10-FY07NPA200SM02-L366F08 / 10-PY07NPA200SM02-L366F08Y

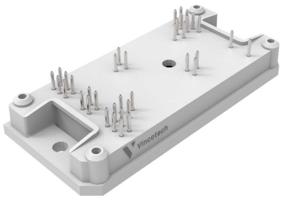
datasheet

flowNPC 1 | **1200 V / 200 A**

Features

- NPC inverter topology
- Optimized for full rated bi-directional usage (4 quadrant
- High-speed IGBT in all switch positions
- Integrated NTC
- Low inductive design with integrated DC capacitor
- *flow* 1 12mm package

flow 1 12 mm housing



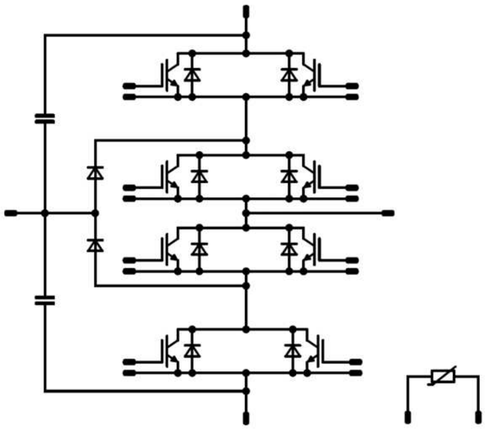
solder pin

press-fit pin

Target applications

- Industrial Drives
- Solar Inverters
- UPS

Schematic



Types

- 10-FY07NPA200SM02-L366F08
- 10-PY07NPA200SM02-L366F08Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	94	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	145	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
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	107	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	131	W
Maximum junction temperature	T_{jmax}			175	°C
Out. Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	94	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	145	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Out. Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	107	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	131	W
Maximum junction temperature	T_{jmax}			175	°C
Out. Boost Inverse Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	124	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	164	W
Maximum junction temperature	T_{jmax}			175	°C
DC Link 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		solder pin \ press-fit pin		8,07 \ 7,86	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,002	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,69 1,86 1,96	2,1	V
Collector-emitter cut-off current	I_{CES}		0	650		25			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		13120		pF
Output capacitance	C_{oes}							194		
Reverse transfer capacitance	C_{res}							42		
Gate charge	Q_g		15	520	200	25		420		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,65		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	-5 / 15	350	120	25 125		67 66		ns
Rise time	t_r					25 125		11 12		
Turn-off delay time	$t_{d(off)}$					25 125		158 174		
Fall time	t_f					25 125		7 9		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,6 µC Q_{rFWD} = 9,1 µC				25 125		1,101 1,637		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,576 0,922		

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				200	25 125 150		1,65 1,60 1,58	2,65	V
Reverse leakage current	I_R			650		25			10,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,73		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 9293 A/µs di/dt = 7591 A/µs	-5 / 15	350	120	25 125		114 160		A
Reverse recovery time	t_{rr}					25 125		59 91		ns
Recovered charge	Q_r					25 125		4,639 9,105		µC
Reverse recovered energy	E_{rec}					25 125		0,966 1,930		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		3621 2111		A/µs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] / V_{GS} [V]	V_{CE} [V] / V_{DS} [V] / V_F [V]	I_C [A] / I_D [A] / I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Out. Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,002	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,69 1,86 1,96	2,1	V
Collector-emitter cut-off current	I_{CES}		0	650		25			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		13120		pF
Output capacitance	C_{oes}							194		
Reverse transfer capacitance	C_{res}							42		
Gate charge	Q_g		15	520	200	25		420		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,65		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	-5 / 15	350	120	25 125		76 62		ns
Rise time	t_r					25 125		12 14		
Turn-off delay time	$t_{d(off)}$					25 125		153 171		
Fall time	t_f					25 125		7 12		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,5 µC Q_{rFWD} = 9,2 µC				25 125		1,709 2,573		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,542 1,009		

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	
Out. Boost Diode										
Static										
Forward voltage	V_F				200	25 125 150		1,65 1,60 1,58	2,65	V
Reverse leakage current	I_R			650		25			10,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,73		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 6472 A/µs di/dt = 5169 A/µs	-5 / 15	350	120	25 125		91 129		A
Reverse recovery time	t_{rr}					25 125		70 103		ns
Recovered charge	Q_r					25 125		4,495 9,160		µC
Reverse recovered energy	E_{rec}					25 125		0,800 1,676		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		2015 1571		A/µs
Out. Boost Inverse Diode										
Static										
Forward voltage	V_F				200	25 125 150		1,77 1,69 1,66	1,95	V
Reverse leakage current	I_R			650		25			2,4	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,58		K/W
DC Link Capacitor										
Capacitance	C							300		nF
Tolerance							-10		+10	%
Dissipation factor		f = 1 kHz				25			2,5	%

Characteristic Values

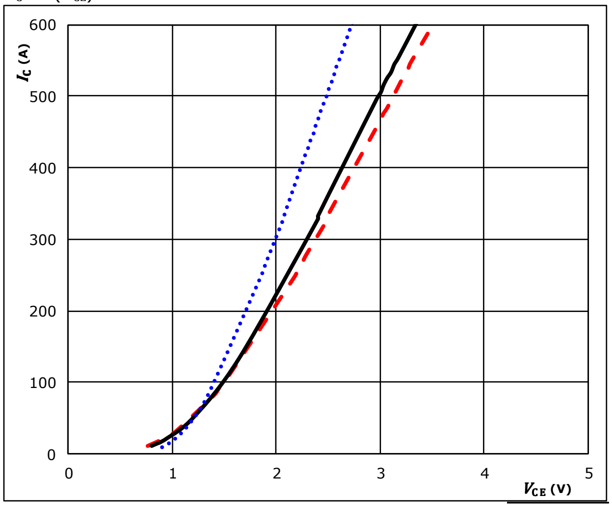
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %				25		4000		K
Vincotech NTC Reference									I	

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

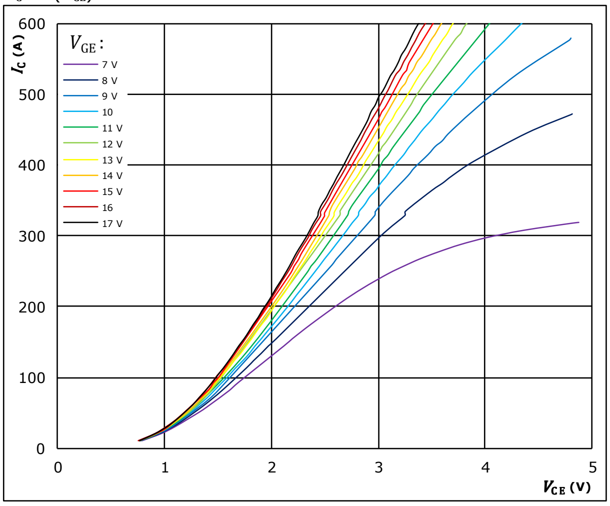


t_p =	250	µs		25 °C	···········
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

