10-FZ12NMA080NS03-M260F38
10-PZ12NMA080NS03-M260F38Y
datasheet

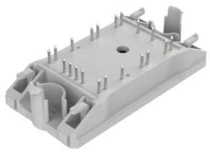
Vincotech

***flow* MNPC 0** | **1200 V / 80 A**

Features

- Mixed voltage component topology
- Neutral point clamped inverter
- Reactive power capability
- Low inductance layout

flow 0 12 mm housing



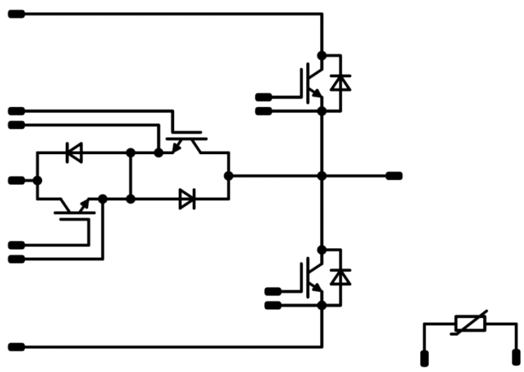
solder pins

press-fit pins

Target applications

- Solar inverter
- UPS

Schematic



Types

- 10-FZ12NMA080NS03-M260F38
- 10-PZ12NMA080NS03-M260F38Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Switch					
Collector-emitter voltage	V_{CES}			600	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	64	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		225	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	101	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq 150$ °C V_{GE} = 15 V		6 360	µs V
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	61	A
Repetitive peak forward current	I_{FRM}			100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	111	W
Maximum Junction Temperature	T_{jmax}			175	°C
Buck Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	80	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	181	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq$ 150 °C V_{GE} = 15 V		10 500	µs V
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			600	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	33	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	58	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Module Properties					
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance		with press-fit pins / with solder pins		9 / 9,15	mm
Comparative Tracking Index	CTI			>200	

*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
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0012	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150	1,05	1,45 1,59 1,64	1,85	V
Collector-emitter cut-off current	I_{CES}		0	600		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			600	nA
Internal gate resistance	r_{g}							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		4620		pF
Output capacitance	C_{oes}							288		
Reverse transfer capacitance	C_{res}							137		
Gate charge	Q_{g}		15	480	75	25		470		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,94		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	55	25 125		84 85		ns
Rise time	t_{r}					25 125		11 12		
Turn-off delay time	$t_{d(off)}$					25 125		177 205		
Fall time	t_{f}					25 125		87 105		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 5,3 µC Q_{rFWD} = 8,2 µC				25 125		0,528 0,747		mWs
Turn-off energy (per pulse)	E_{off}					25 125		1,860 2,500		

Characteristic Values

Parameter	Symbol	Conditions					Value			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				50	25 125 150		1,73 1,70 1,68	2,05	V
Reverse leakage current	I_r			1200		25			10	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,86		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 6090 A/µs di/dt = 5325 A/µs	±15	350	55	25 125		106 118		A
Reverse recovery time	t_{rr}					25 125		102 148		ns
Recovered charge	Q_r					25 125		5,316 8,219		µC
Reverse recovered energy	E_{rec}					25 125		1,551 2,418		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		6904 4951		A/µs

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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]	Value Min	Value Typ	Value Max	Unit
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0008	25	4,5	5,5	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		80	25 125 150		2,08 2,19 2,22	2,4	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			800	µA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							14770		
Output capacitance	C_{oes}	f = 1 Mhz	0	20		25		460		pF
Reverse transfer capacitance	C_{res}							280		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,53		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	56	25 125 150		113 113 112		ns
Rise time	t_r					25 125 150		15 17 18		
Turn-off delay time	$t_{d(off)}$					25 125 150		128 149 155		
Fall time	t_f					25 125 150		28 45 46		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,5 µC Q_{rFWD} = 2,3 µC Q_{rFWD} = 2,8 µC				25 125 150		0,412 0,675 0,761		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,730 1,364 1,586		

Characteristic Values

Parameter	Symbol	Conditions					Value			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				50	25 125		1,99 2,16	2,7	V
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,65		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 4594 A/µs di/dt = 4470 A/µs di/dt = 3885 A/µs	±15	350	56	25 125 150		72 74 75		A
Reverse recovery time	t_{rr}					25 125 150		40 79 93		ns
Recovered charge	Q_r					25 125 150		1,458 2,329 2,776		µC
Reverse recovered energy	E_{rec}					25 125 150		0,324 0,525 0,635		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		5066 3825 3590		A/µs
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-12		+14	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				25		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				25		3998		K
Vincotech NTC Reference									B	

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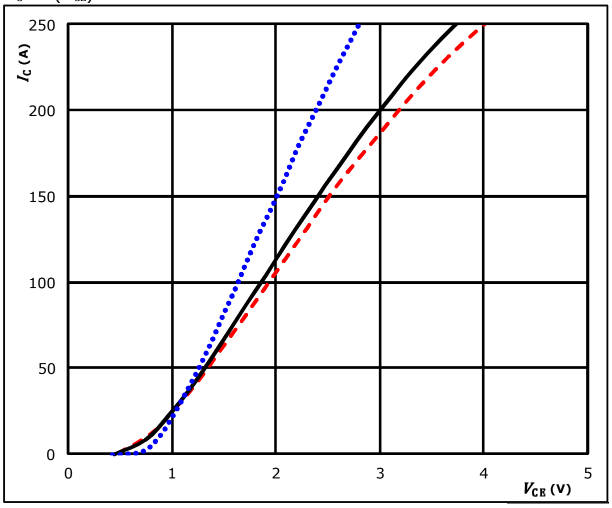
Boost Switch Characteristics

figure 1.	**IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

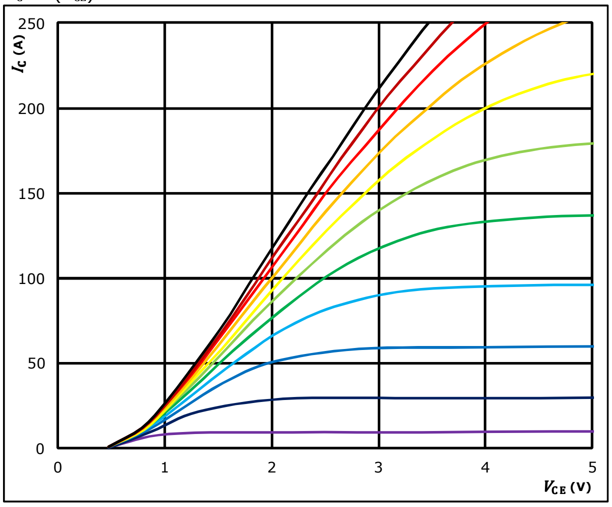


t_p =	250	µs		25 °C	dotted blue
V_{GE} =	15	V	T_j:	125 °C	solid black
				150 °C	dashed red

figure 2.	**IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

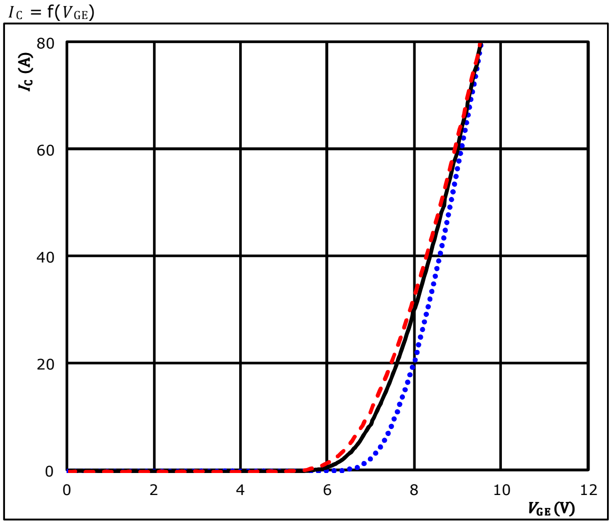


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3.	**IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

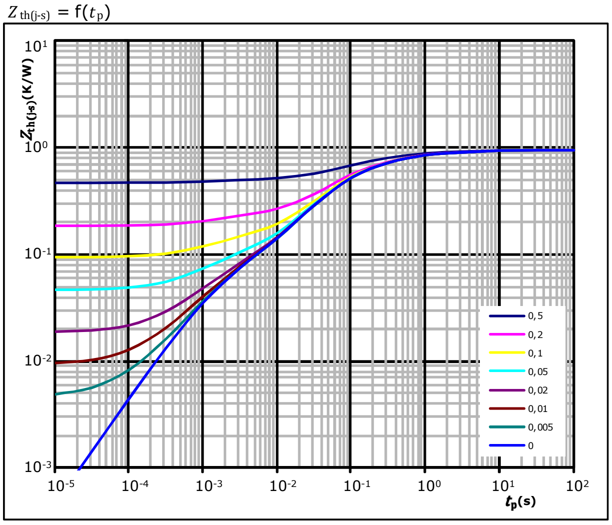


t_p =	100	µs		25 °C	dotted blue
V_{CE} =	10	V	T_j:	125 °C	solid black
				150 °C	dashed red

figure 4.	**IGBT**

Transient Thermal Impedance as function of Pulse duration

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



D = t_p / T
$R_{th(j\text{-}s)}$ = 0,94 K/W

IGBT thermal model values

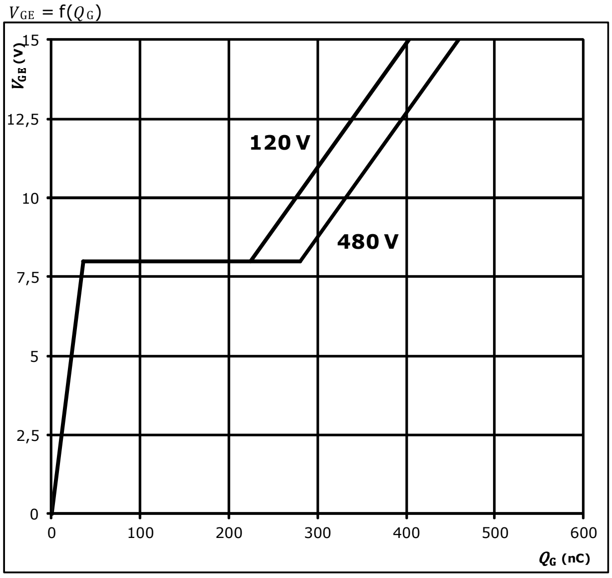
R (K/W)	τ (s)
8,42E-02	4,56E+00
2,89E-01	4,19E-01
4,35E-01	7,20E-02
8,50E-02	2,19E-02
4,67E-02	1,33E-03

