10-FZ12NMA080SM01-L740F58

datasheet

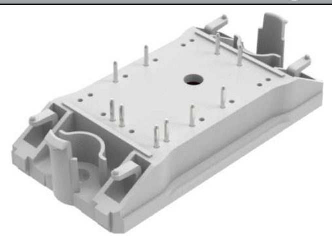
Vincotech

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

Features

- Mixed NPC three-level topology
- High speed components
- Integrated NTC

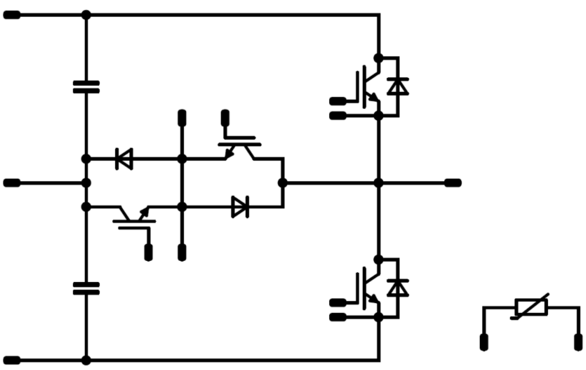
flow 0 12 mm housing



Target applications

- UPS

Schematic



Types

- 10-FZ12NMA080SM01-L740F58

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	79	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	133	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	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	46	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	94	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	82	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		320	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	219	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
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	76	A
Repetitive peak forward current	I_{FRM}			200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	106	W
Maximum Junction Temperature	T_{jmax}			175	°C
Capacitor					
Maximum DC voltage	V_{MAX}			500	V
Operation Temperature	T_{op}			-55…+125	°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				min. 12,7	mm
Clearance				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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,001	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 125		1,63 1,78	2,22	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		6000		pF
Output capacitance	C_{oes}							100		
Reverse transfer capacitance	C_{res}							22		
Gate charge	Q_g		15	520	100	25		240		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,72		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	81	25 125 150		66 66 65		ns
Rise time	t_r					25 125 150		9 8 8		
Turn-off delay time	$t_{d(off)}$					25 125 150		74 88 93		
Fall time	t_f					25 125 150		9 10 11		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 3,3 µC Q_{rFWD} = 7,8 µC Q_{rFWD} = 9,5 µC				25 125 150		1,007 1,402 1,560		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,324 0,604 0,613		

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		2,21 2,31	2,54	V
Reverse leakage current	I_R			1200		25 150			60 8800	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,02		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 8288 A/µs di/dt = 7815 A/µs di/dt = 7250 A/µs	±15	350	81	25 125 150		114 147 154		A
Reverse recovery time	t_{rr}					25 125 150		35 48 74		ns
Recovered charge	Q_r					25 125 150		3,291 7,845 9,525		µC
Reverse recovered energy	E_{rec}					25 125 150		0,812 2,082 2,490		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		11172 9951 9159		A/µs

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 Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,08	25	5	6,2	7,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		80	25 125 150	1,5	2,38 2,54 2,58	2,5	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		25	0		25			500	nA
Internal gate resistance	r_{g}							none		Ω
Input capacitance	C_{ies}	f = 1 MHz	0	30		25		8600		pF
Output capacitance	C_{oes}							360		
Reverse transfer capacitance	C_{res}							200		
Gate charge	Q_{g}		15	600	80	25		740		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,43		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	80	25 125 150		144 150 147		ns
Rise time	t_{r}					25 125 150		30 41 50		
Turn-off delay time	$t_{d(off)}$					25 125 150		234 270 278		
Fall time	t_{f}					25 125 150		49 73 106		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,6 µC Q_{rFWD} = 4,7 µC Q_{rFWD} = 5,3 µC				25 125 150		2,879 4,662 5,225		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,590 3,093 3,651		

Characteristic Values

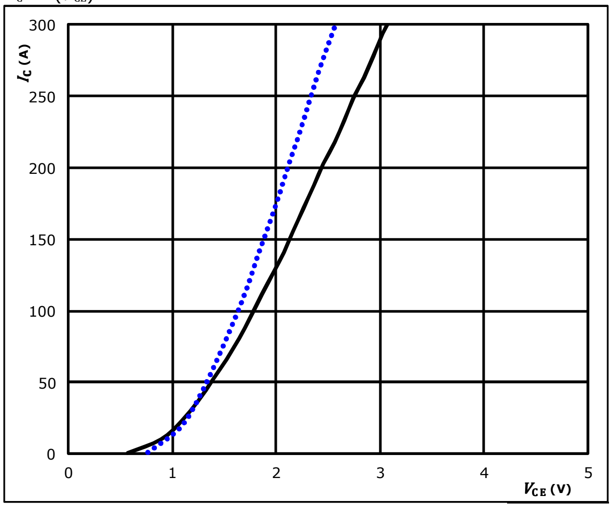
Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Buck Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,61 1,58 1,57	1,77	V
Reverse leakage current	I_r			650		25			5,3	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,90		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 3060 A/µs di/dt = 722 A/µs di/dt = 1553 A/µs	±15	350	80	25 125 150		34 42 42		A
Reverse recovery time	t_{rr}					25 125 150		100 148 163		ns
Recovered charge	Q_r					25 125 150		2,604 4,722 5,329		µC
Reverse recovered energy	E_{rec}					25 125 150		0,327 0,577 0,658		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2205 818 619		A/µs
Capacitor										
Capacitance	C							150		nF
Tolerance							-10		+10	%
Dissipation factor		f = 1 kHz				25			2,5	%
Climatic category								55/125/56		
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	

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

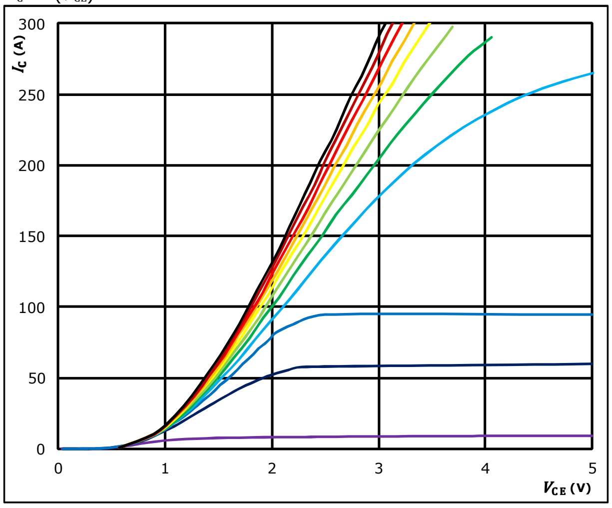


t_p = 250 µs 25 °C (dotted)
V_{GE} = 15 V T_j: 125 °C (solid)

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

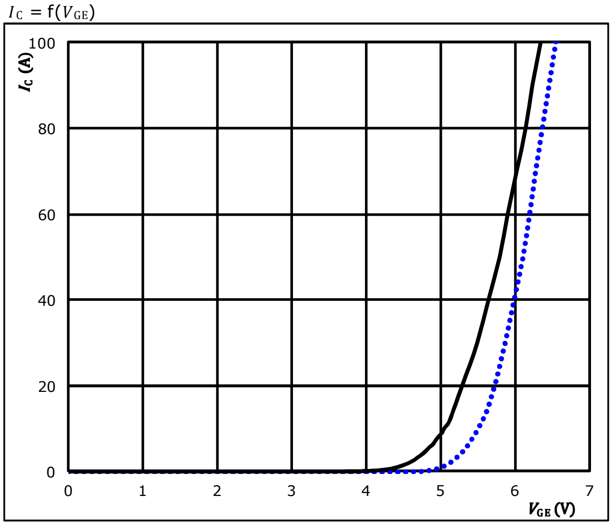


t_p = 250 µs
T_j = 125 °C
V_{GE} from 5 V to 19 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

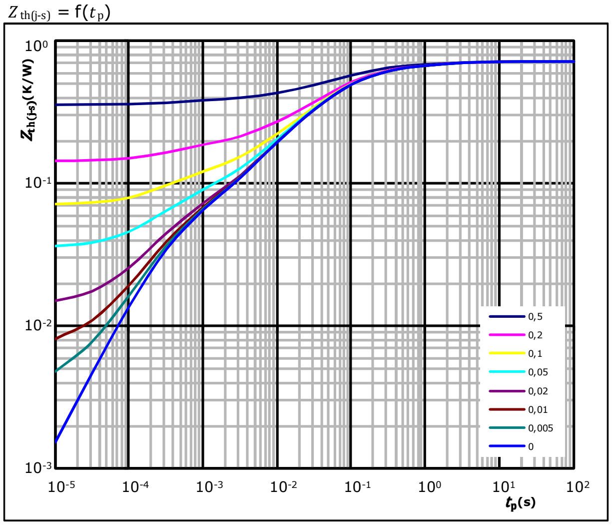


t_p = 100 µs 25 °C (dotted)
V_{CE} = 10 V T_j: 125 °C (solid)

figure 4. **IGBT**

Transient Thermal Impedance as function of Pulse duration

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



D = t_p / T
$R_{th(j-s)}$ = 0,72 K/W

IGBT thermal model values

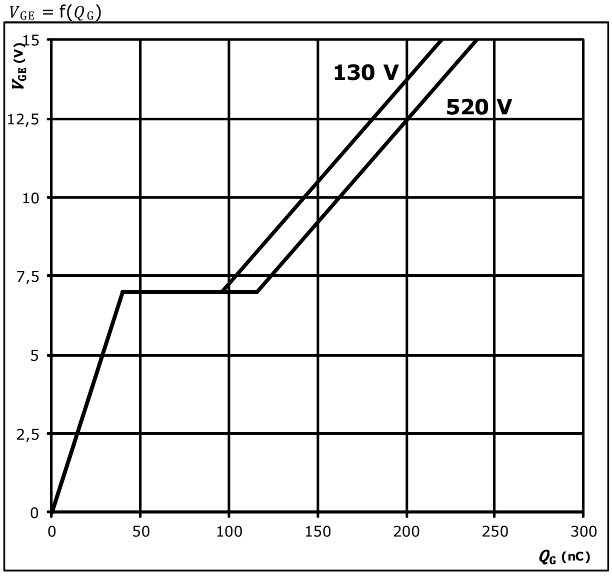
R (K/W)	τ (s)
7,52E-02	1,73E+00
1,31E-01	2,44E-01
3,01E-01	6,32E-02
1,21E-01	1,39E-02
4,30E-02	3,50E-03
4,35E-02	3,33E-04