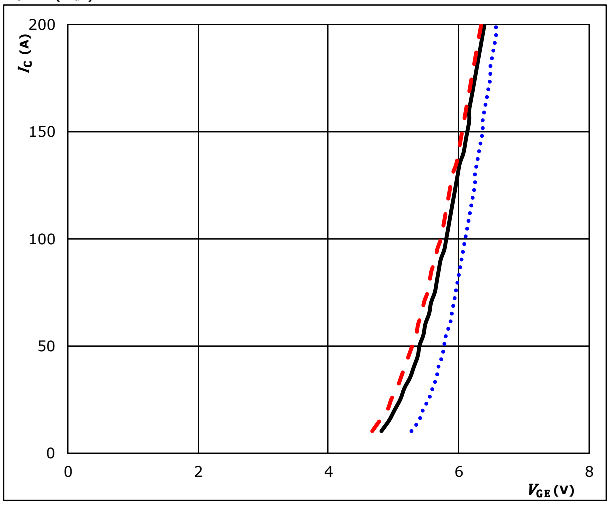


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

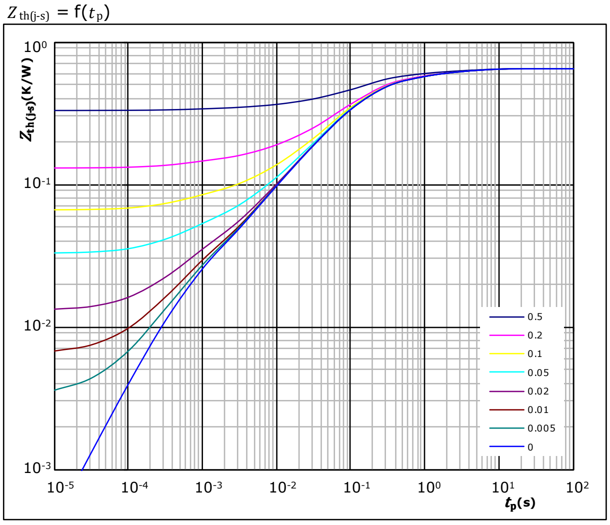


t_p =	100	µs		25 °C	···········
V_{CE} =	0	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,65 K/W

IGBT thermal model values

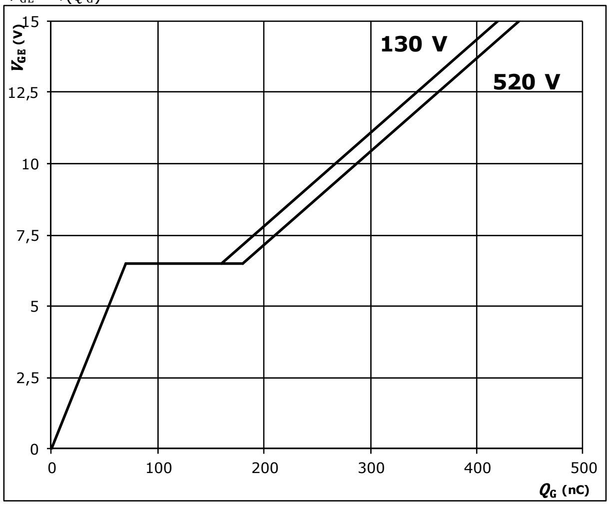
R (K/W)	τ (s)
7,51E-02	3,22E+00
1,27E-01	5,51E-01
3,27E-01	1,11E-01
7,19E-02	2,69E-02
3,44E-02	6,17E-03
1,81E-02	5,82E-04

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

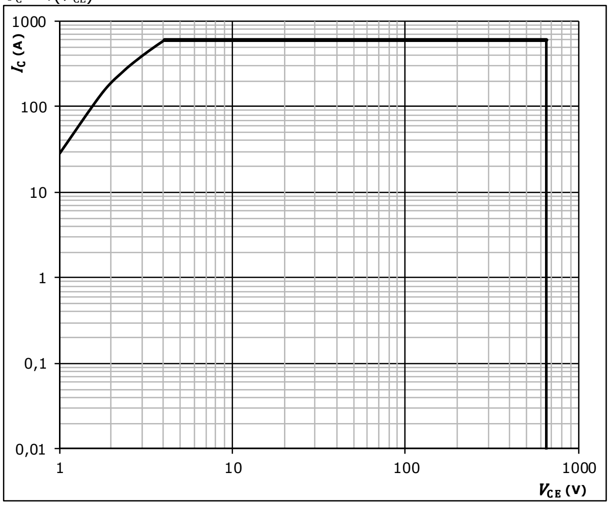


I_C = 200 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



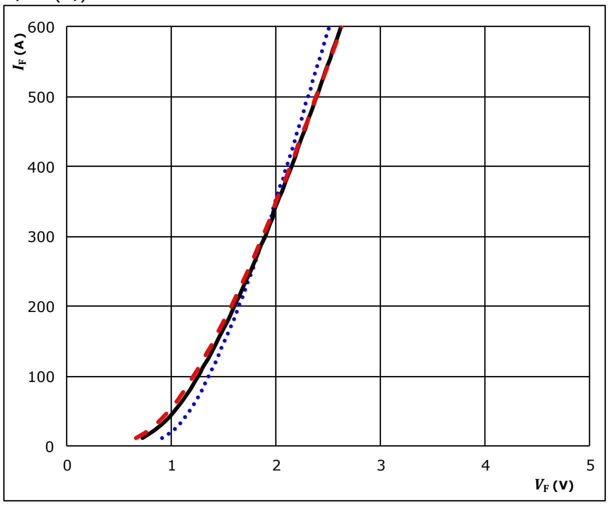
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



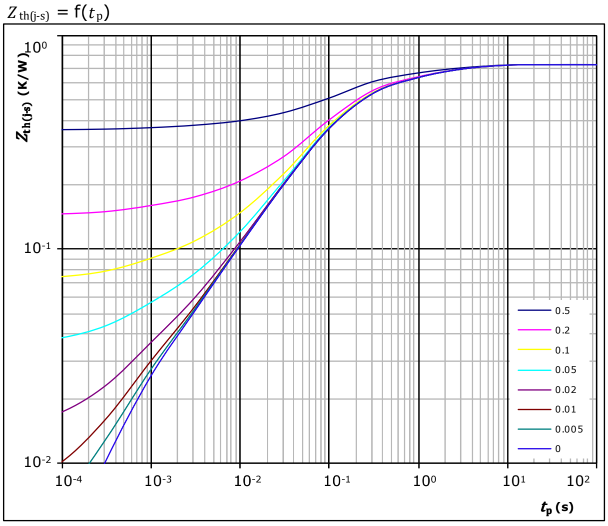
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j\text{-}s)}$ = 0,73 K/W