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs Gate charge

$V_{GE} = f(Q_G)$



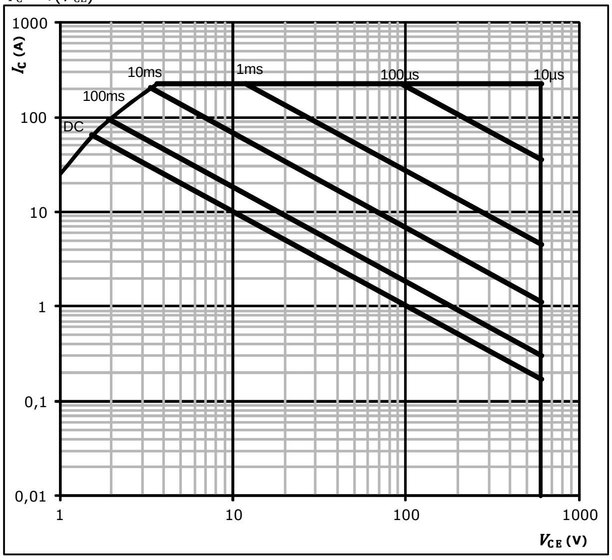
At

I_C= 75 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



At

D = single pulse

T_s = 80 ºC

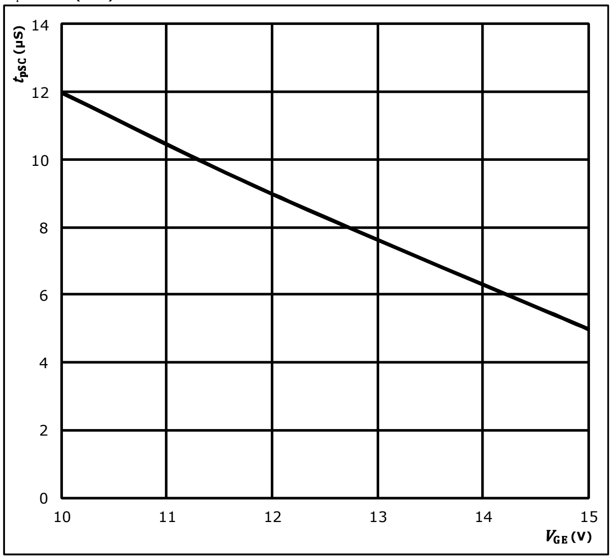
V_{GE} = ±15 V

T_j = T_{jmax}

figure 7. **IGBT**

Short circuit duration as a function of

$t_{pSC} = f(V_{GE})$



At

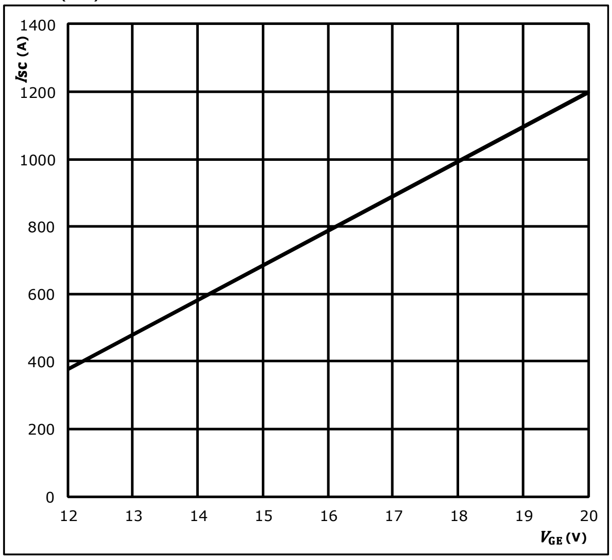
V_{CE} = 600 V

$T_j \leq$ 175 ºC

figure 8. **IGBT**

Typical short circuit current as a function of

$I_{SC} = f(V_{GE})$



At

$V_{CE} \leq$ 600 V

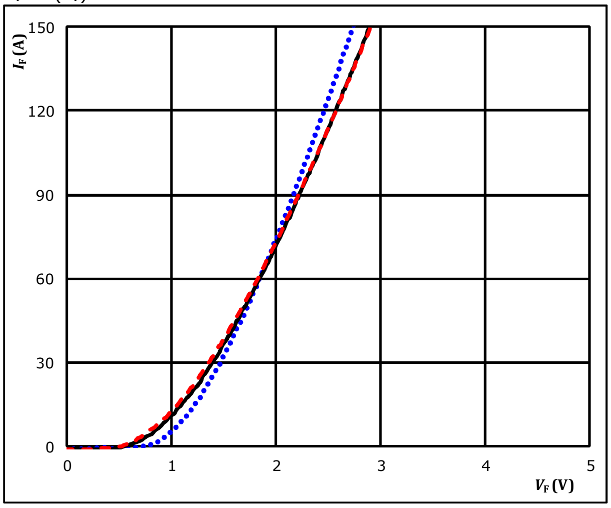
$T_j \leq$ 175 ºC

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$

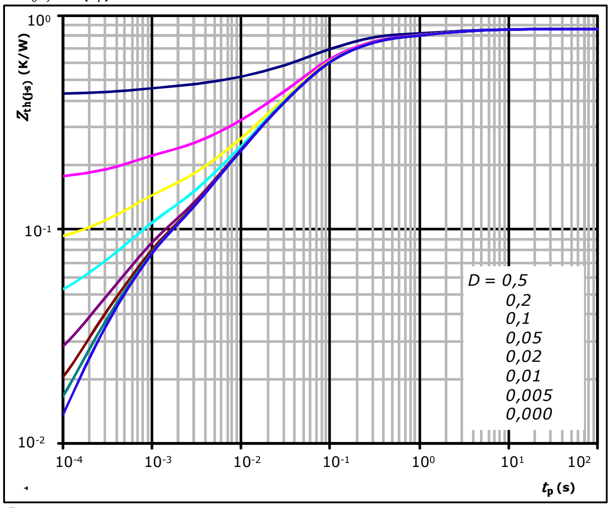


t_p =	250	µs	25 °C	
		T_j:	125 °C	
			150 °C	

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,86 K/W

FWD thermal model values

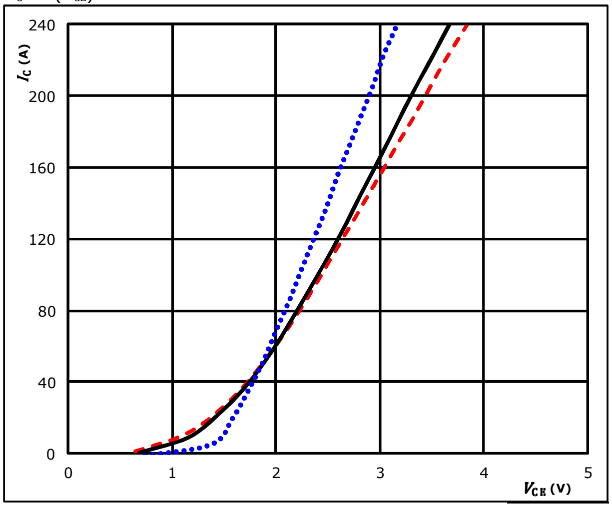
R (K/W)	τ (s)
3,99E-02	4,72E+00
9,06E-02	7,70E-01
3,15E-01	1,07E-01
2,60E-01	3,37E-02
9,39E-02	5,79E-03
5,83E-02	4,95E-04

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

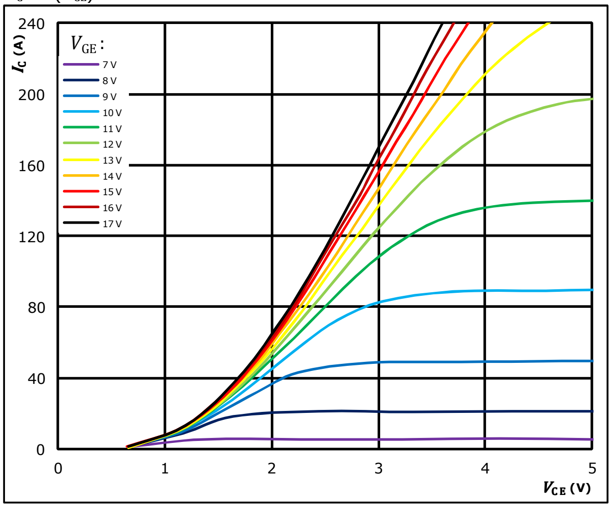


t_p =	250	µs		25 °C	············
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

