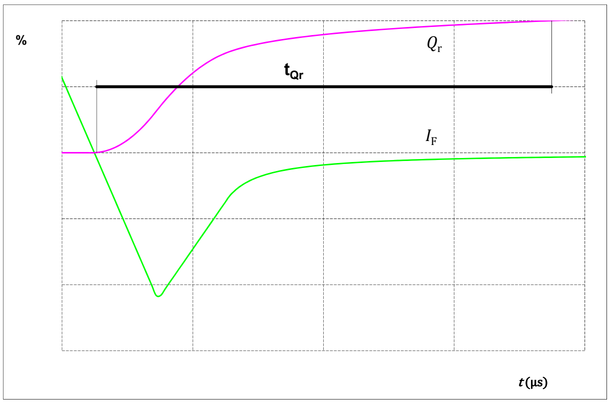


figure 53.	FWD

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



MNPC BUCK Switching Definitions

figure 48. **MOSFET**

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

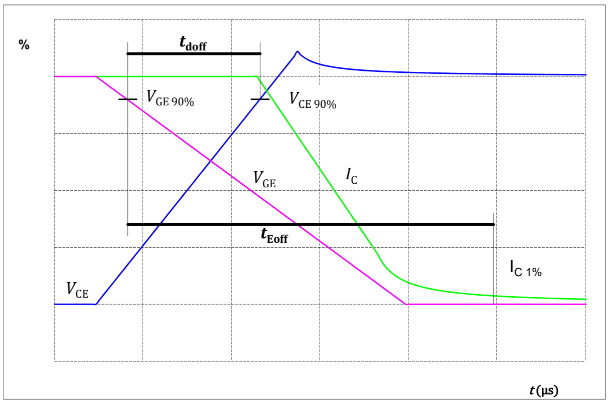


figure 49. **MOSFET**

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

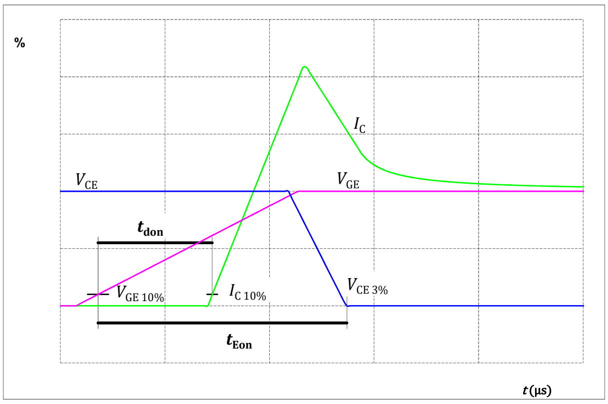


figure 50. **MOSFET**

Turn-off Switching Waveforms & definition of t_f

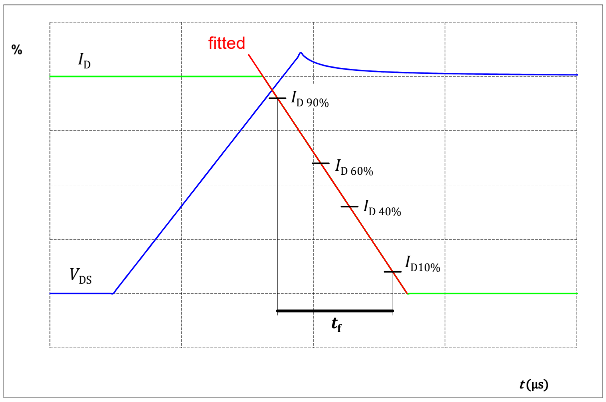
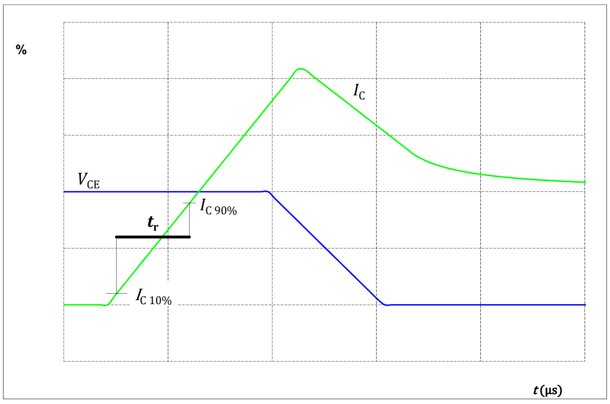