Boost Switch Characteristics

figure 5. IGBT

Gate voltage vs Gate charge

$V_{GE} = f(Q_G)$



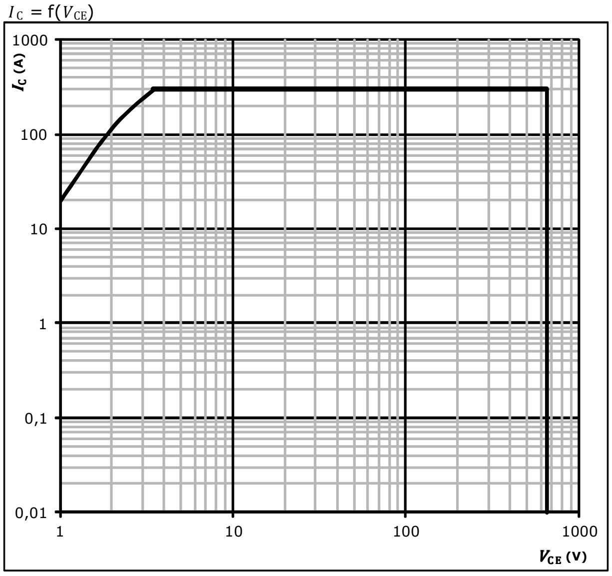
At

I_C= 100 A

figure 6. IGBT

Safe operating area

$I_C = f(V_{CE})$



At

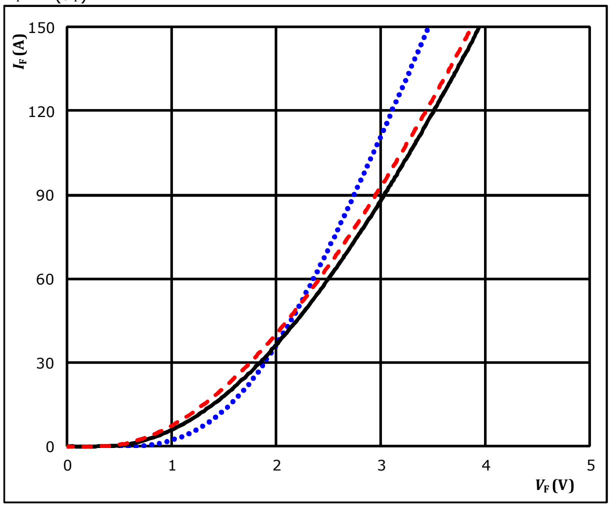
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



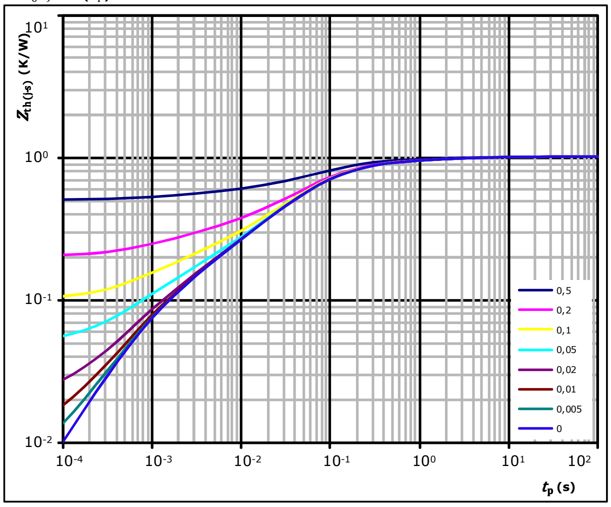
t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,02 K/W

FWD thermal model values

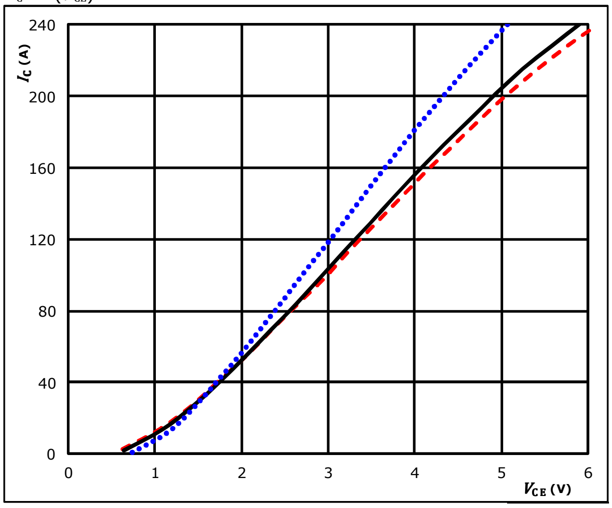
R (K/W)	τ (s)
5,56E-02	3,42E+00
1,14E-01	5,52E-01
4,09E-01	9,78E-02
2,64E-01	3,21E-02
9,94E-02	6,42E-03
7,49E-02	9,84E-04

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

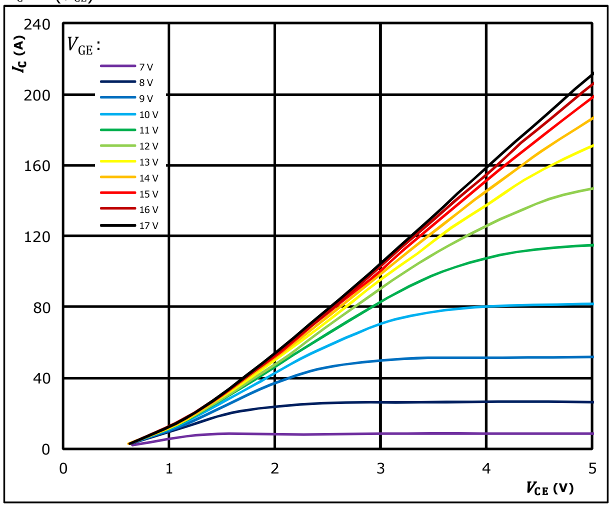


t_p =	250	μs		25 °C	············
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

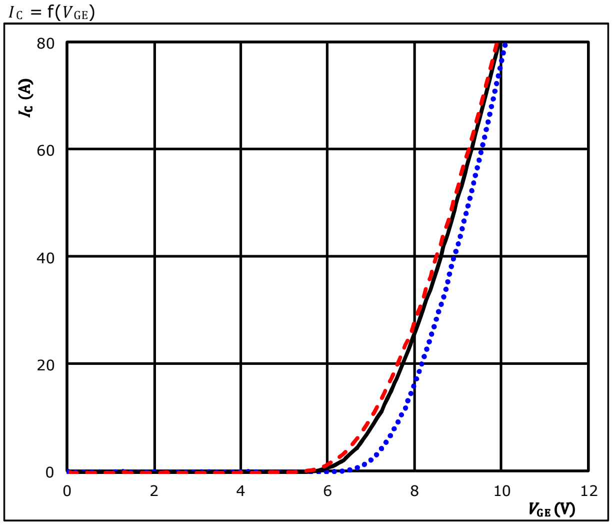


t_p =	250	μs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

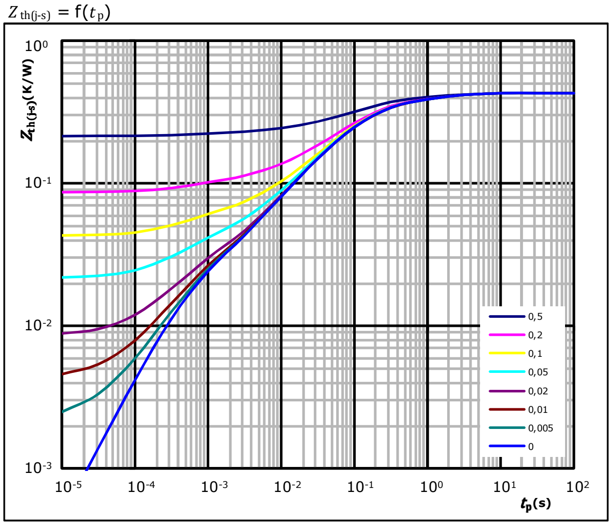


t_p =	100	μs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,43 K/W

IGBT thermal model values

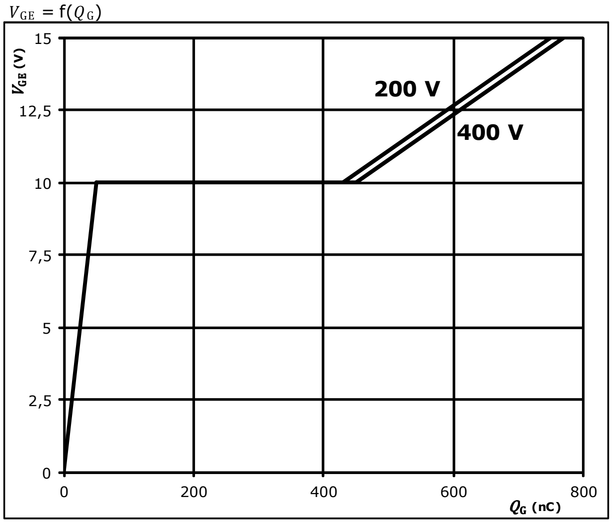
R (K/W)	τ (s)
5,91E-02	1,98E+00
7,77E-02	3,67E-01
1,92E-01	9,56E-02
6,69E-02	2,22E-02
2,08E-02	4,92E-03
1,78E-02	4,96E-04