FWD thermal model values

R (K/W)	τ (s)
8,64E-02	3,05E+00
1,38E-01	6,75E-01
3,34E-01	1,25E-01
1,06E-01	3,99E-02
4,34E-02	6,89E-03
1,90E-02	7,34E-04

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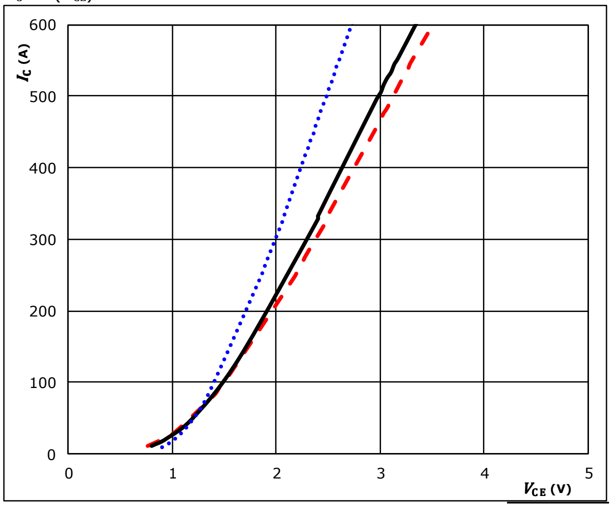
datasheet

Out. Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

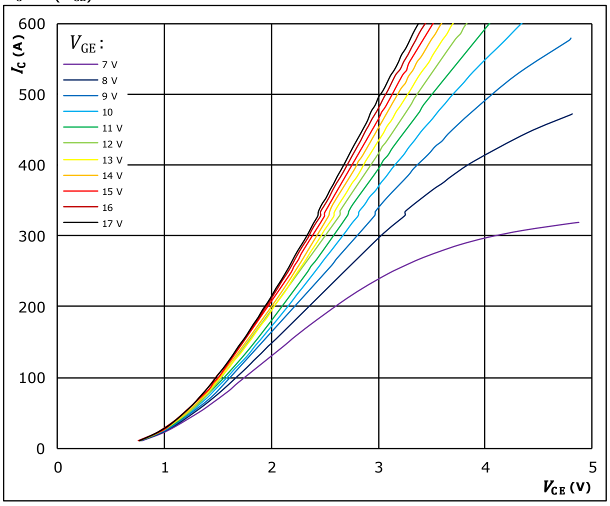


t_p =	250	μs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 μs

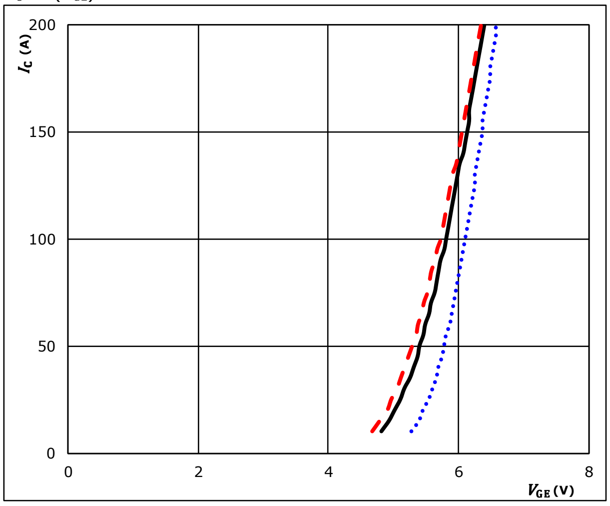
T_j = 150 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

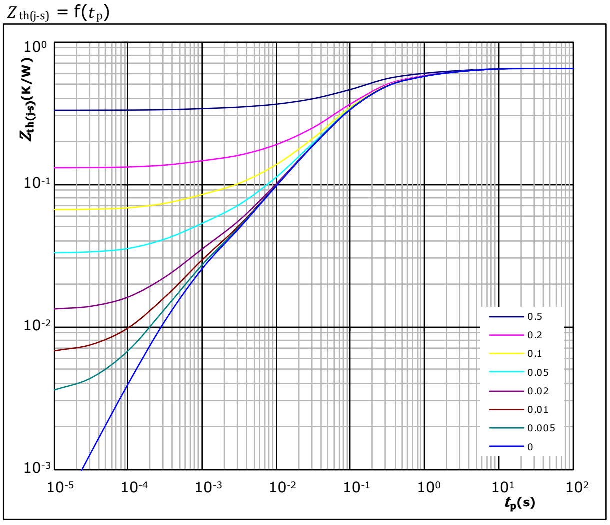


t_p =	100	μs		25 °C
V_{CE} =	0	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,65 K/W

IGBT thermal model values

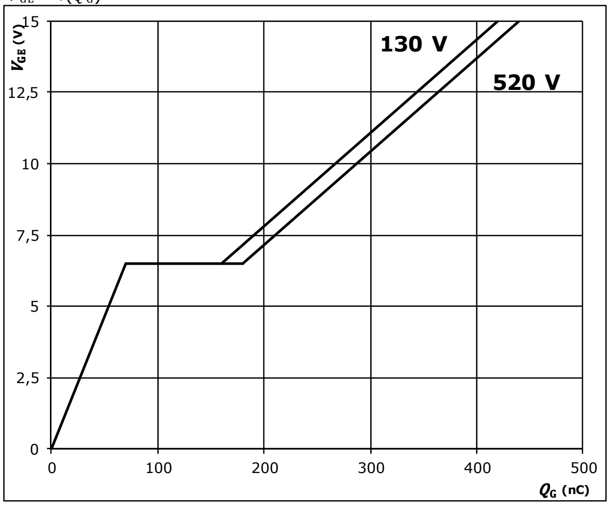
R (K/W)	τ (s)
7,51E-02	3,22E+00
1,27E-01	5,51E-01
3,27E-01	1,11E-01
7,19E-02	2,69E-02
3,44E-02	6,17E-03
1,81E-02	5,82E-04