figure 51. **MOSFET**

Turn-on Switching Waveforms & definition of t_r



MNPC BUCK Switching Definitions

figure 52. **FWD**

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

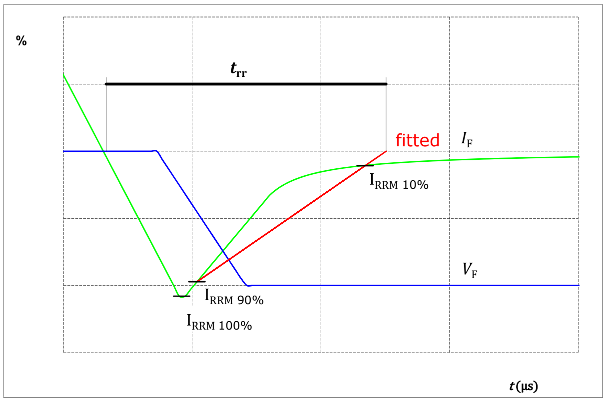


figure 53. **FWD**

Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})

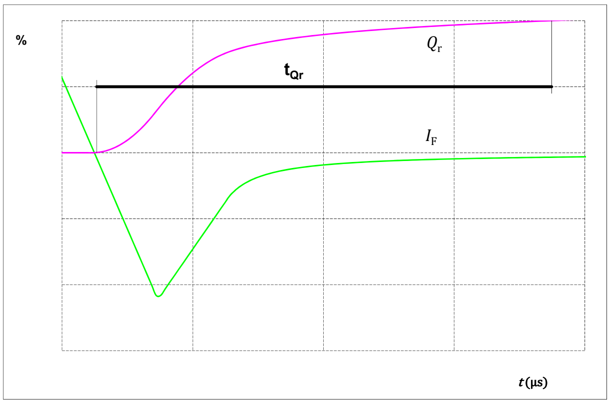
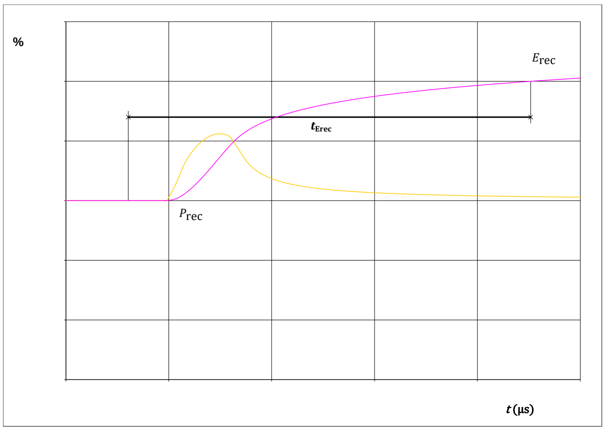


figure 54. **FWD**

Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec} = integrating time for E_{rec})



Ordering Code

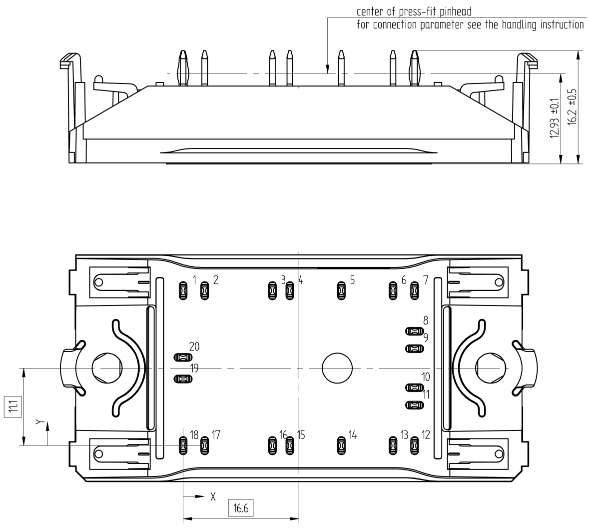
Version	Ordering Code
Without thermal paste	10-PZ12NMA027ME-M340F63Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PZ12NMA027ME-M340F63Y-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-PZ12NMA027ME-M340F63Y-/3/