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

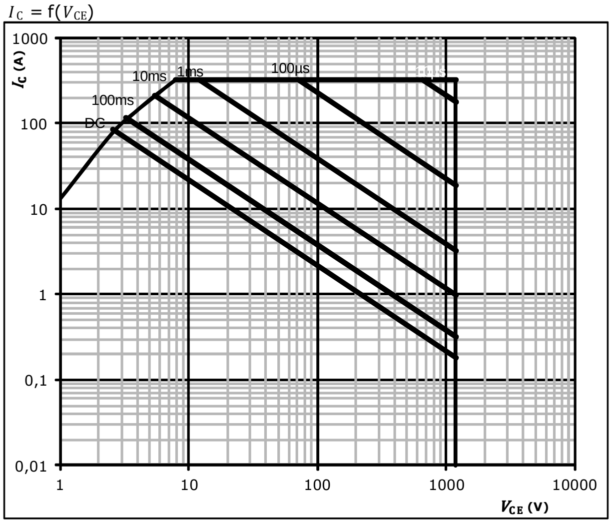


I_C= 80 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



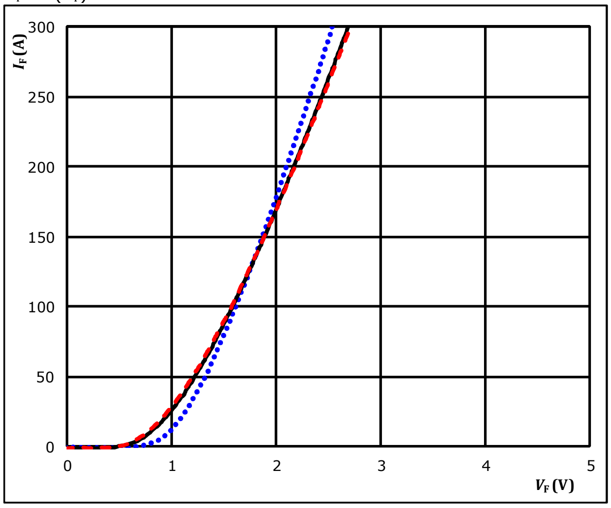
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



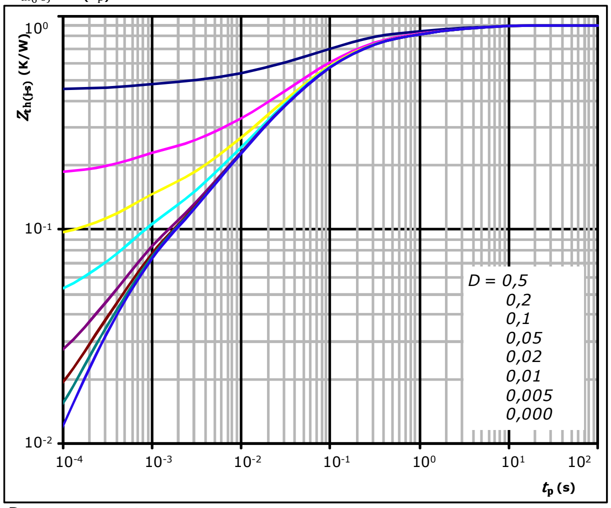
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,90 K/W

FWD thermal model values

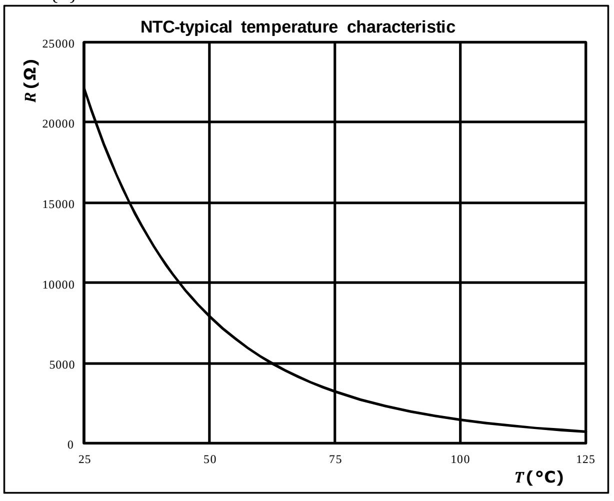
R (K/W)	τ (s)
7,42E-02	3,64E+00
1,41E-01	5,85E-01
3,41E-01	1,04E-01
1,94E-01	2,64E-02
9,09E-02	6,04E-03
5,85E-02	5,72E-04

Thermistor Characteristics

figure 1.	Thermistor

Typical NTC characteristic as a function of temperature

$R = f(T)$

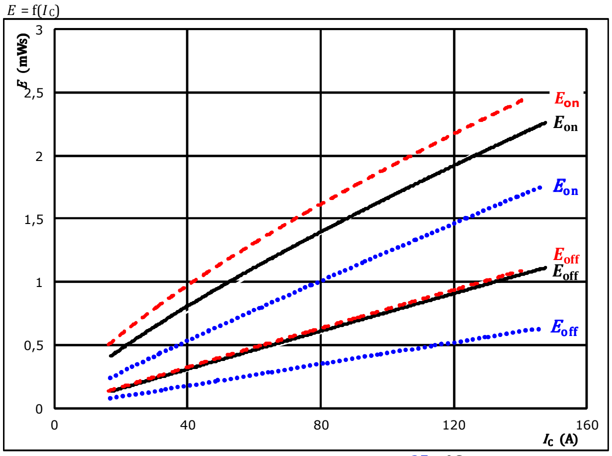


Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



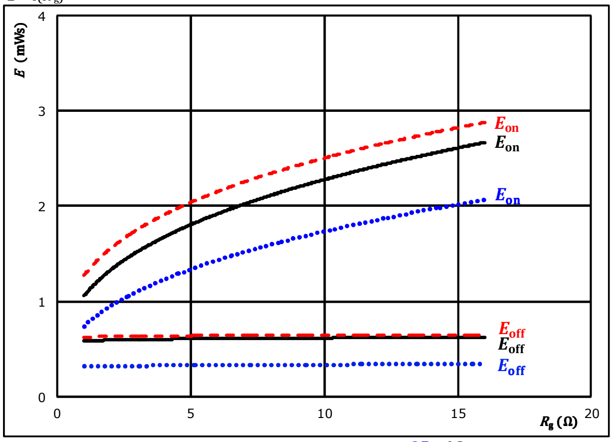
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



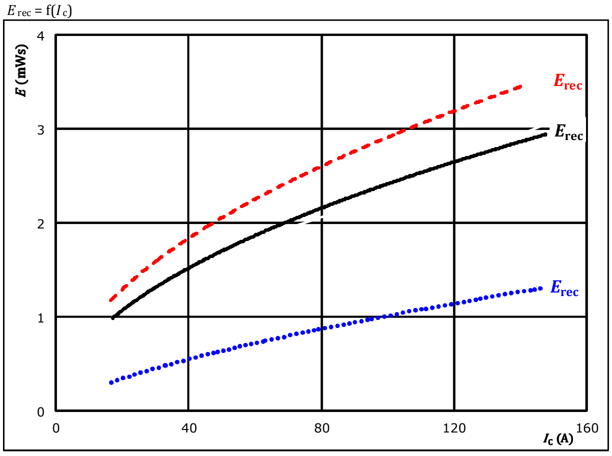
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	81	A		150 °C	– – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



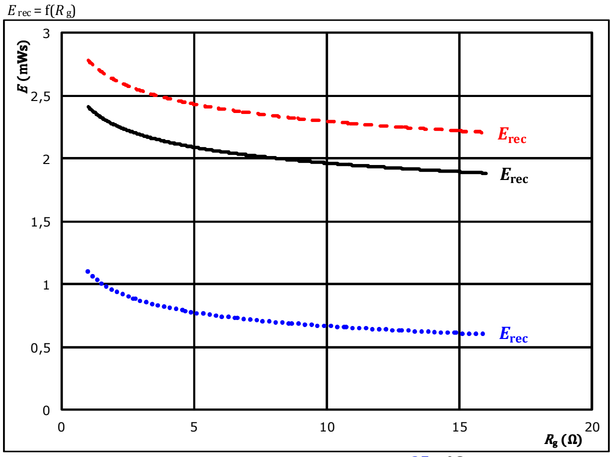
With an inductive load at

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

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$

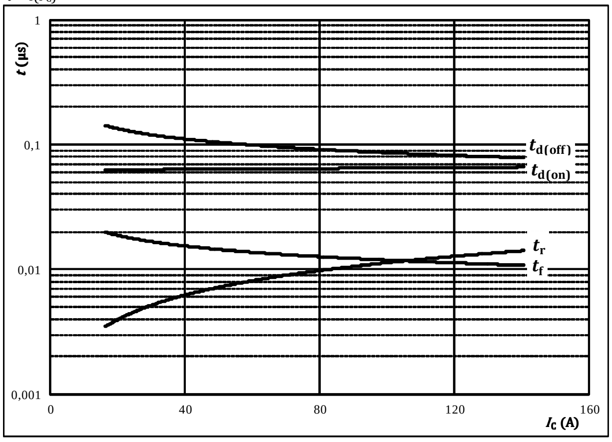


With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	81	A		150 °C	– – –

Boost Switching Characteristics

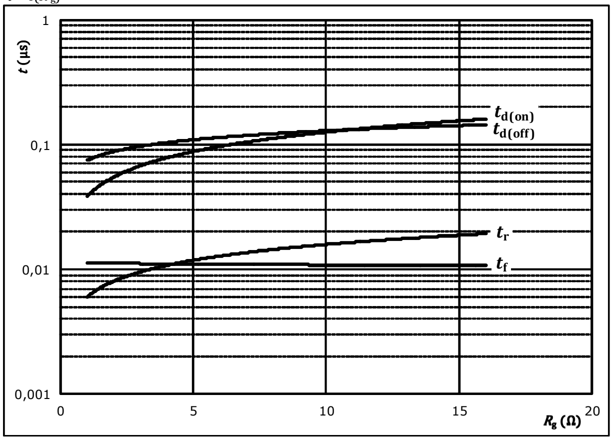
figure 5. IGBT
Typical switching times as a function of collector current
$t = f(I_C)$