Out. Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

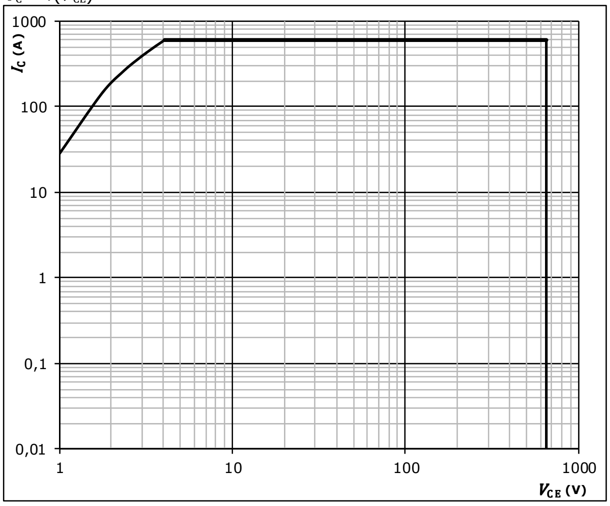


I_C =	200	A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



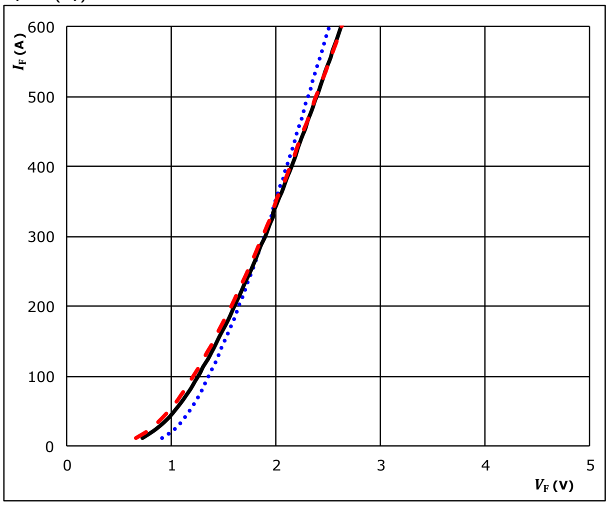
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Out. Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



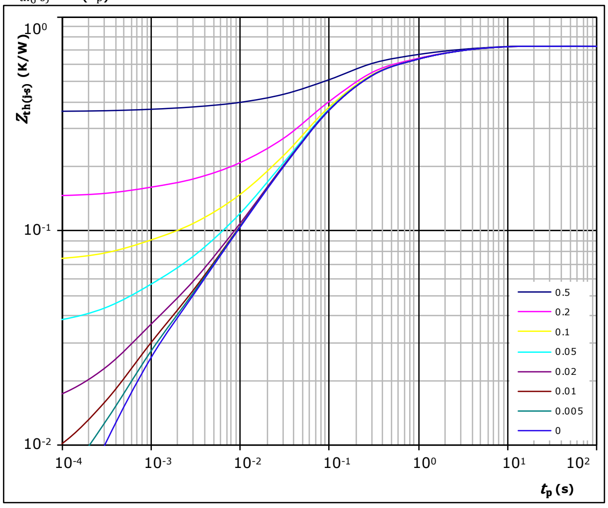
t_p = 250 µs

T_j: 25 °C / 125 °C / 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,73 K/W

FWD thermal model values

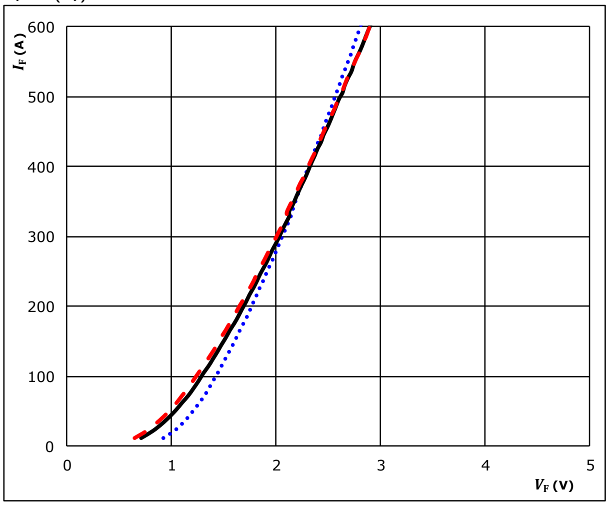
R (K/W)	τ (s)
8,64E-02	3,05E+00
1,38E-01	6,75E-01
3,34E-01	1,25E-01
1,06E-01	3,99E-02
4,34E-02	6,89E-03
1,90E-02	7,34E-04

Out. Boost Inverse Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$

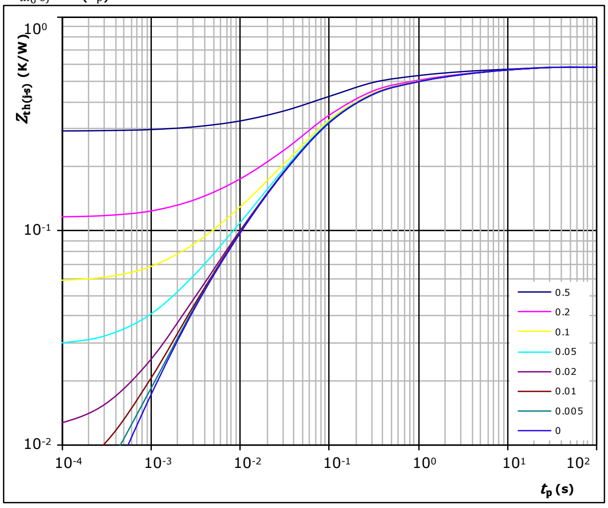


t_p =	250	µs	T_j:	25 °C
				125 °C
				150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,58 K/W

FWD thermal model values

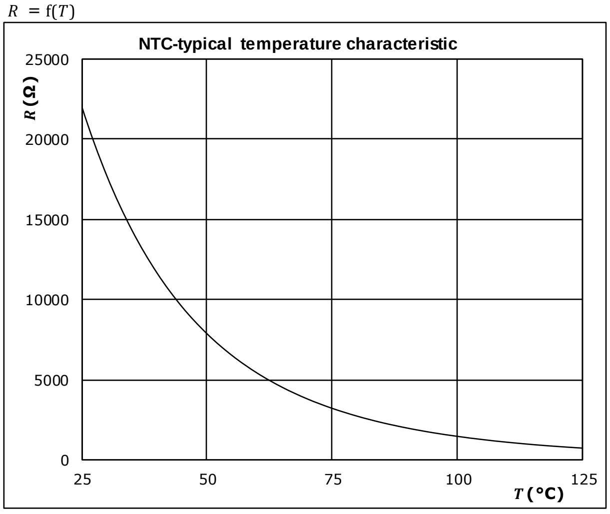
R (K/W)	τ (s)
5,80E-02	8,20E+00
8,03E-02	1,08E+00
1,46E-01	1,95E-01
2,11E-01	6,41E-02
6,77E-02	1,10E-02
1,80E-02	2,03E-03