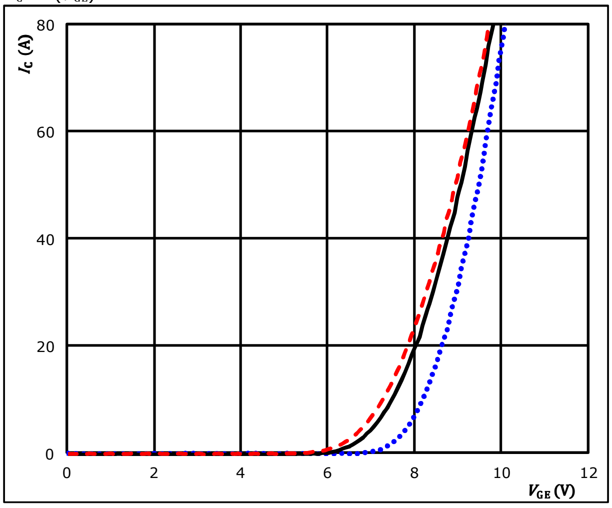


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

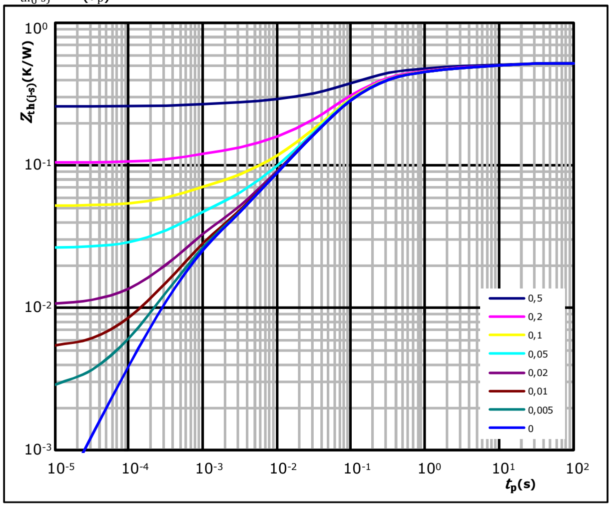


t_p =	100	µs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,53 K/W

IGBT thermal model values

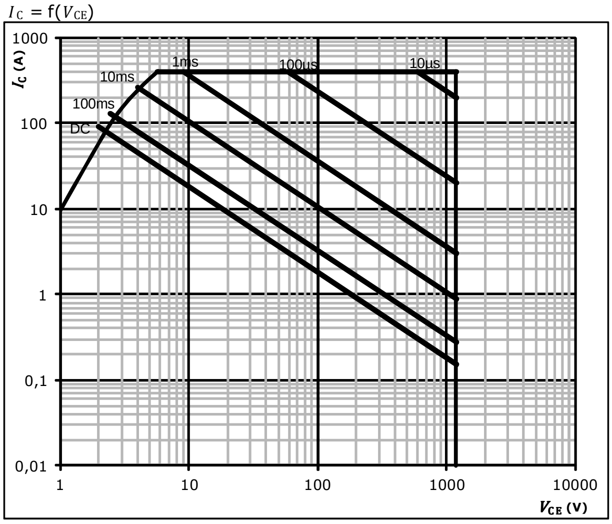
R (K/W)	τ (s)
4,93E-02	9,94E+00
8,58E-02	7,60E-01
2,23E-01	1,25E-01
1,13E-01	4,15E-02
3,39E-02	6,51E-03
2,06E-02	6,18E-04

Buck Switch Characteristics

figure 6.	IGBT

Safe operating area

$I_C = f(V_{CE})$



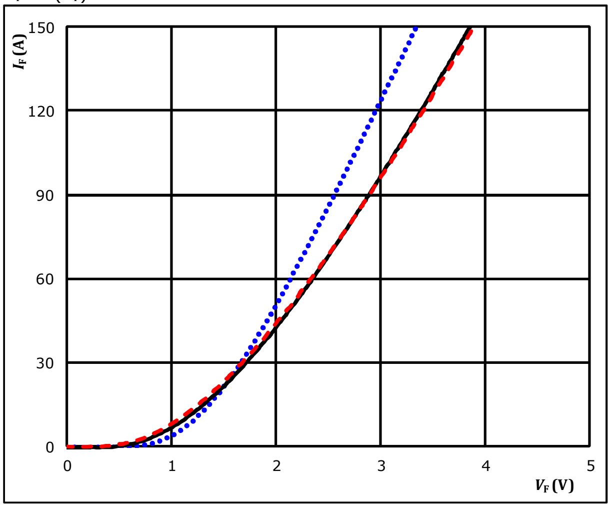
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



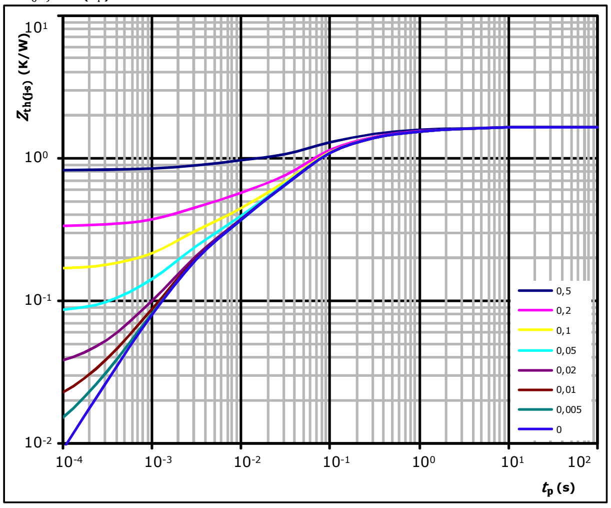
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,65 K/W

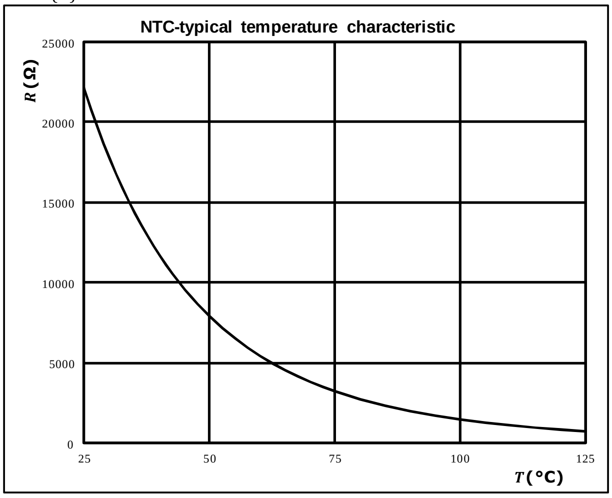
FWD thermal model values

R (K/W)	τ (s)
1,38E-01	2,78E+00
3,51E-01	3,25E-01
7,90E-01	6,26E-02
1,62E-01	3,53E-02
2,07E-01	2,89E-03

Thermistor Characteristics

figure 1.	Thermistor

Typical NTC characteristic
as a function of temperature
$R = f(T)$

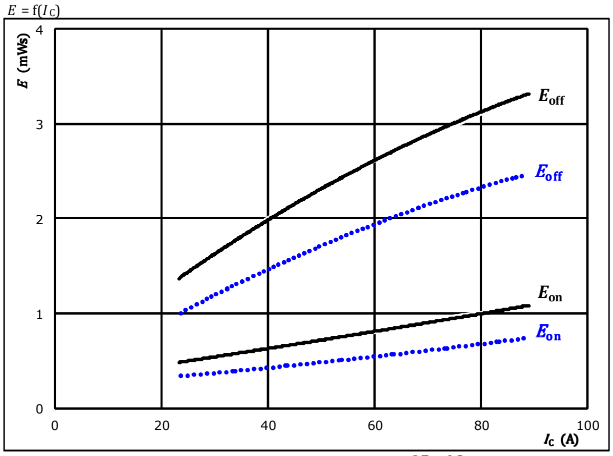


Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



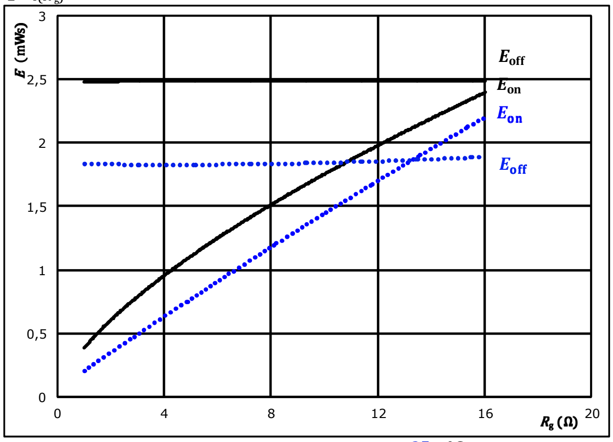
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C ··········
V_{GE} =	±15	V		125 °C ———
R_{gon} =	4	Ω		
R_{goff} =	4	Ω		

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



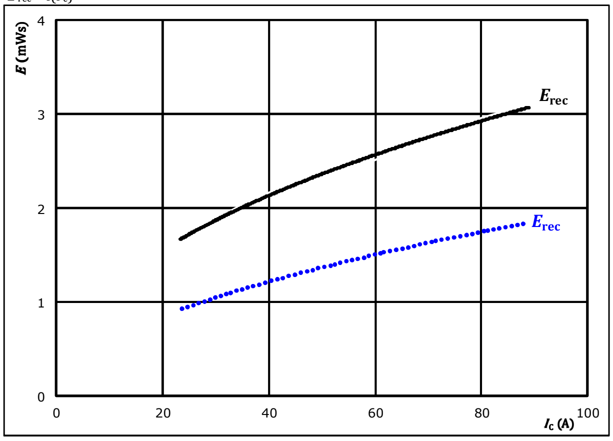
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C ··········
V_{GE} =	±15	V		125 °C ———
I_C =	55	A		

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



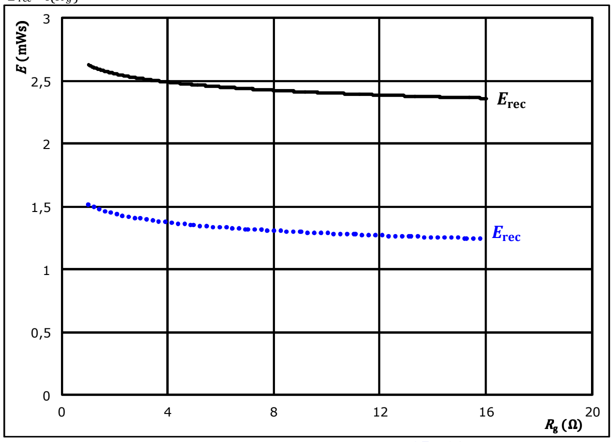
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C ··········
V_{GE} =	±15	V		125 °C ———
R_{gon} =	4	Ω		