With an inductive load at

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

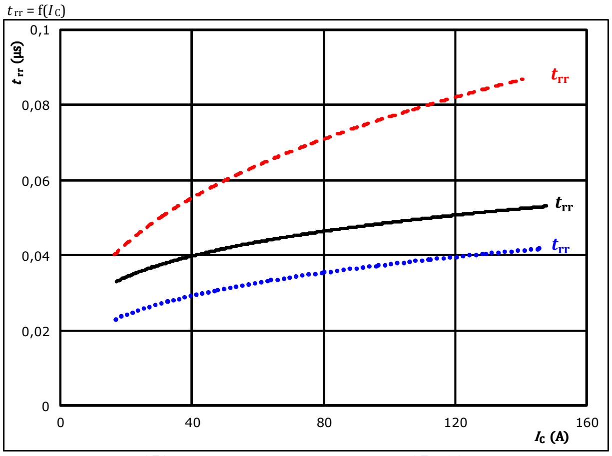
figure 6. IGBT
Typical switching times as a function of gate resistor
$t = f(R_g)$



With an inductive load at

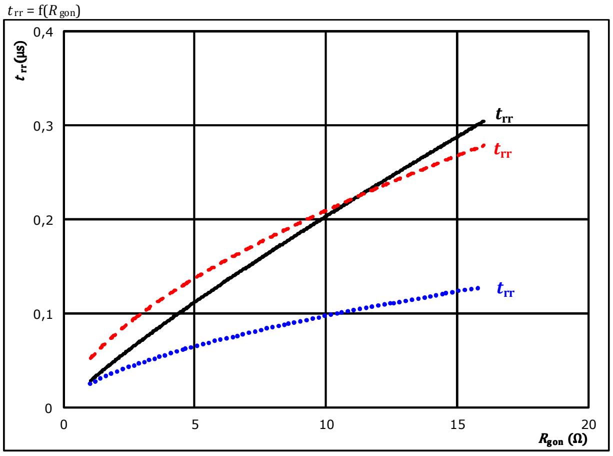
T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	81	A

figure 7. FWD
Typical reverse recovery time as a function of collector current
$t_{rr} = f(I_C)$



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

figure 8. FWD
Typical reverse recovery time as a function of IGBT turn on gate resistor
$t_{rr} = f(R_{gon})$



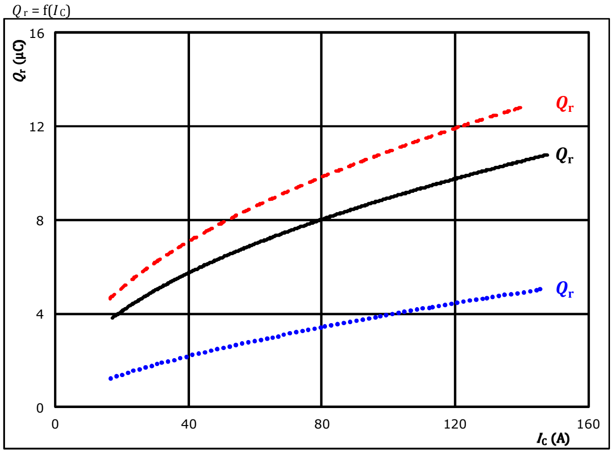
At					
V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	81	A		150 °C	– – –

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

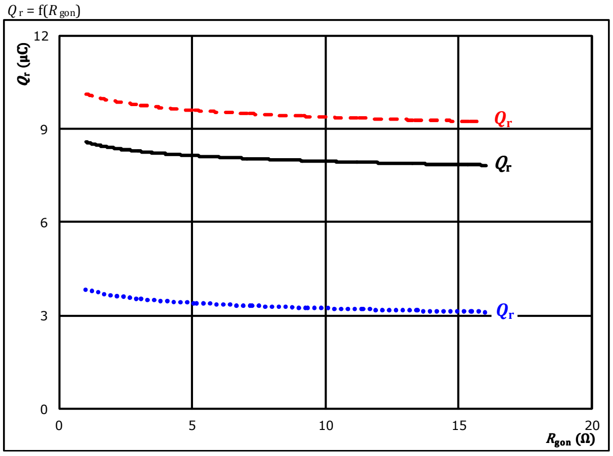


At					
V_{CE} =	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

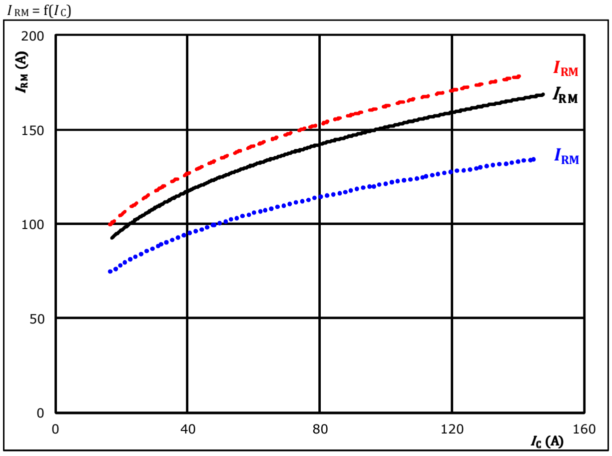


At					
V_{CE}=	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	81	A		150 °C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

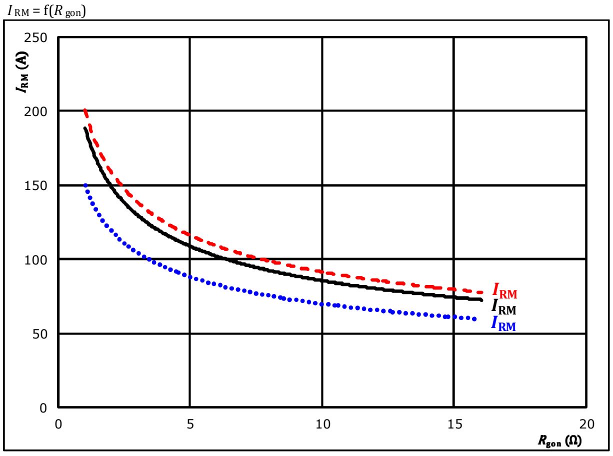


At					
V_{CE}:	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 12. **FWD**

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

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



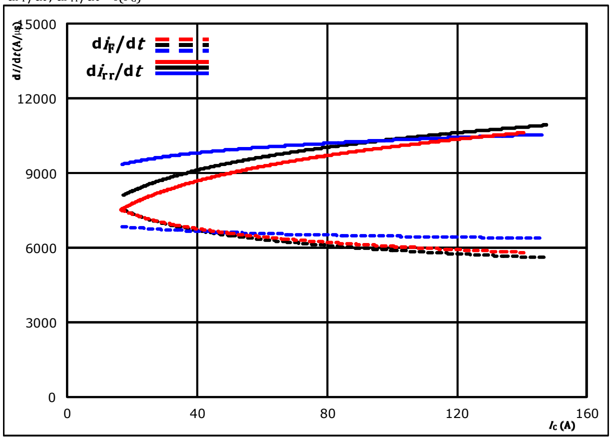
At					
V_{CE} =	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	81	A		150 °C	– – –

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

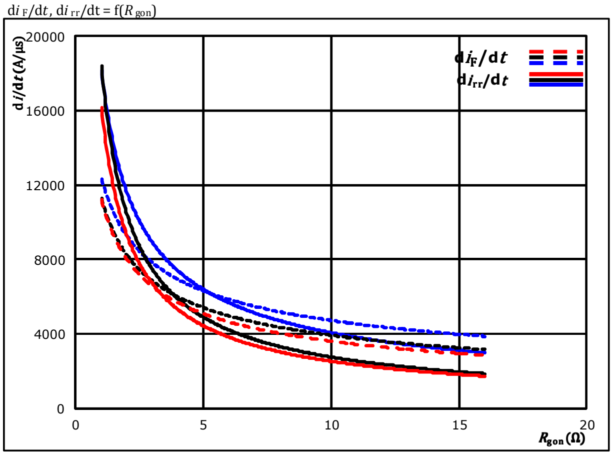


At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

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

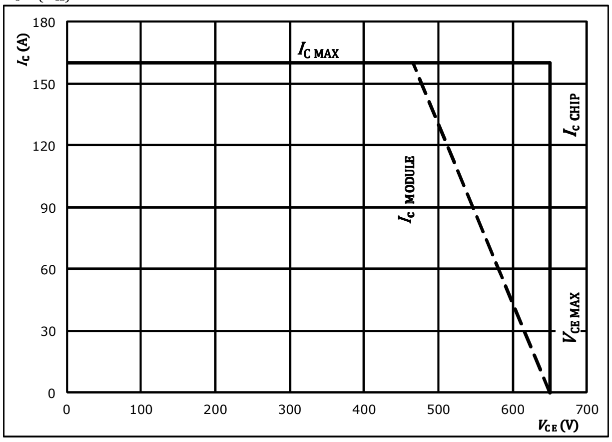


At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C =	81	A		150	°C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