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

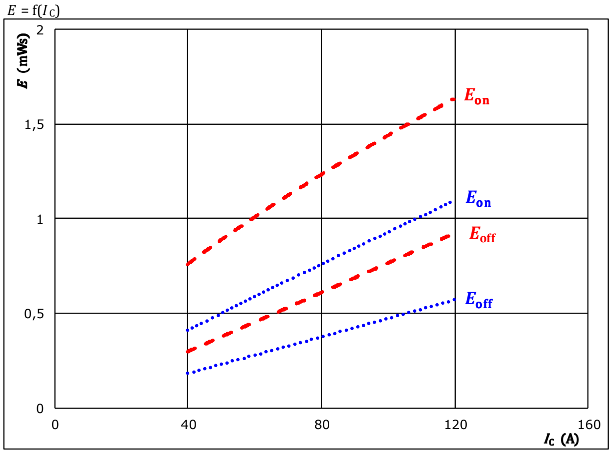


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



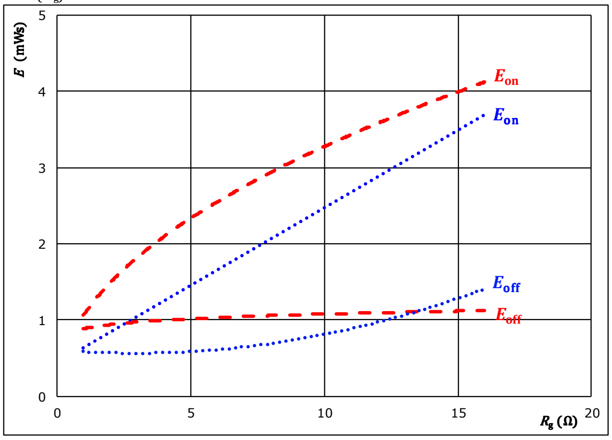
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 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

$E = f(R_g)$



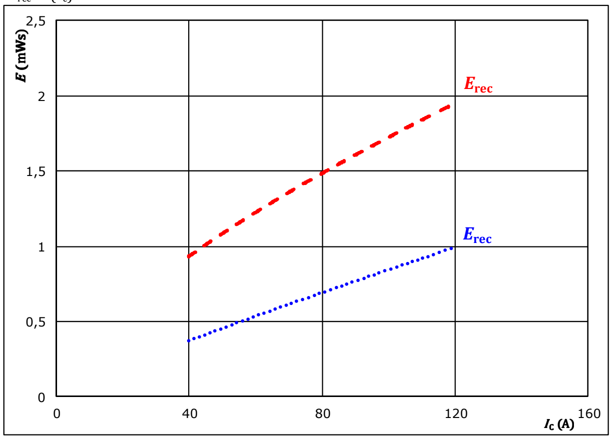
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C =	120	A			

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



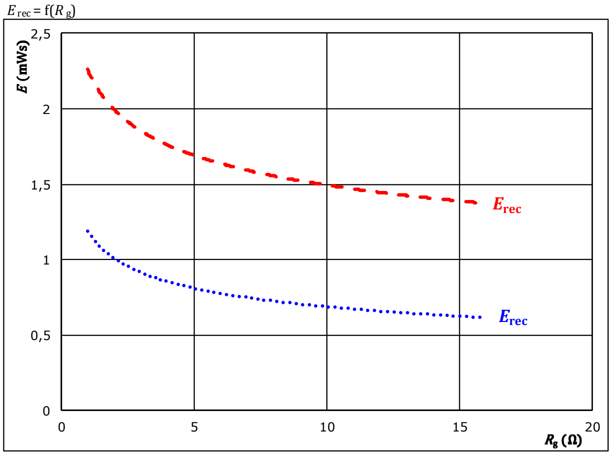
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 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

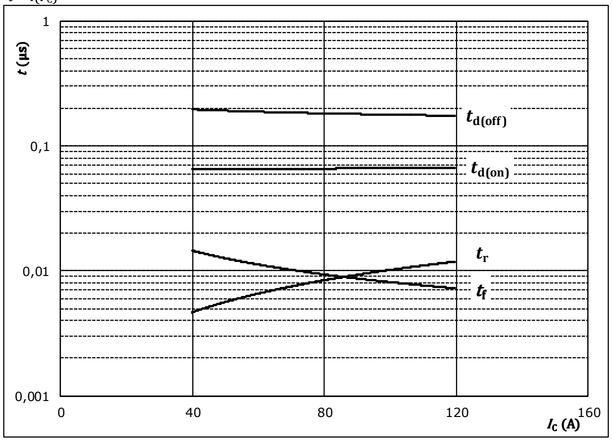
V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C =	120	A			

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



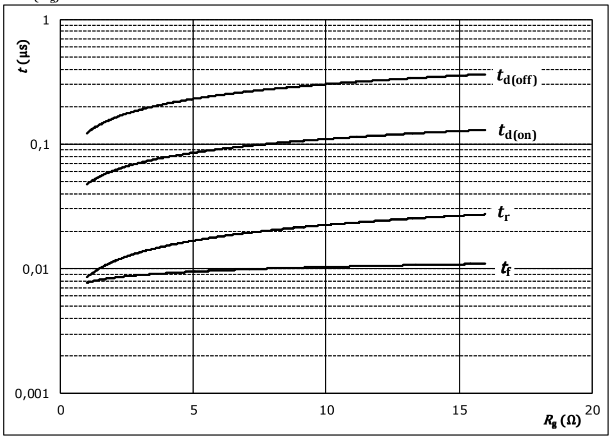
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



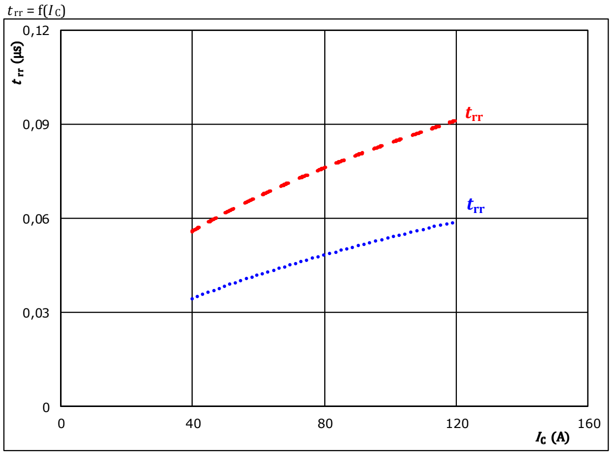
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
I_C =	120	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