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

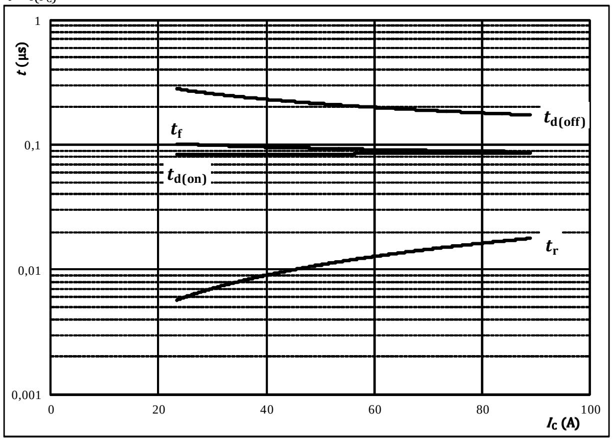
V_{CE} =	350	V	T_j:	25 °C ··········
V_{GE} =	±15	V		125 °C ———
I_C =	55	A		

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



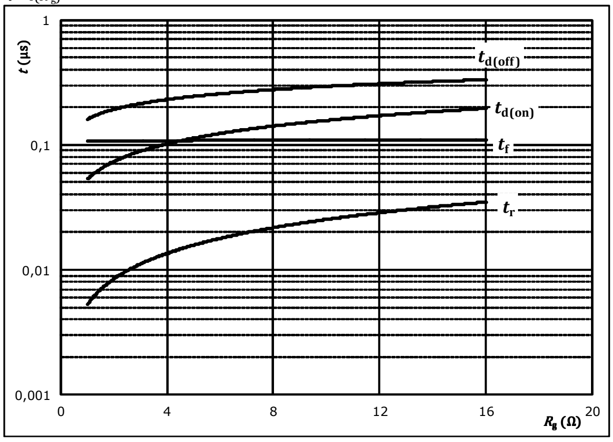
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



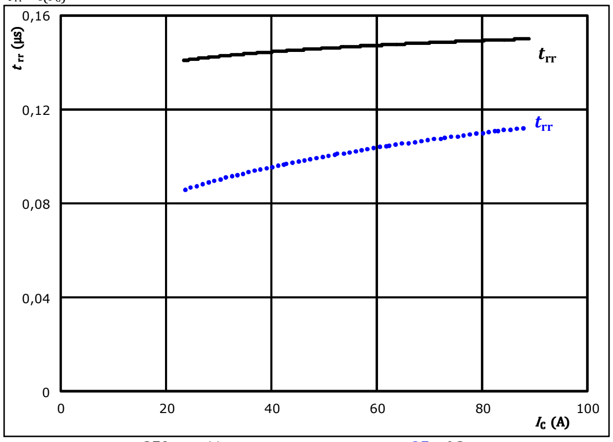
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	55	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

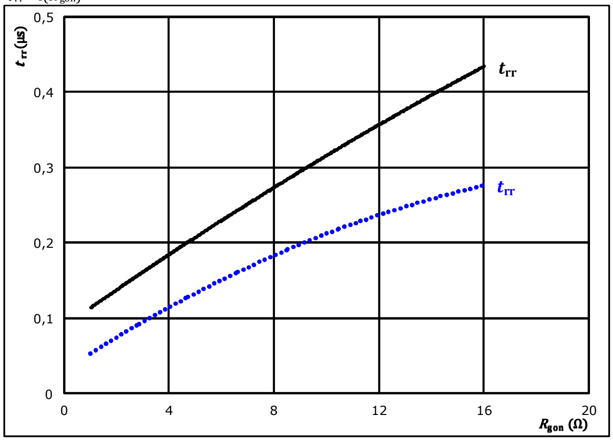


At V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω			

figure 8. **FWD**

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

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



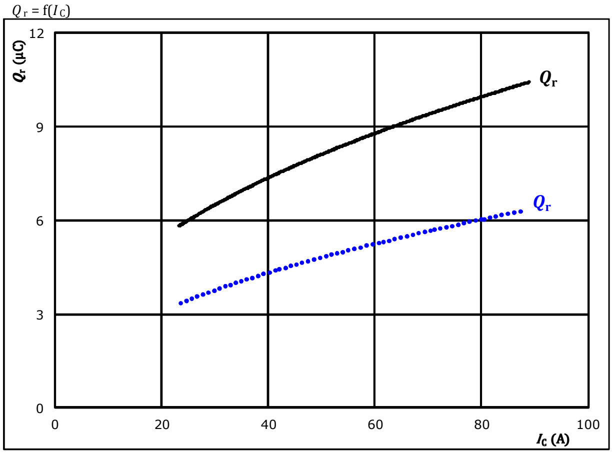
At V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C =	55	A			

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

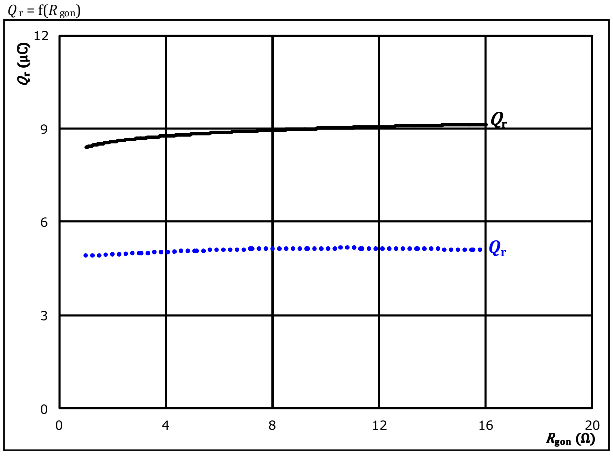


At					
V_{CE} =	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω			

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

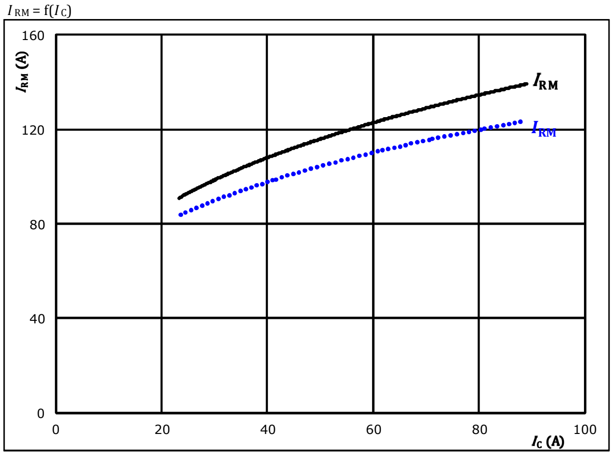


At					
V_{CE}=	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	55	A			

figure 11. **FWD**

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

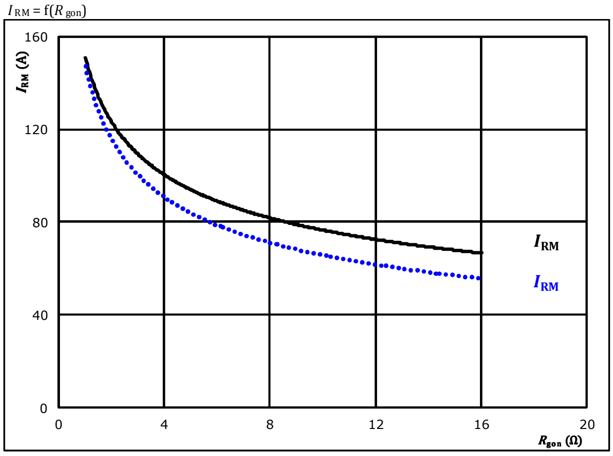


At					
V_{CE} =	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω			

figure 12. **FWD**

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

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



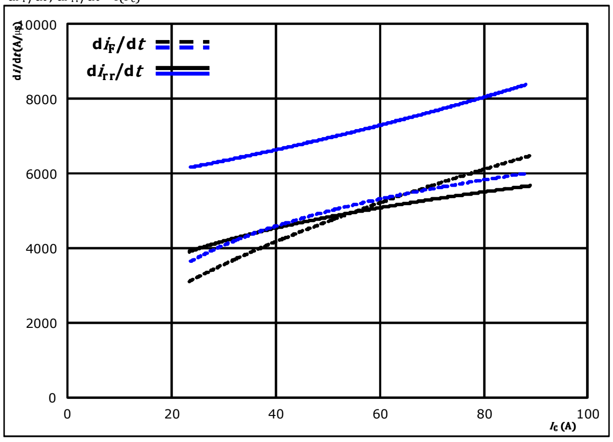
At					
V_{CE} =	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	55	A			