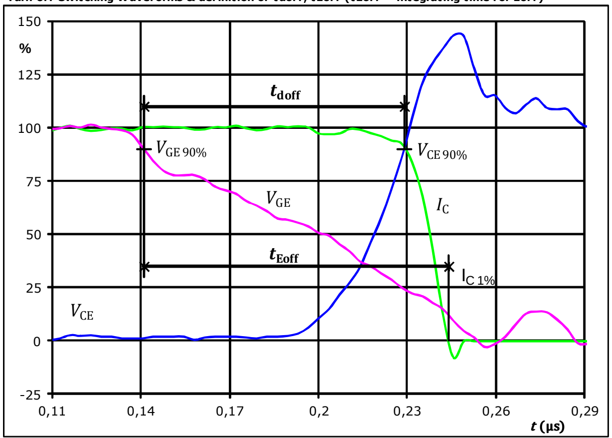
At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Boost Switching Definitions

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

figure 1. **IGBT**

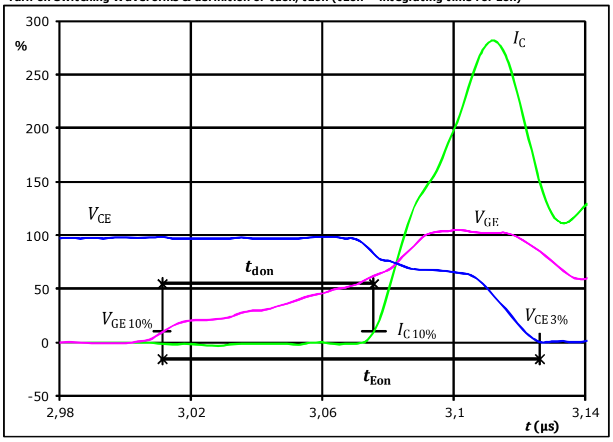
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	81	A
t_{doff} =	0,088	µs
t_{Eoff} =	0,103	µs

figure 2. **IGBT**

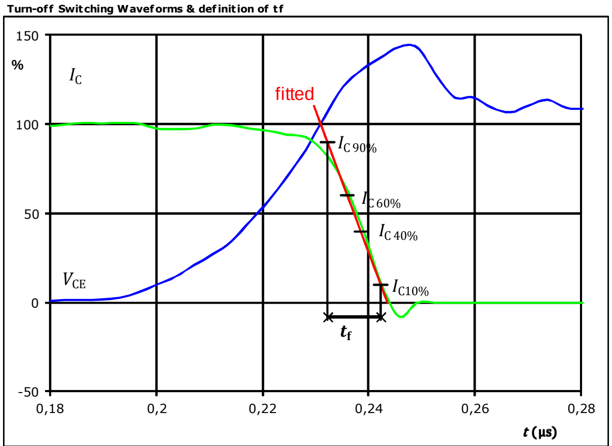
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	81	A
t_{don} =	0,066	µs
t_{Eon} =	0,115	µs

figure 3. **IGBT**

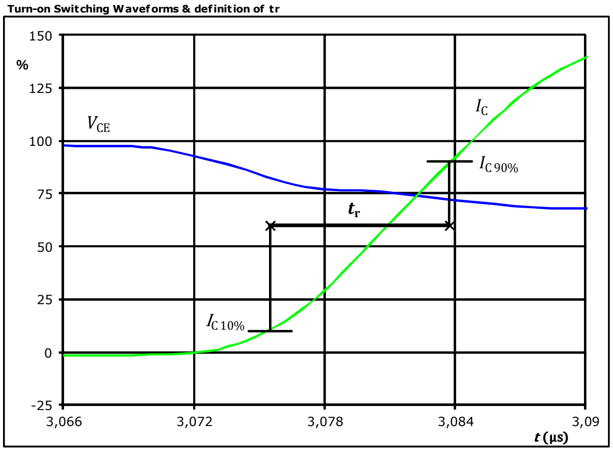
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	81	A
t_f =	0,010	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

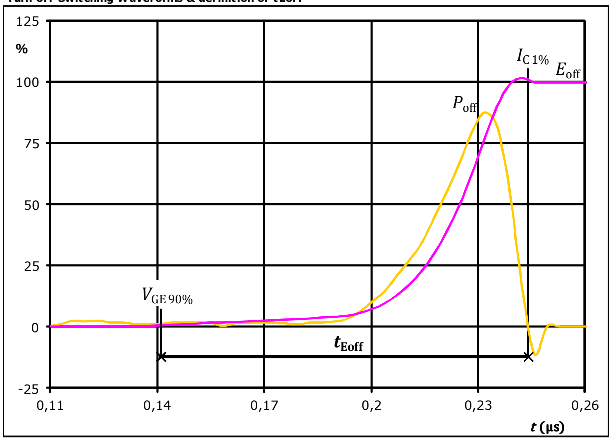


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	81	A
t_r =	0,008	µs

Boost Switching Characteristics

figure 5. **IGBT**

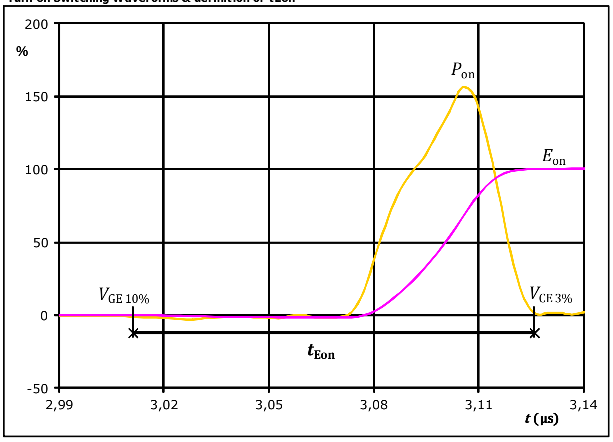
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	28,49	kW
E_{off} (100%) =	0,60	mJ
t_{Eoff} =	0,10	µs

figure 6. **IGBT**

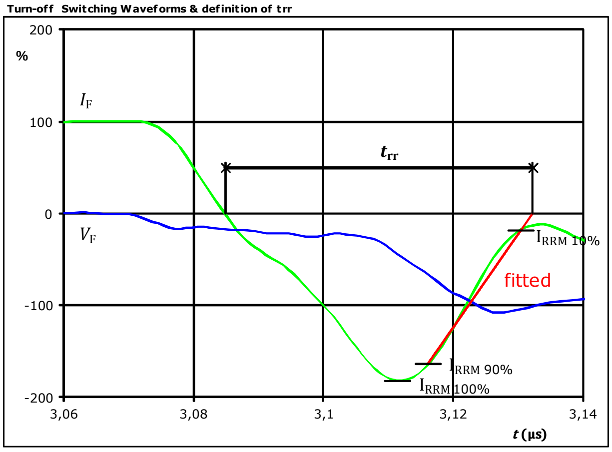
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	28,49	kW
E_{on} (100%) =	1,40	mJ
t_{Eon} =	0,11	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

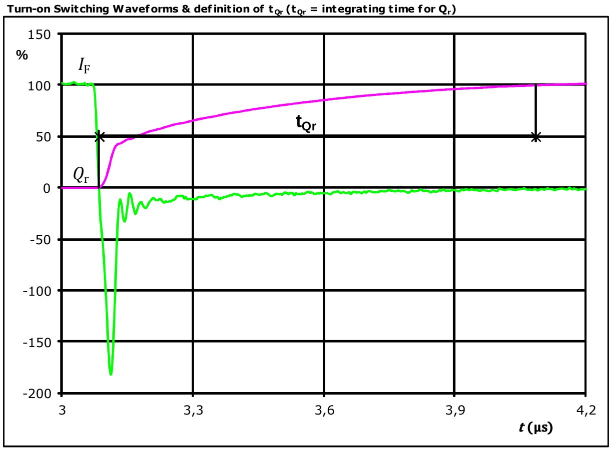


V_F (100%) =	350	V
I_F (100%) =	81	A
I_{RRM} (100%) =	-147	A
t_{rr} =	0,048	µs

Boost Switching Characteristics

figure 8.	FWD

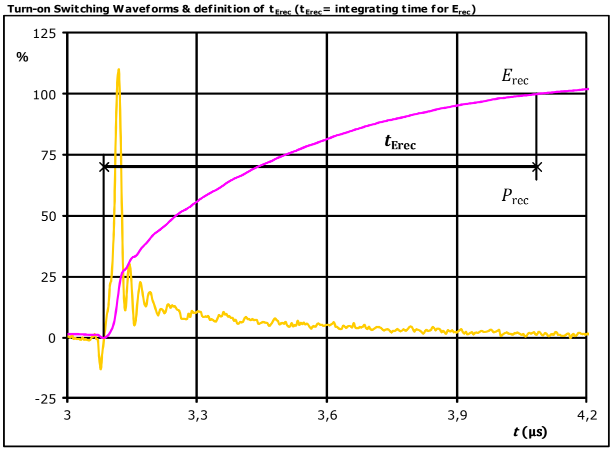
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	81	A
Q_r (100%) =	7,85	µC
t_{Qr} =	1,00	µs

figure 9.	FWD

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



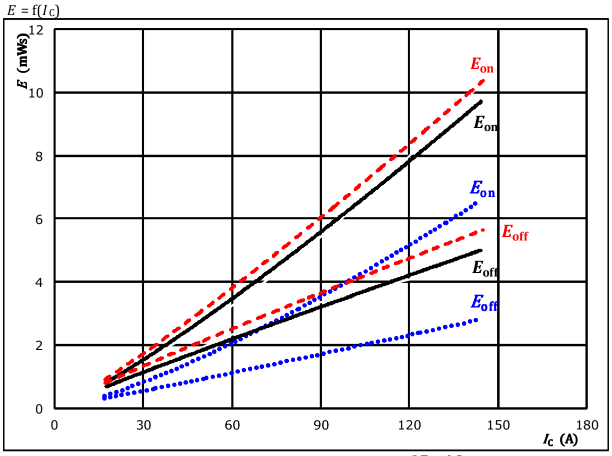
P_{rec} (100%) =	28,49	kW
E_{rec} (100%) =	2,08	mJ
t_{Erec} =	1,00	µs

Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



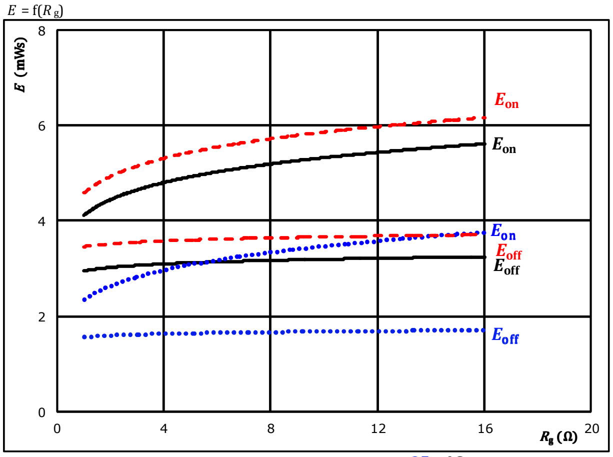
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



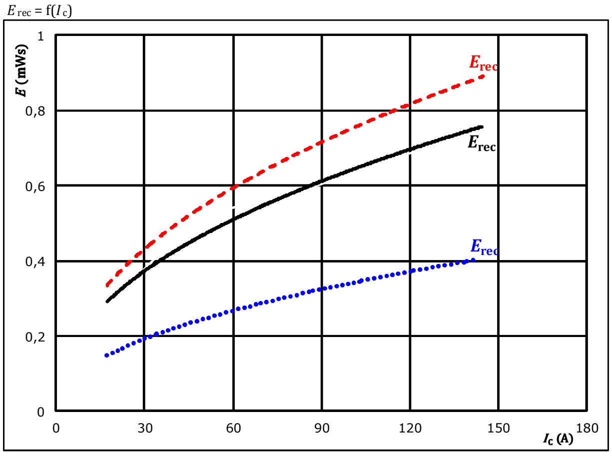
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	80	A		150 °C	– – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



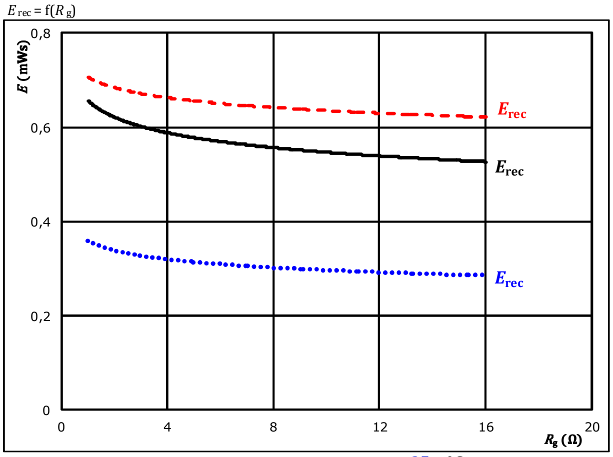
With an inductive load at

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

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

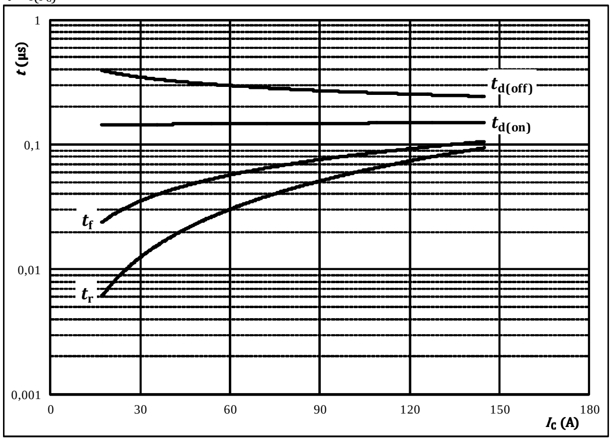
V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	80	A		150 °C	– – –

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



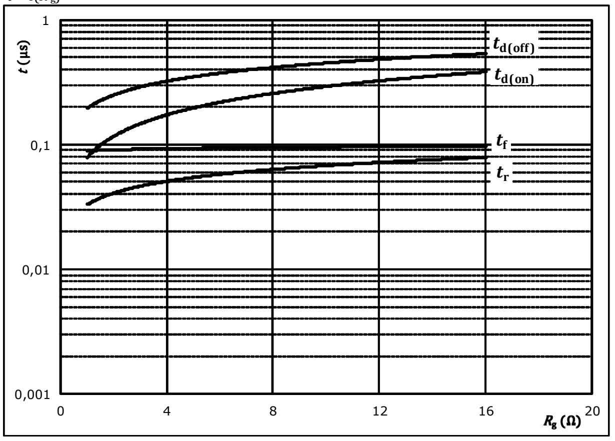
With an inductive load at

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

$t = f(R_g)$



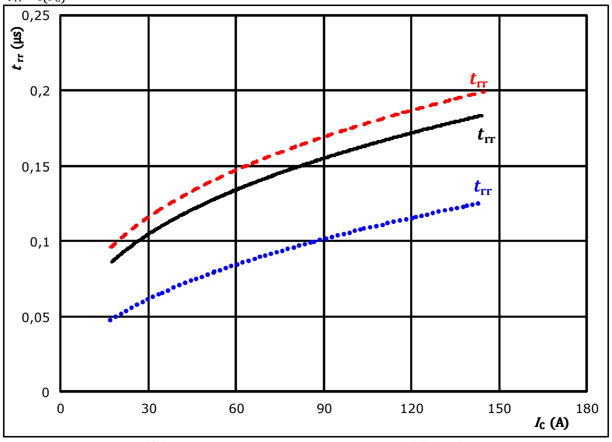
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	80	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