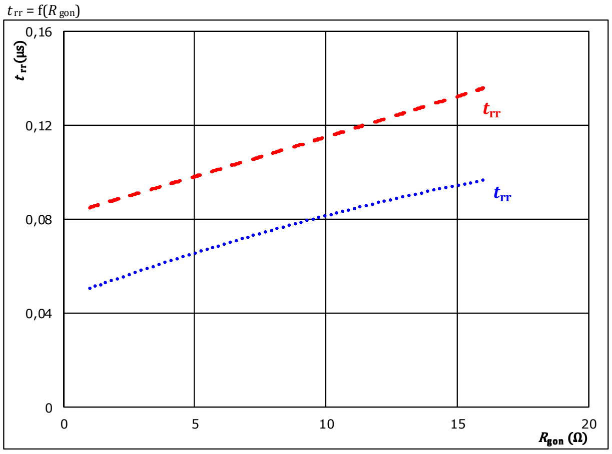
V_{CE}=	350	V
V_{GE} =	-5 / 15	V
R_{gon} =	4	Ω

T_j: 25 °C (dotted), 125 °C (dashed)

figure 8. **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 =	120	A

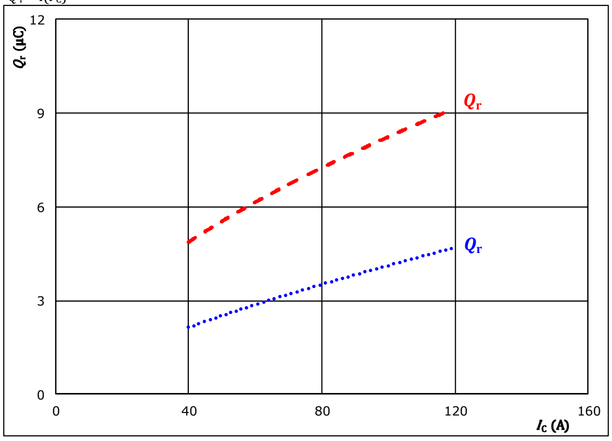
T_j: 25 °C, 125 °C

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



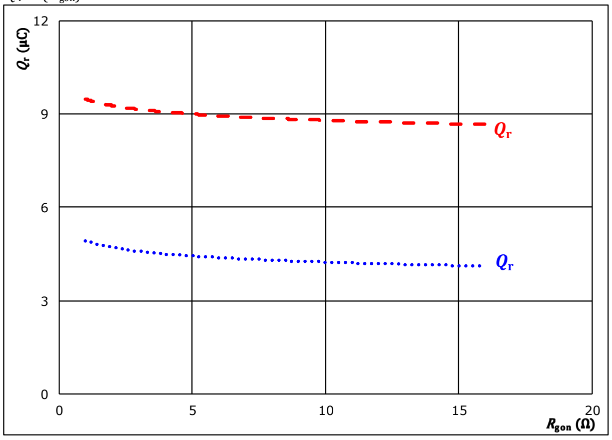
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
R_{gon} =	4	Ω			

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



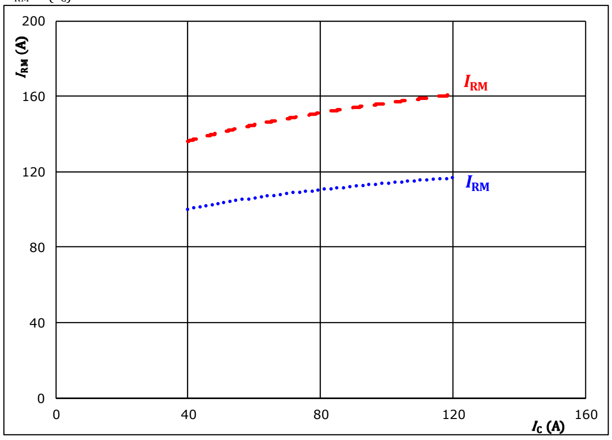
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C=	120	A			

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



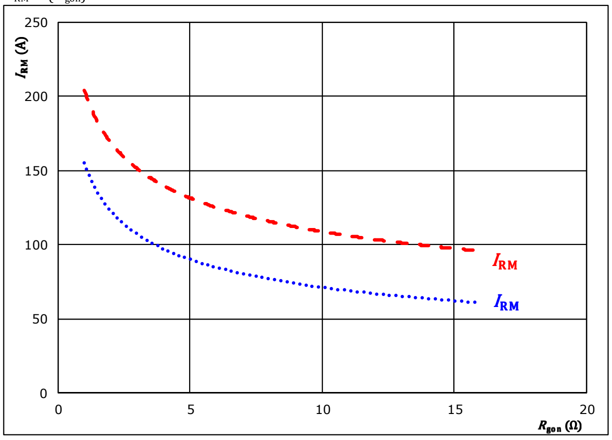
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
R_{gon} =	4	Ω			

figure 12. **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

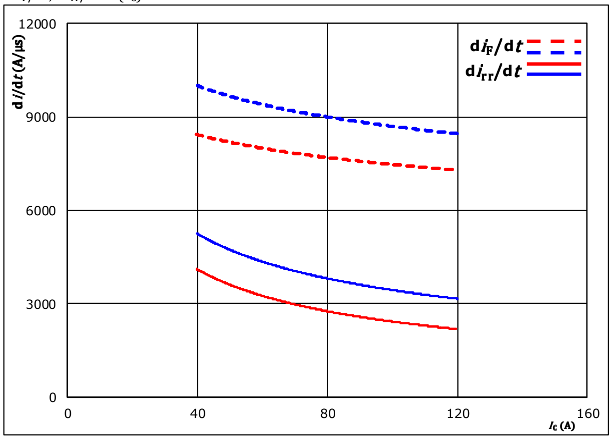
V_{CE}=	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C=	120	A			

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



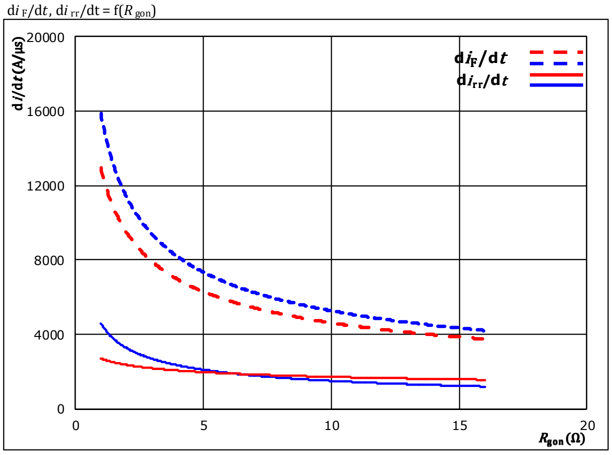
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
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, $di_{rr}/dt = f(R_{gon})$