Boost Switching Characteristics

figure 13. FWD

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

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

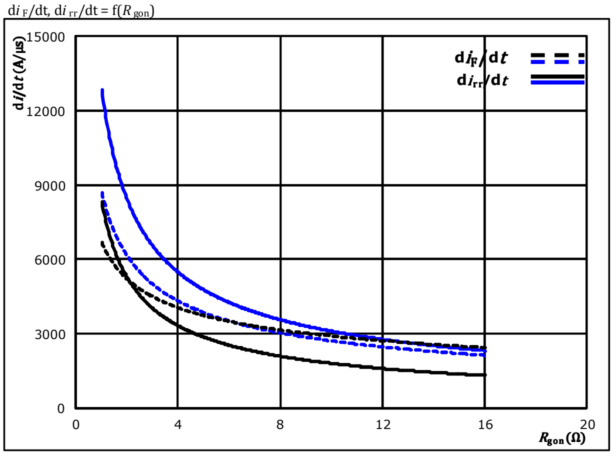


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	4	Ω			

figure 14. FWD

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

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

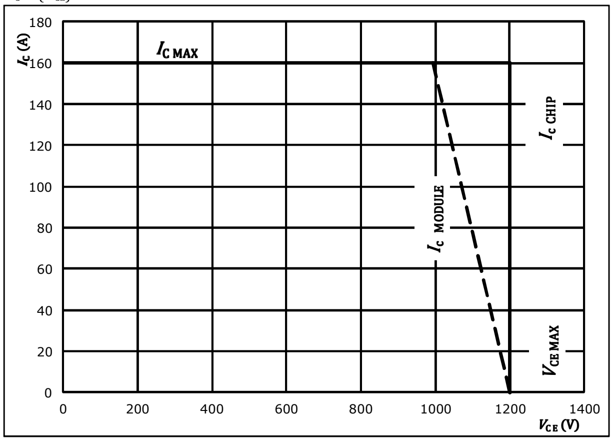


At		
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	55	A

figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

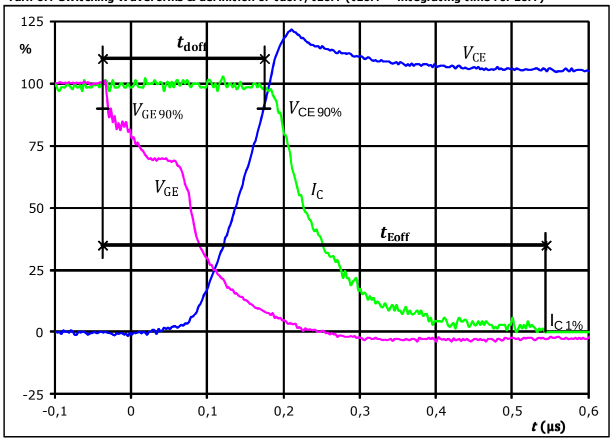
Boost Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. **IGBT**

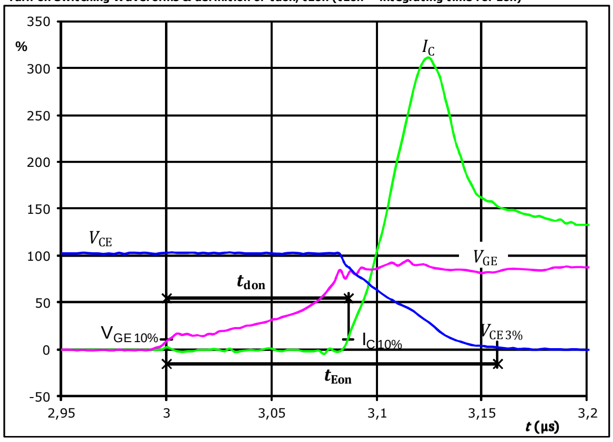
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_{doff} =	0,205	µs
t_{Eoff} =	0,582	µs

figure 2. **IGBT**

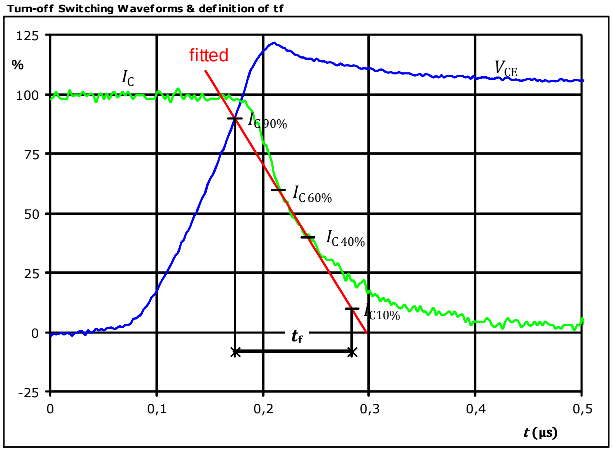
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_{don} =	0,085	µs
t_{Eon} =	0,157	µs

figure 3. **IGBT**

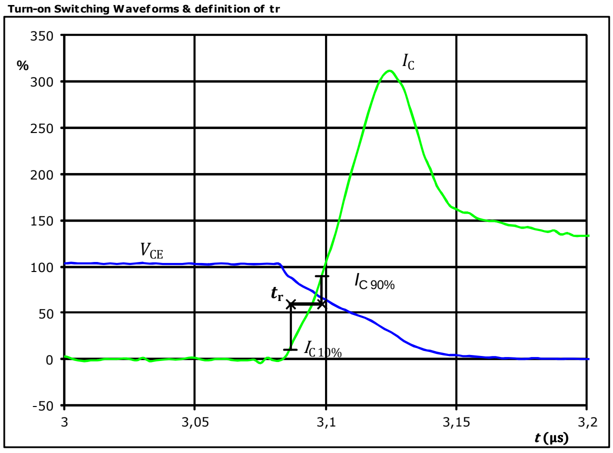
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_f =	0,105	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr



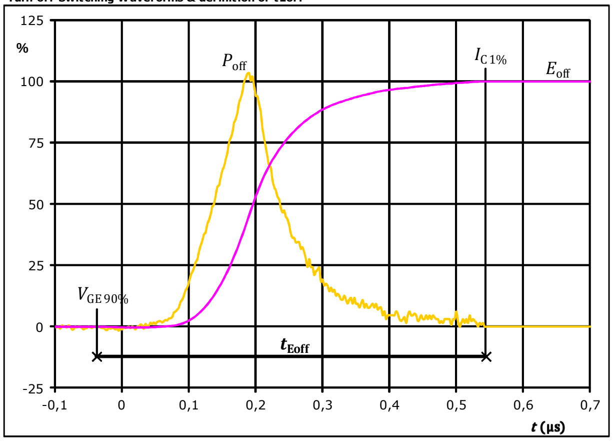
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_r =	0,012	µs

10-FZ12NMA080NS03-M260F38
10-PZ12NMA080NS03-M260F38Y
datasheet

Boost Switching Characteristics

figure 5. IGBT

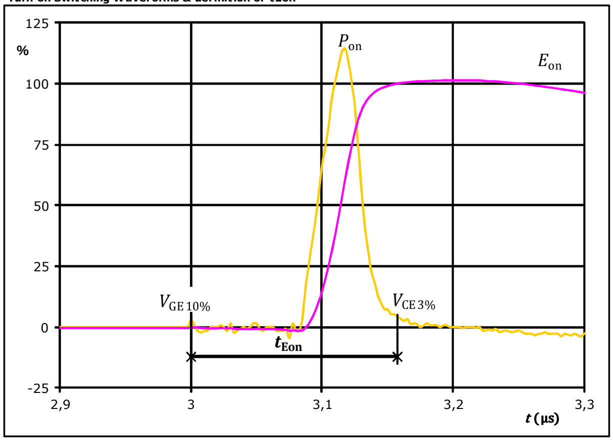
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	19,56	kW
E_{off} (100%) =	2,50	mJ
t_{Eoff} =	0,58	μs

figure 6. IGBT

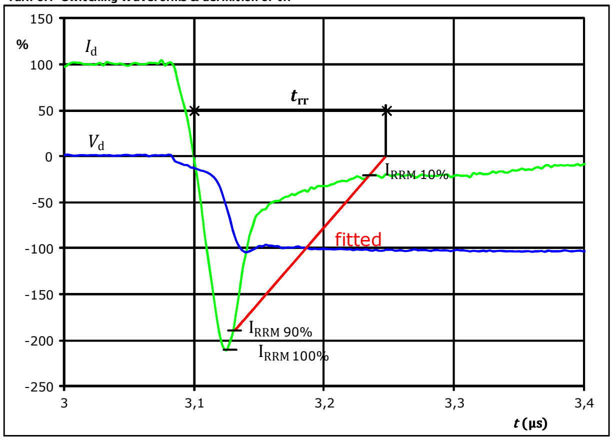
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	19,56	kW
E_{on} (100%) =	0,75	mJ
t_{Eon} =	0,16	μs

figure 7. FWD

Turn-off Switching Waveforms & definition of trr

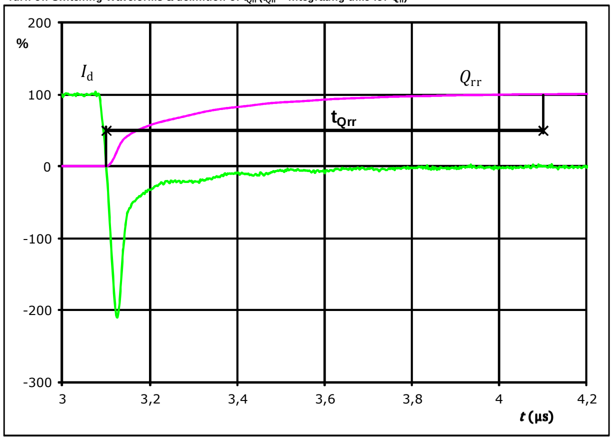


V_d (100%) =	350	V
I_d (100%) =	56	A
I_{RRM} (100%) =	-118	A
t_{rr} =	0,148	μs

Boost Switching Characteristics

figure 8. **FWD**

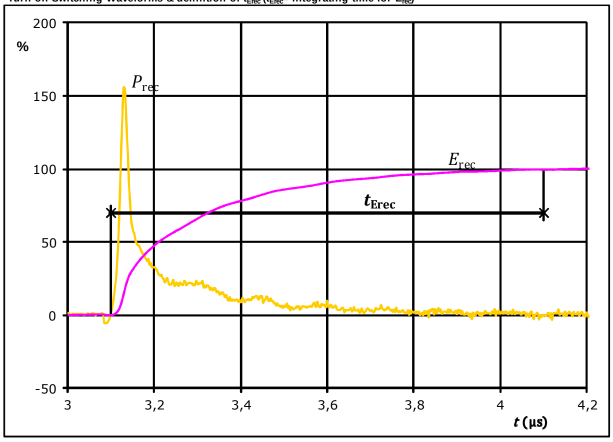
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	56	A
Q_{rr} (100%) =	8,22	µC
t_{Qrr} =	1,00	µs

figure 9. **FWD**

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



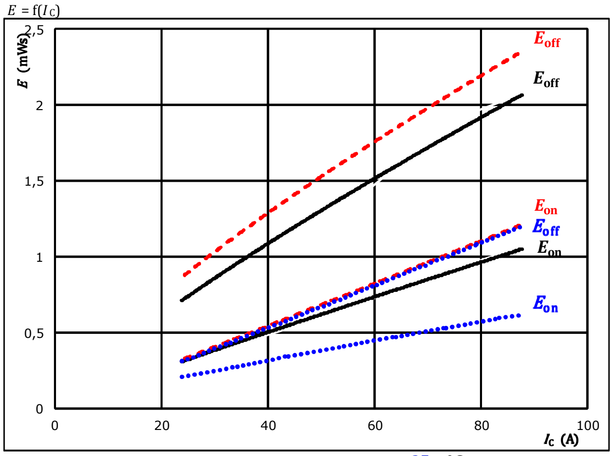
P_{rec} (100%) =	19,56	kW
E_{rec} (100%) =	2,42	mJ
t_{Erec} =	1,00	µs

Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



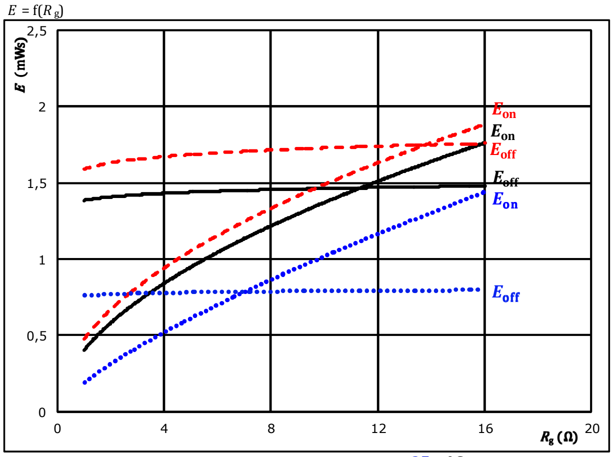
With an inductive load at

V_{CE} =	350	V	T_j:	25	°C	dotted blue
V_{GE} =	±15	V		125	°C	solid black
R_{gon} =	4	Ω		150	°C	dashed red
R_{goff} =	4	Ω				

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



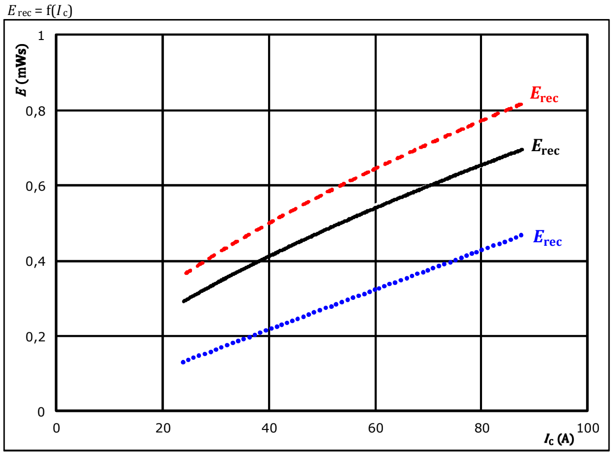
With an inductive load at

V_{CE} =	350	V	T_j:	25	°C	dotted blue
V_{GE} =	±15	V		125	°C	solid black
I_C =	56	A		150	°C	dashed red

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



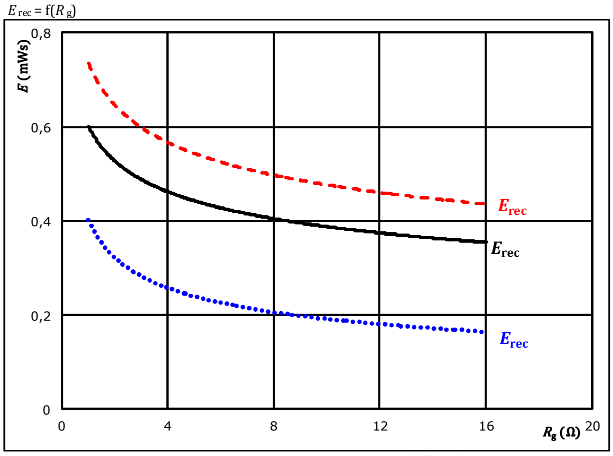
With an inductive load at

V_{CE} =	350	V	T_j:	25	°C	dotted blue
V_{GE} =	±15	V		125	°C	solid black
R_{gon} =	4	Ω		150	°C	dashed red

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

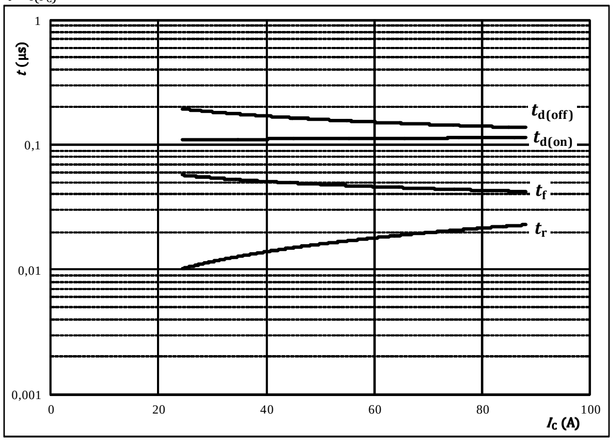
V_{CE} =	350	V	T_j:	25	°C	dotted blue
V_{GE} =	±15	V		125	°C	solid black
I_C =	56	A		150	°C	dashed red

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



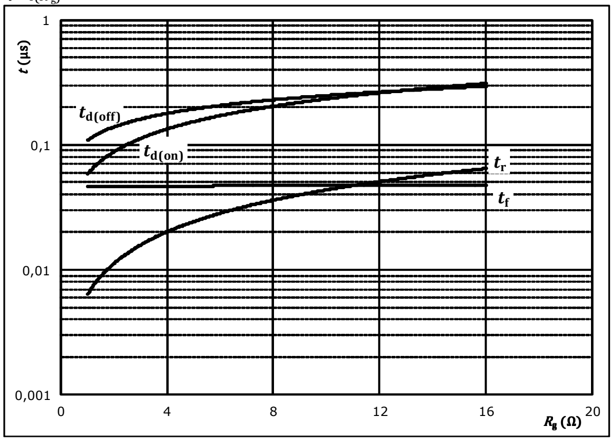
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



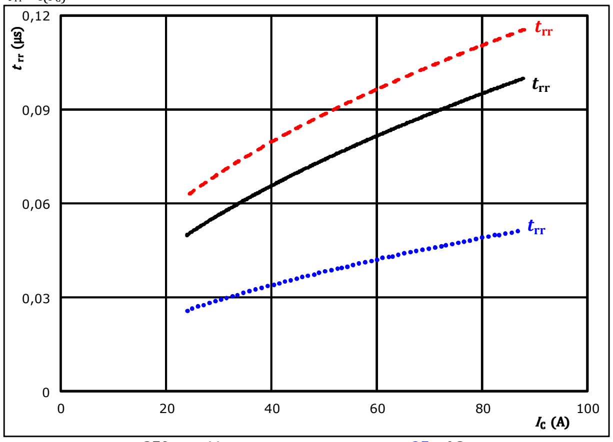
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	56	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

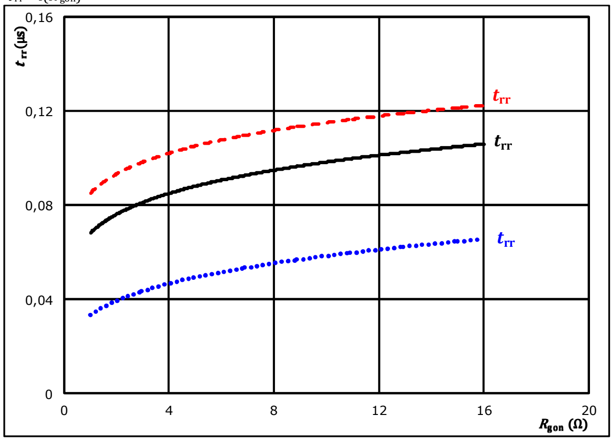


At					
V_{CE}=	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

figure 8. **FWD**

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

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



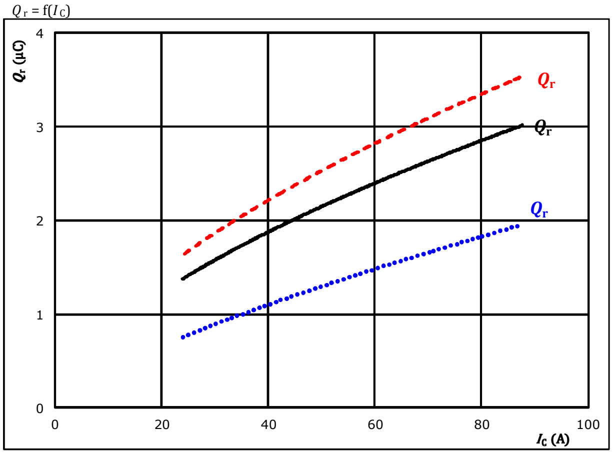
At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C =	56	A		150	°C