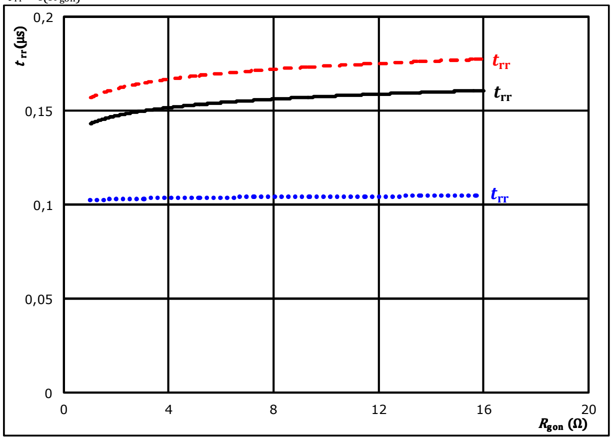


At					
V_{CE} =	350	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

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 =	80	A		150 °C	– – –

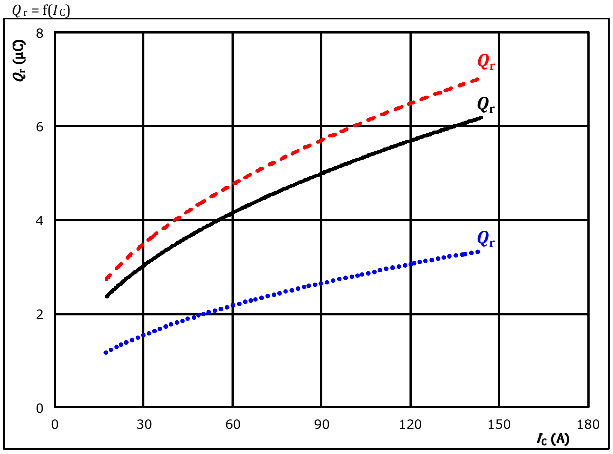
Vincotech

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

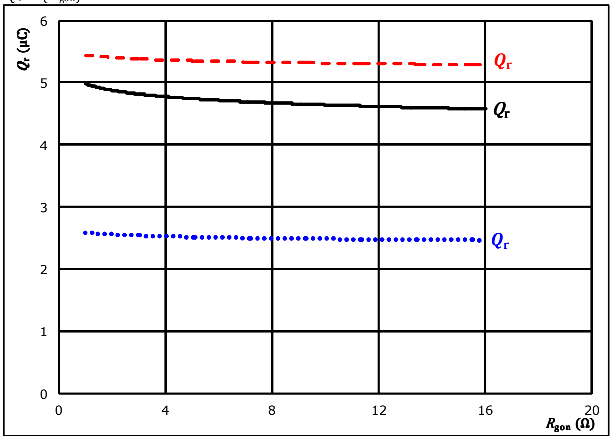


At					
V_{CE} =	350	V	T_j:	25	°C
V_{GE} =	±15	V		125	°C
R_{gon} =	4	Ω		150	°C

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

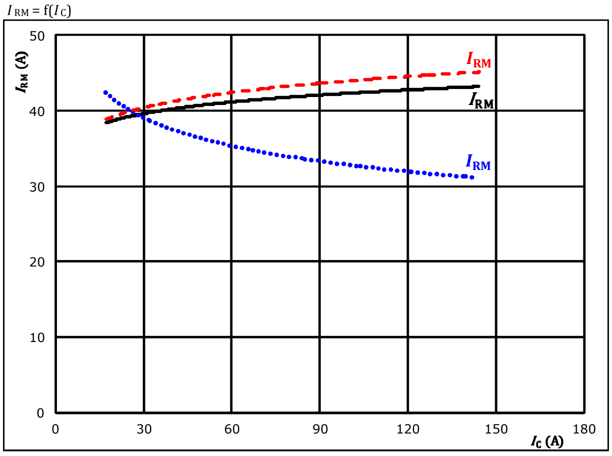


At					
V_{CE}=	350	V	T_j:	25	°C
V_{GE} =	±15	V		125	°C
I_C=	80	A		150	°C

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

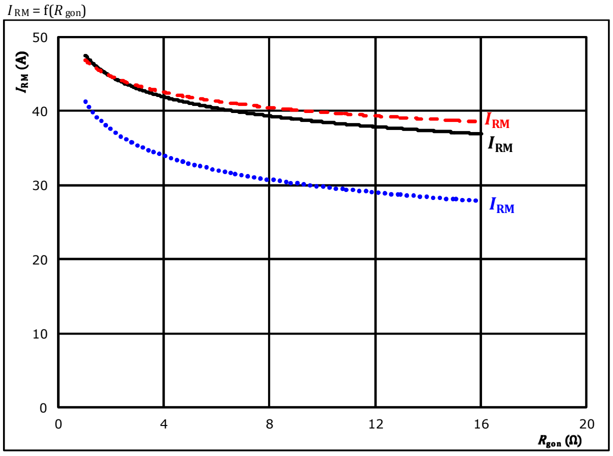


At					
V_{CE}:	350	V	T_j:	25	°C
V_{GE} =	±15	V		125	°C
R_{gon} =	4	Ω		150	°C

figure 12. **FWD**

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

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



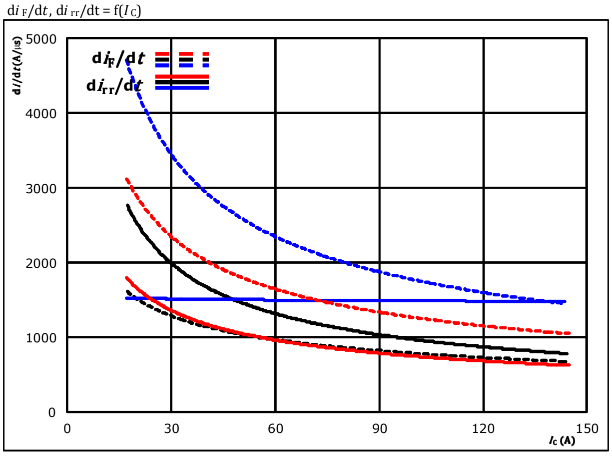
At					
V_{CE} =	350	V	T_j:	25	°C
V_{GE} =	±15	V		125	°C
I_C =	80	A		150	°C

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

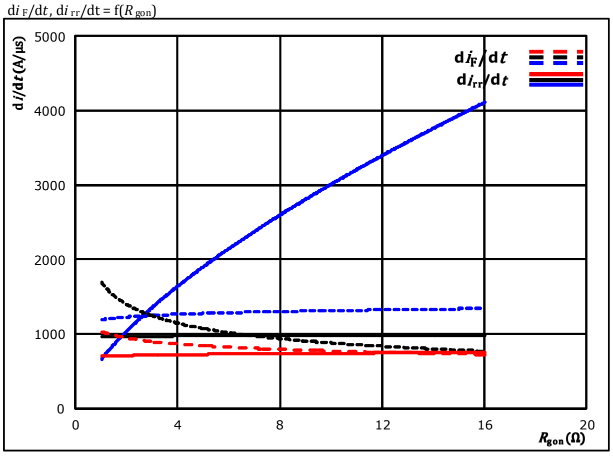


At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

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

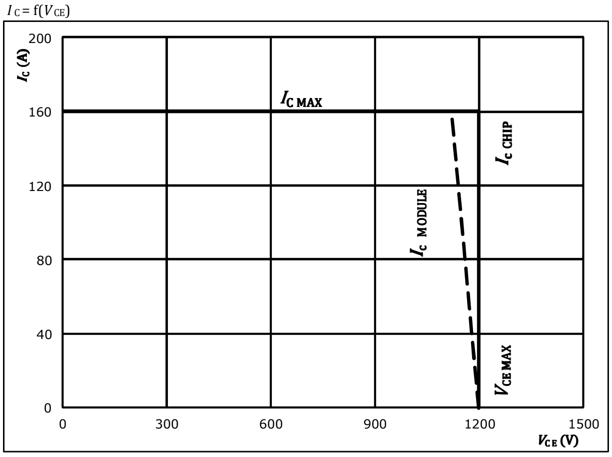


At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C=	80	A		150	°C

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

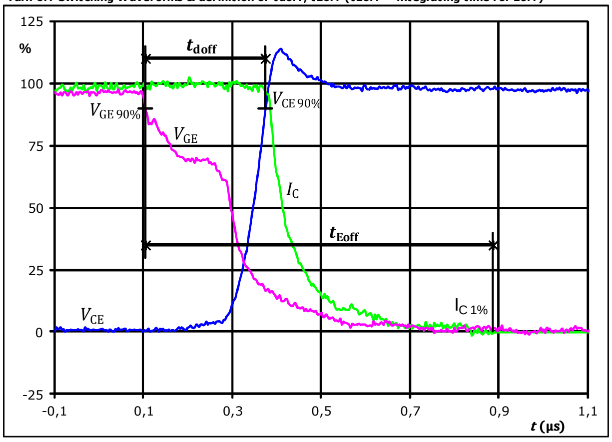
Buck Switching Definitions

General conditions

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

figure 1. IGBT

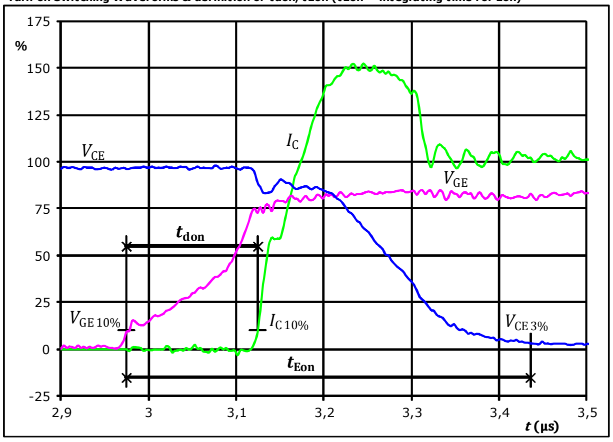
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	80	A
t_{doff} =	0,270	µs
t_{Eoff} =	0,783	µs

figure 2. IGBT

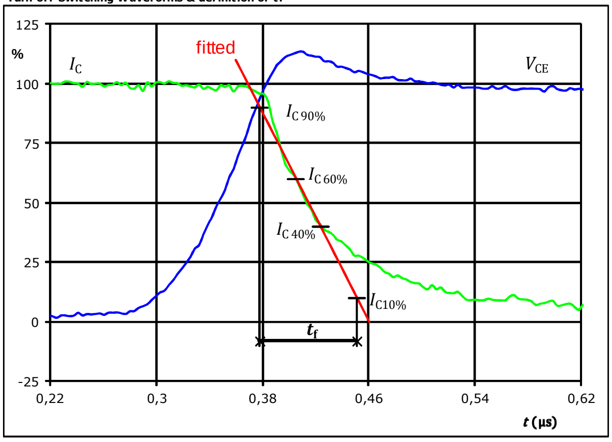
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	80	A
t_{don} =	0,150	µs
t_{Eon} =	0,461	µs

figure 3. IGBT

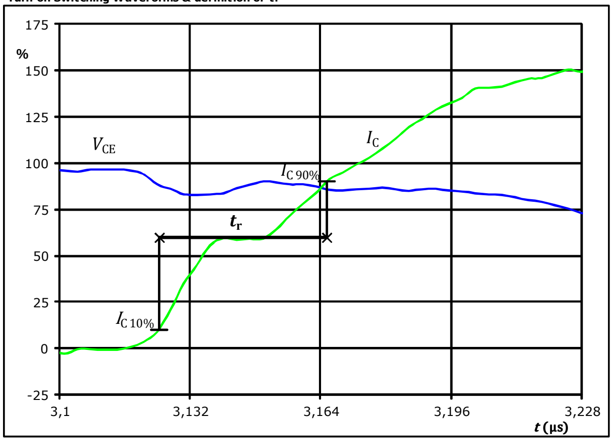
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	80	A
t_f =	0,073	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