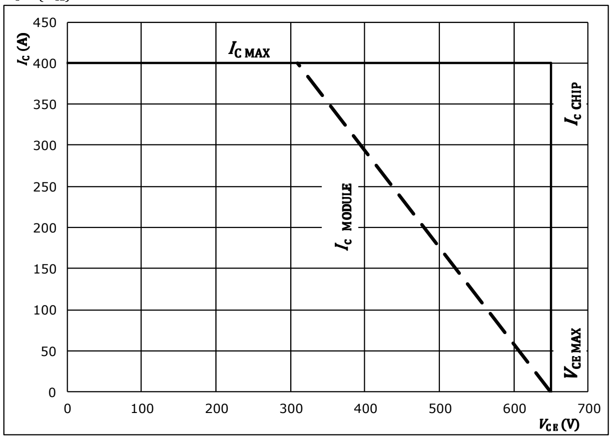
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C=	120	A		

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

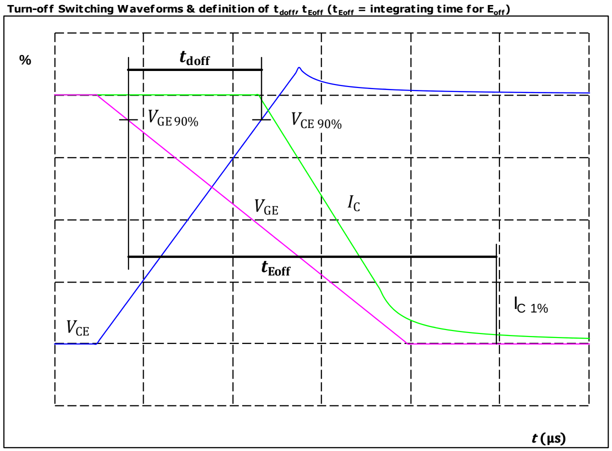
T_j =	125	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Buck Switching Definitions

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

figure 1. IGBT

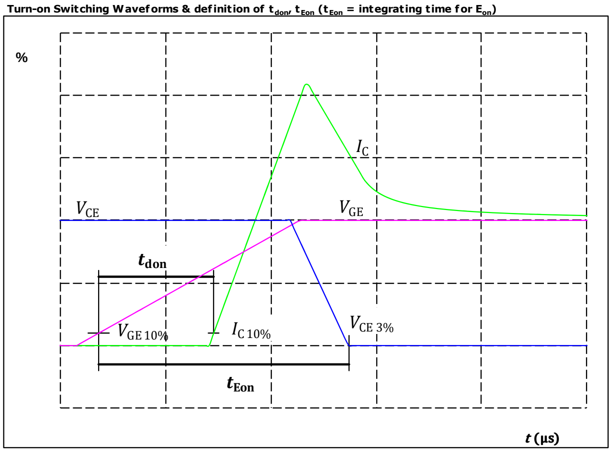
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



V_{GE}(0%) =	-5	V
V_{GE}(100%) =	15	V
V_C(100%) =	350	V
I_C(100%) =	120	A
t_{doff} =	174	ns

figure 2. IGBT

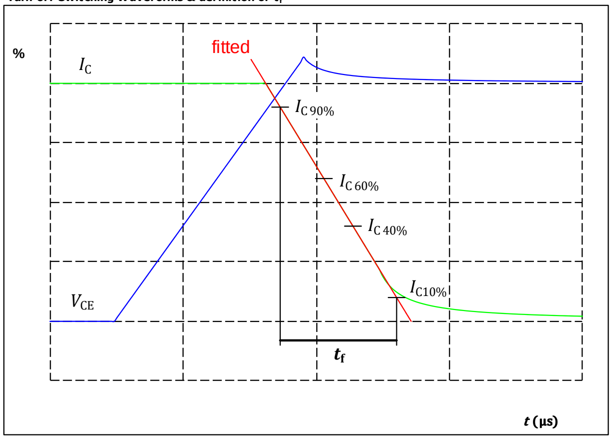
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



V_{GE}(0%) =	-5	V
V_{GE}(100%) =	15	V
V_C(100%) =	350	V
I_C(100%) =	120	A
t_{don} =	66	ns

figure 3. IGBT

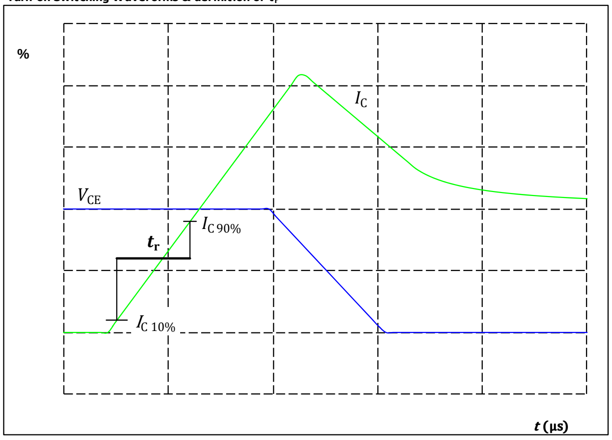
Turn-off Switching Waveforms & definition of t_f



V_C(100%) =	350	V
I_C(100%) =	120	A
t_f =	9	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

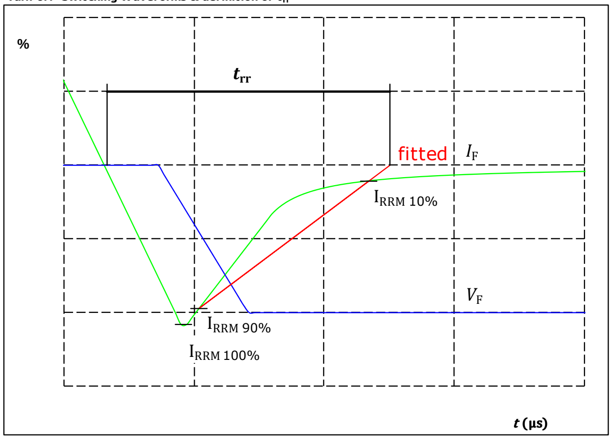


V_C(100%) =	350	V
I_C(100%) =	120	A
t_r =	12	ns

Buck Switching Characteristics

figure 5. **FWD**

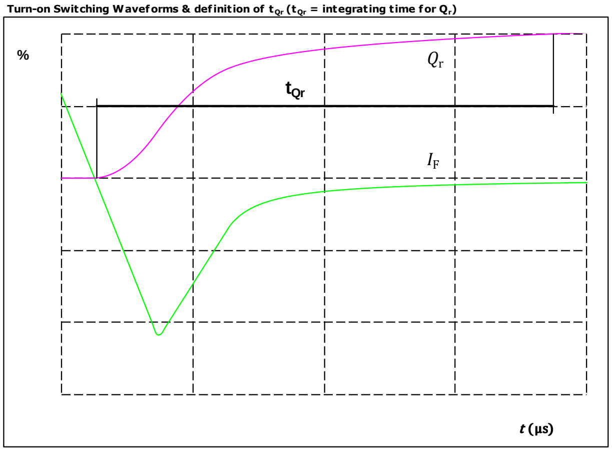
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	120	A
I_{RRM} (100%) =	160	A
t_{rr} =	91	ns