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		

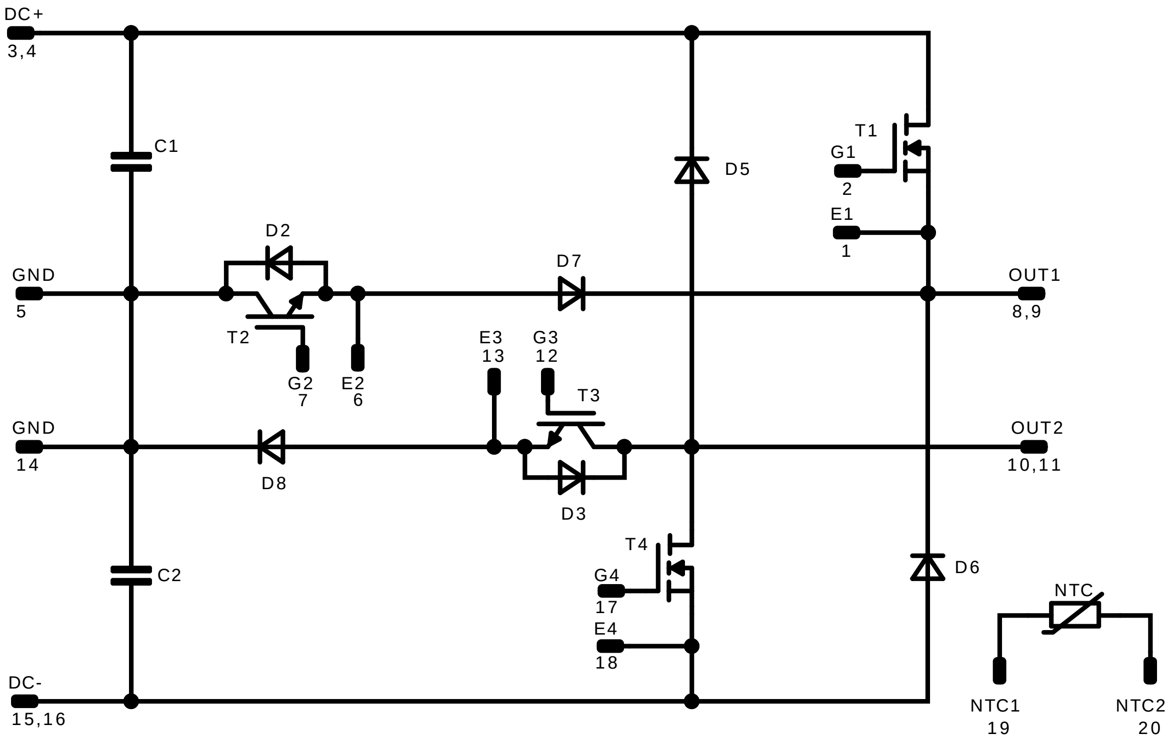
Outline

Pin table [mm]			
Pin	X	Y	Function
1	0	22,2	E1
2	3,1	22,2	G1
3	12,8	22,2	DC+
4	15,3	22,2	DC+
5	22,7	22,2	GND
6	30,1	22,2	E2
7	33,2	22,2	G2
8	33,2	16,4	OUT1
9	33,2	13,9	OUT1
10	33,2	8,3	OUT2
11	33,2	5,8	OUT2
12	33,2	0	G3
13	30,1	0	E3
14	22,7	0	GND
15	15,3	0	DC-
16	12,8	0	DC-
17	3,1	0	G4
18	0	0	E4
19	0	9,55	NTC1
20	0	12,65	NTC2



Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1, T4	MOSFET	1200 V	26,67 mΩ	MNPC BUCK Switch	
D7, D8	FWD	650 V	24 A	MNPC BUCK Diode	
T3, T2	IGBT	650 V	80 A	MNPC BOOST Switch	
D5, D6	FWD	1200 V	10 A	MNPC BOOST Diode	
D3, D2	FWD	650 V	6 A	Boost Sw. Protection Diode	
C2, C1	Capacitor	500 V		Capacitor (DC)	
NTC	Thermistor			Thermistor	

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

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 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
10-PZ12NMA027ME-M340F63Y-D4-14	9 Sep. 2022	Correct Buck Diode Maximum Ratings according to PCN-31-2022 Characteristic values updated with new measurements	