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

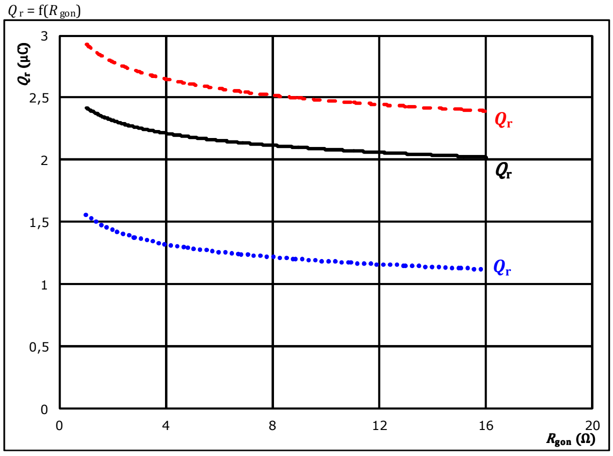


At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

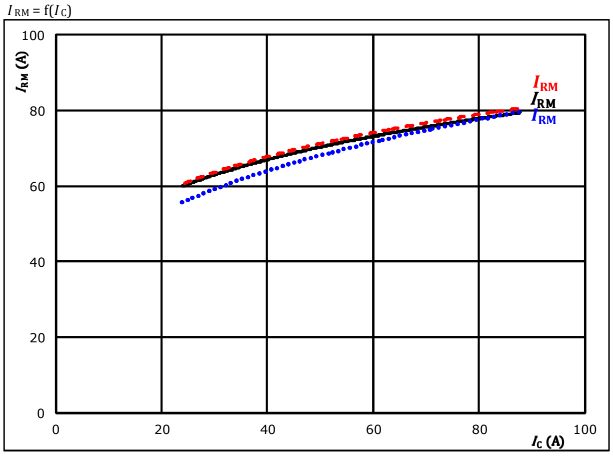


At					
V_{CE}=	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C=	56	A		150	°C

figure 11. **FWD**

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

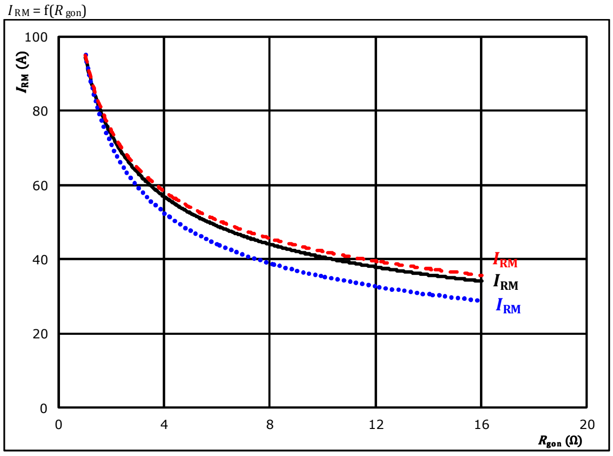


At					
V_{CE}:	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

figure 12. **FWD**

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

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



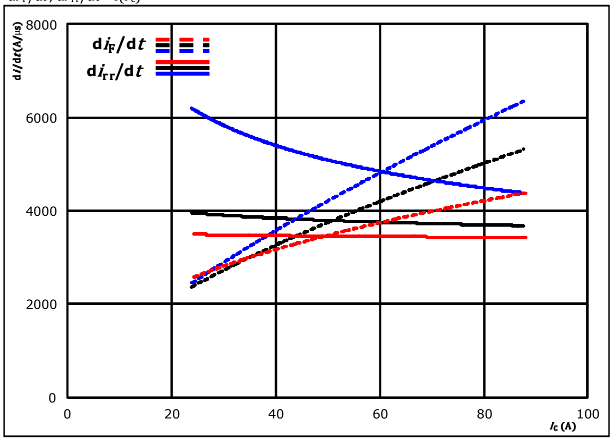
At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C =	56	A		150	°C

Buck Switching Characteristics

figure 13. **FWD**

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

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

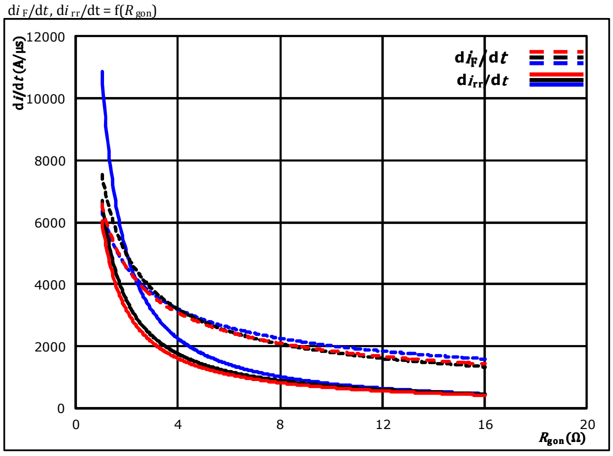


At					
V_{CE} =	350	V		25 °C	··············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 14. **FWD**

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

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

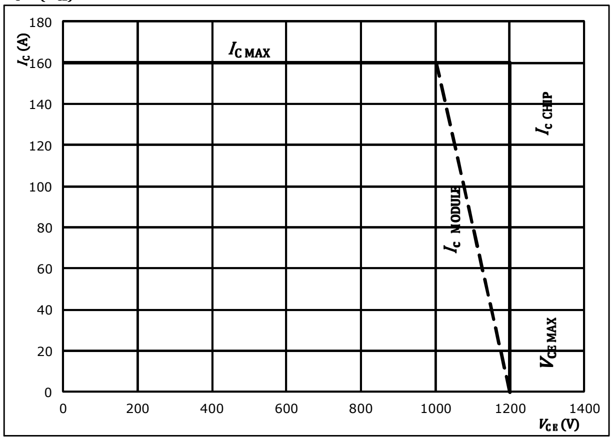


At					
V_{CE} =	350	V		25 °C	··············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	56	A		150 °C	– – –

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



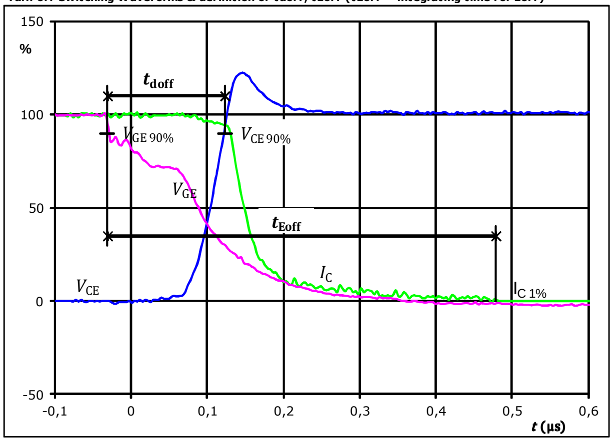
At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Buck Switching Definitions

General conditions		
T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. IGBT

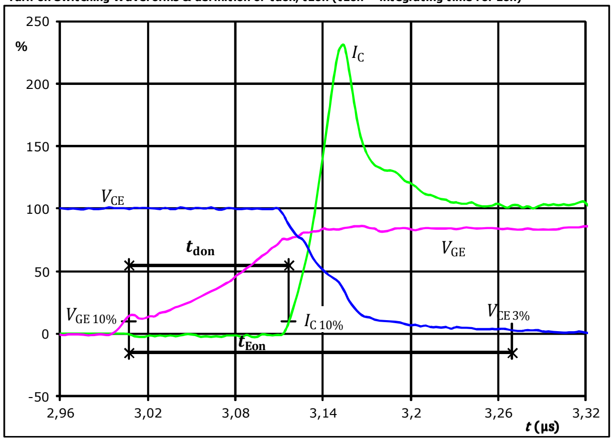
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_{doff} =	0,149	μs
t_{Eoff} =	0,510	μs

figure 2. IGBT

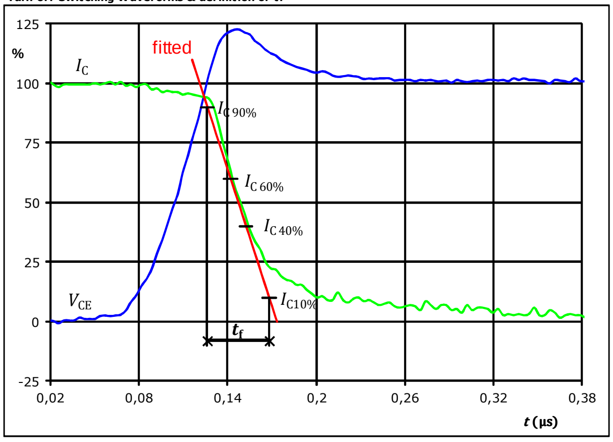
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_{don} =	0,113	μs
t_{Eon} =	0,262	μs

figure 3. IGBT

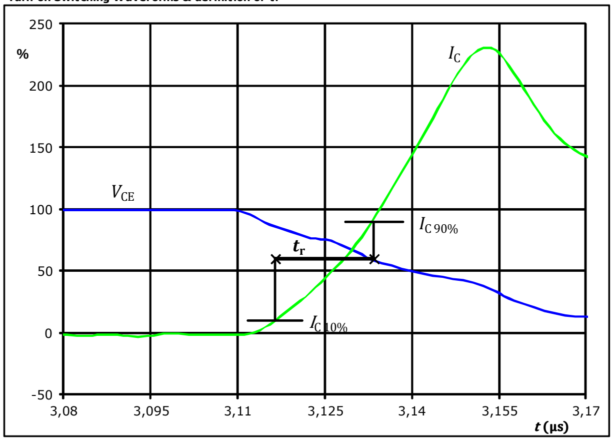
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_f =	0,045	μs

figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

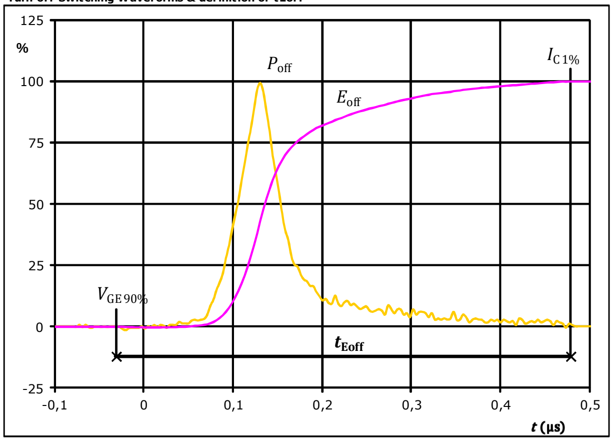


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_r =	0,017	μs

Buck Switching Characteristics

figure 5. **IGBT**

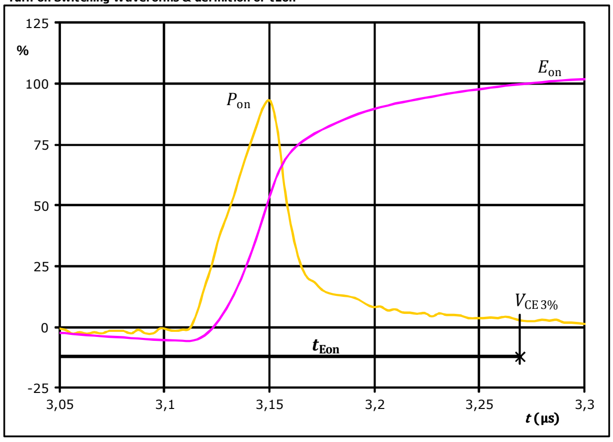
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	19,59	kW
E_{off} (100%) =	1,36	mJ
t_{Eoff} =	0,51	µs