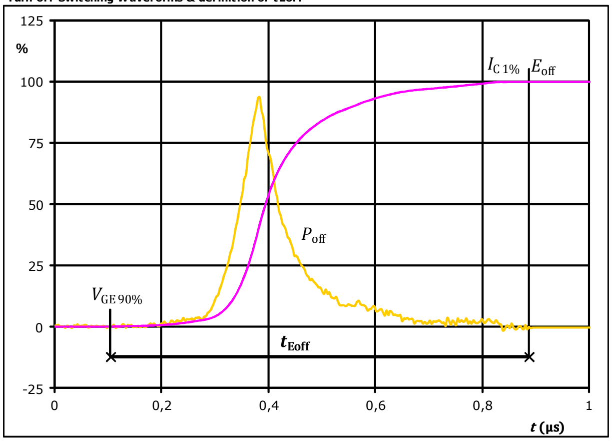


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	80	A
t_r =	0,041	µs

Buck Switching Characteristics

figure 5. **IGBT**

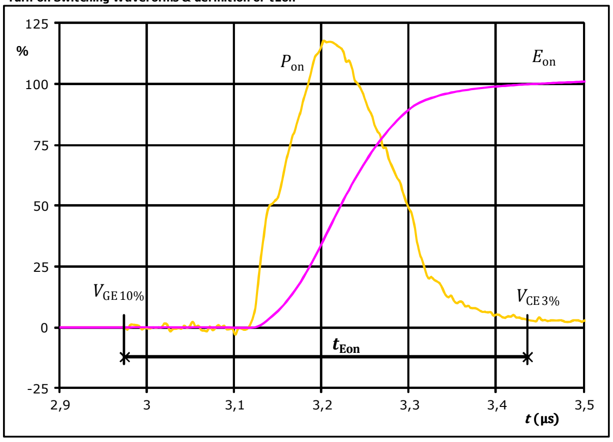
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	28,03	kW
E_{off} (100%) =	3,09	mJ
t_{Eoff} =	0,78	µs

figure 6. **IGBT**

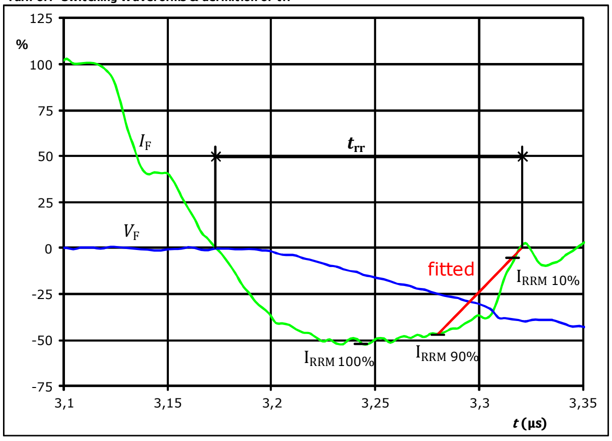
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	28,03	kW
E_{on} (100%) =	4,66	mJ
t_{Eon} =	0,46	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

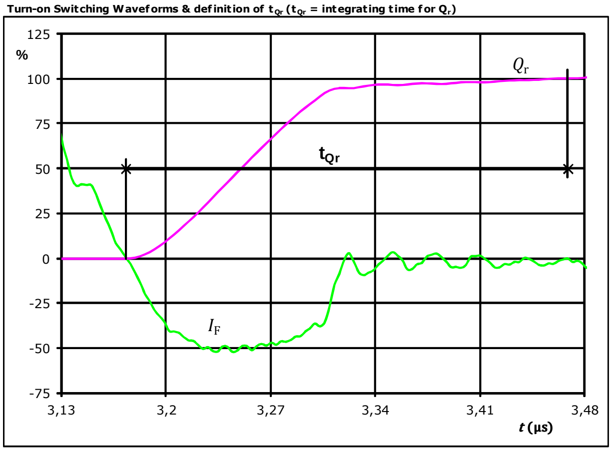


V_F (100%) =	350	V
I_F (100%) =	80	A
I_{RRM} (100%) =	-42	A
t_{rr} =	0,148	µs

Buck Switching Characteristics

figure 8.	**FWD**

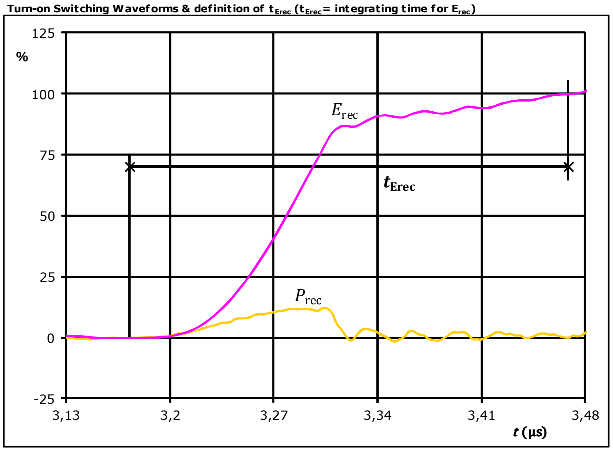
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	80	A
Q_r (100%) =	4,72	µC
t_{Qr} =	0,30	µs

figure 9.	**FWD**

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



P_{rec} (100%) =	28,03	kW
E_{rec} (100%) =	0,58	mJ
t_{Erec} =	0,30	µs

Vincotech

10-FZ12NMA080SM01-L740F58
datasheet

Ordering Code & Marking

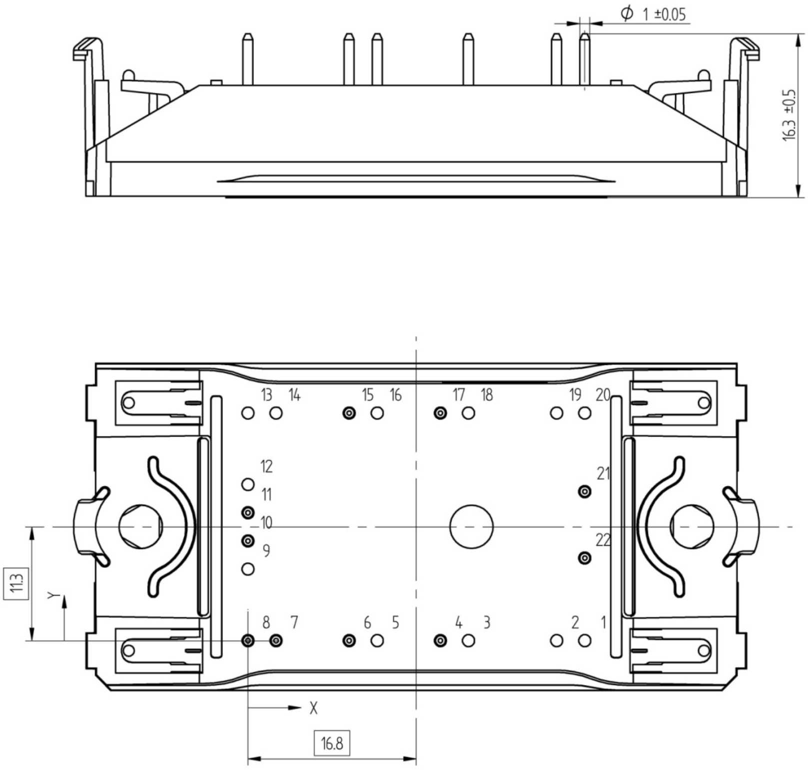
Version	Ordering Code
without thermal paste with 12 mm housing	10-FZ12NMA080SM01-L740F58

	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

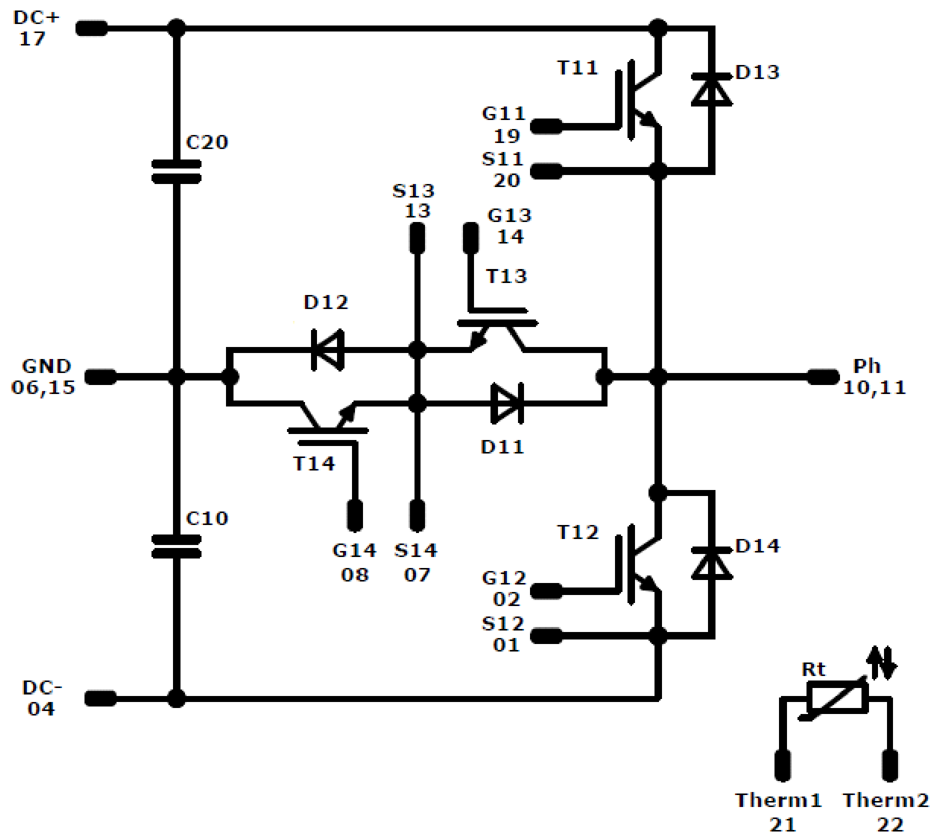
Pin table

Pin	X	Y	Functions
1	33,6	0	S12
2	30,8	0	G12
3	Not assembled		
4	19,2	0	-DC
5	Not assembled		
6	10,1	0	GND
7	2,8	0	S14
8	0	0	G14
9	Not assembled		
10	0	9,9	Ph
11	0	12,7	Ph
12	Not assembled		
13	0	22,6	S13
14	2,8	22,6	G13
15	10,1	22,6	GND
16	Not assembled		
17	19,2	22,6	+DC
18	Not assembled		
19	30,8	22,6	G11
20	33,6	22,6	S11
21	33,6	14,8	Therm1
22	33,6	8,2	Therm2



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
T13, T14	IGBT	650 V	100 A	Boost Switch	
D13, D14	FWD	1200 V	50 A	Boost Diode	
T11, T12	IGBT	1200 V	80 A	Buck Switch	
D11, D12	FWD	650 V	100 A	Buck Diode	
C10, C20	Capacitor	500 V		Capacitor	
Rt	NTC			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**
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