figure 6. **IGBT**

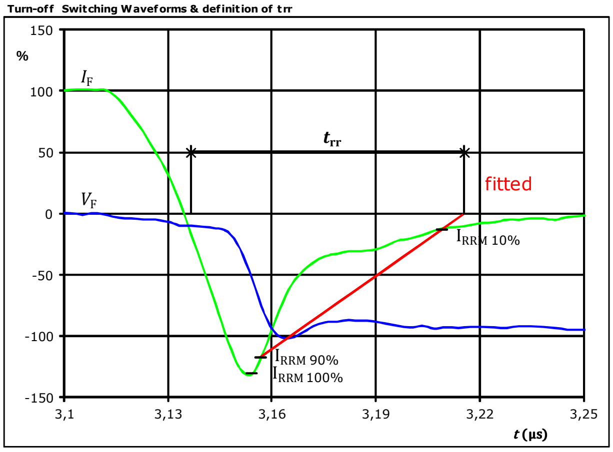
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	19,59	kW
E_{on} (100%) =	0,68	mJ
t_{Eon} =	0,26	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

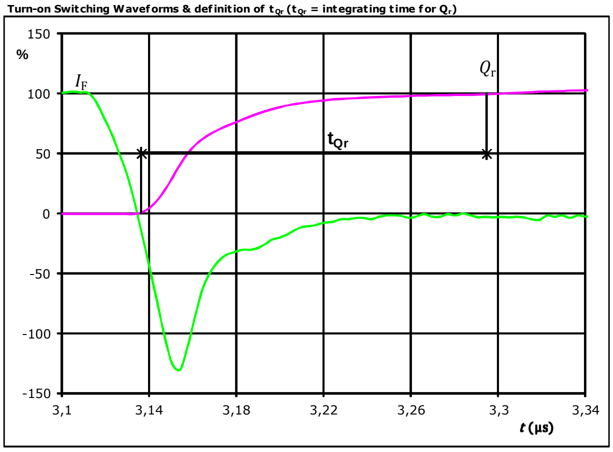


V_F (100%) =	350	V
I_F (100%) =	56	A
I_{RRM} (100%) =	-74	A
t_{rr} =	0,079	µs

Buck Switching Characteristics

figure 8. **FWD**

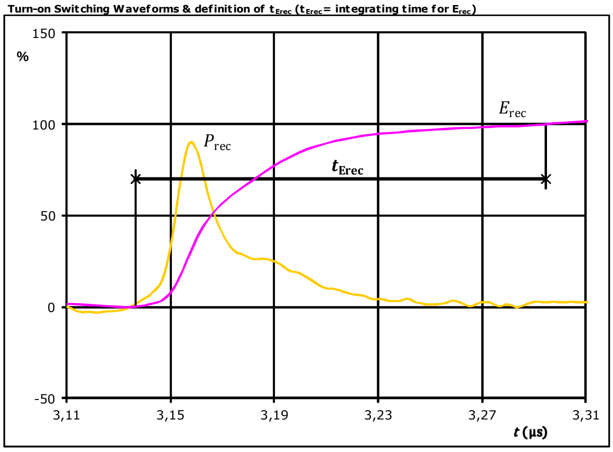
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F(100%) =	56	A
Q_r(100%) =	2,33	µC
t_{Qr} =	0,16	µs

figure 9. **FWD**

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



P_{rec}(100%) =	19,59	kW
E_{rec}(100%) =	0,53	mJ
t_{Erec} =	0,16	µs

10-FZ12NMA080NS03-M260F38
10-PZ12NMA080NS03-M260F38Y
datasheet

Vincotech

Ordering Code & Marking

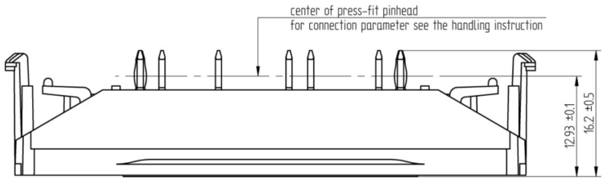
Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FZ12NMA080NS03-M260F38
without thermal paste 12 mm housing with press-fit pins	10-PZ12NMA080NS03-M260F38Y

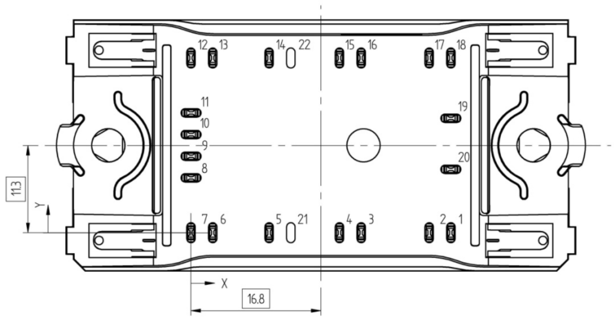
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

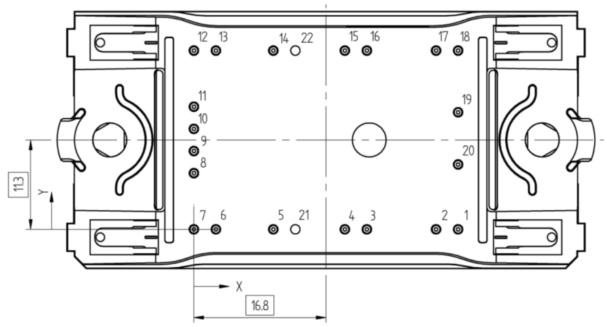
Outline

Pin table

Pin	X	Y	Function
1	33,6	0	S2
2	30,8	0	G2
3	22	0	-DC
4	19,2	0	-DC
5	10,1	0	GND
6	2,8	0	S4
7	0	0	G4
8	0	7,1	Line
9	0	9,9	Line
10	0	12,7	Line
11	0	15,5	Line
12	0	22,6	G3
13	2,8	22,6	S3
14	10,1	22,6	GND
15	19,2	22,6	+DC
16	22	22,6	+DC
17	30,8	22,6	G1
18	33,6	22,6	S1
19	33,6	14,8	NTC1
20	33,6	8,2	NTC2
21	Not assembled		
22	Not assembled		

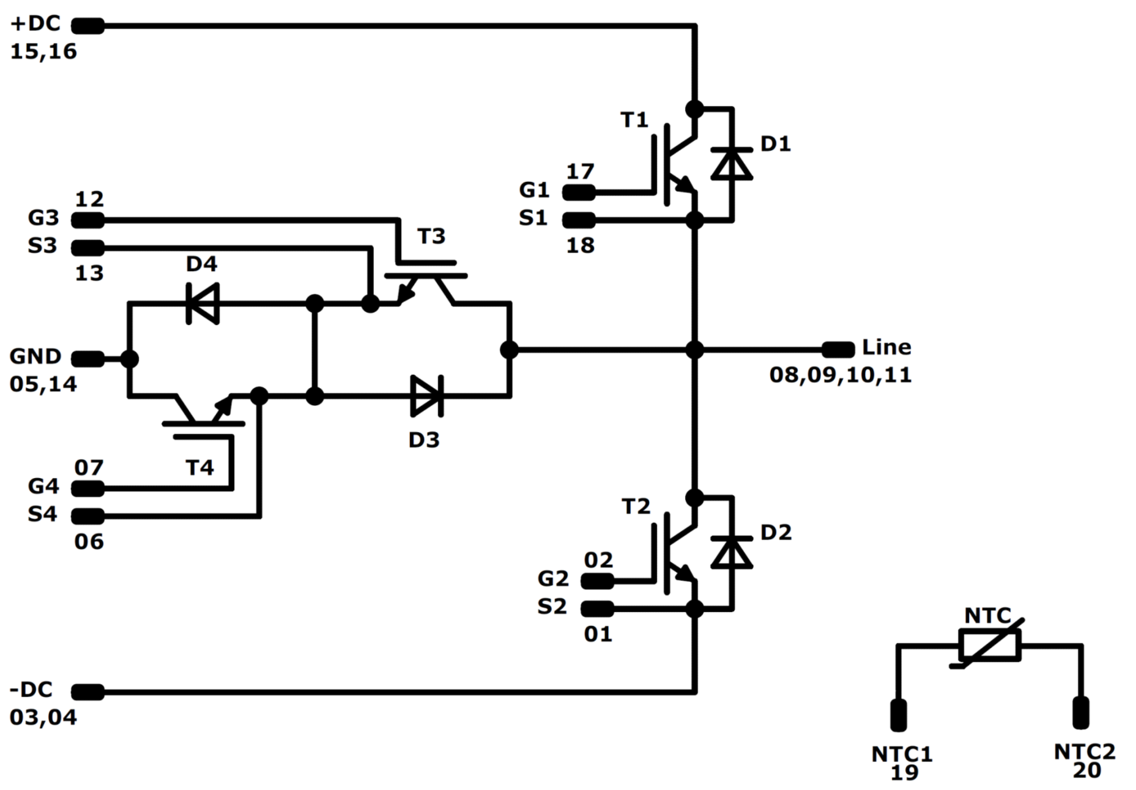






Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T3, T4	IGBT	600 V	75 A	Boost Switch	
D1, D2	FWD	1200 V	50 A	Boost Diode	
T1, T2	IGBT	1200 V	80 A	Buck Switch	
D3, D4	FWD	600 V	50 A	Buck Diode	
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.

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-xZ12NMA080NS03-M260F38x-D1-14	29 Jun. 2017		

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