figure 6. **FWD**

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



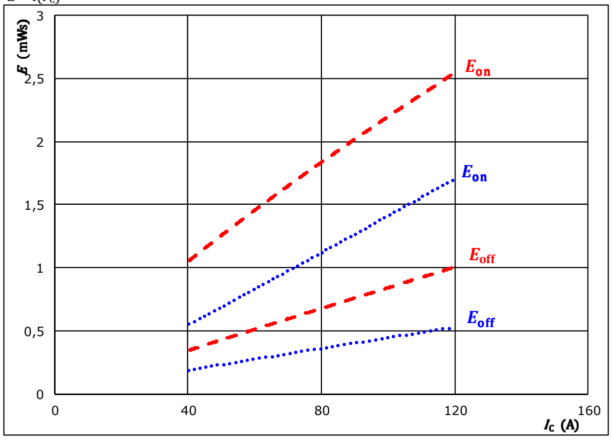
I_F (100%) =	120	A
Q_r (100%) =	9,11	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



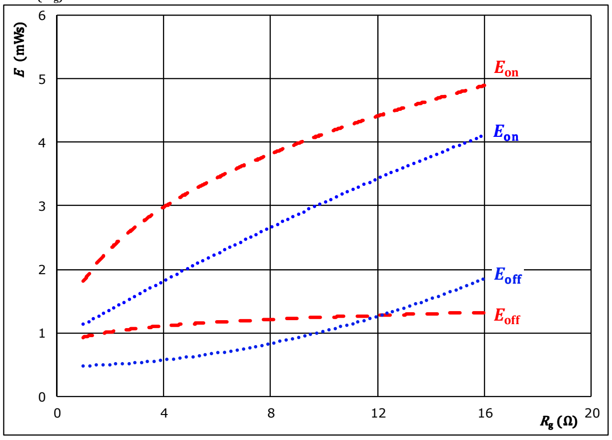
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 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

$E = f(R_g)$



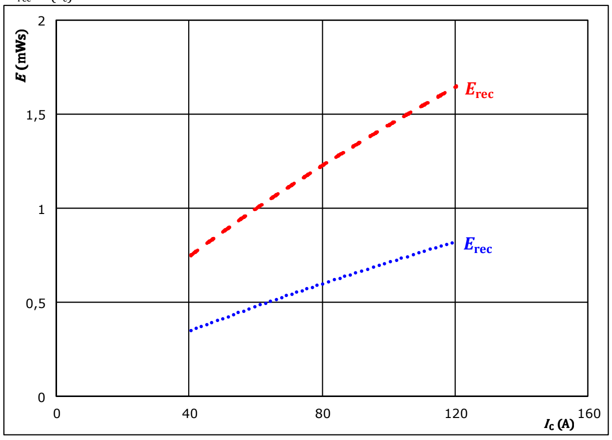
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C =	120	A			

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



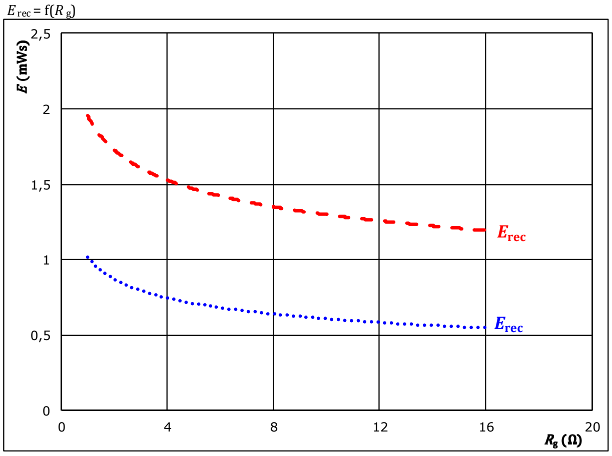
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 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

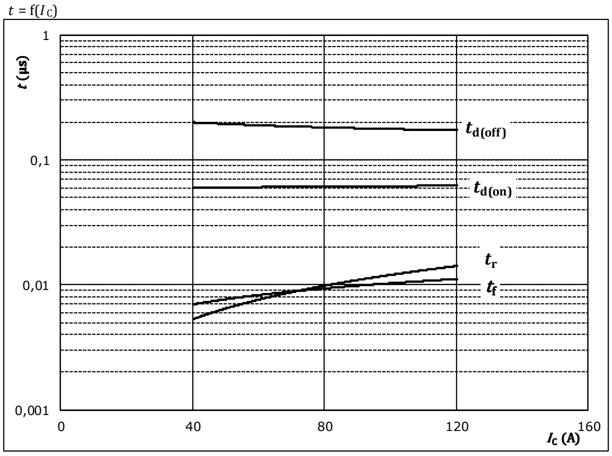
V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C =	120	A			

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



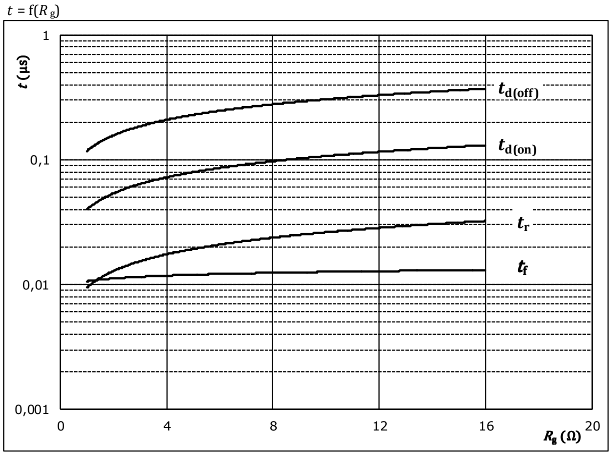
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



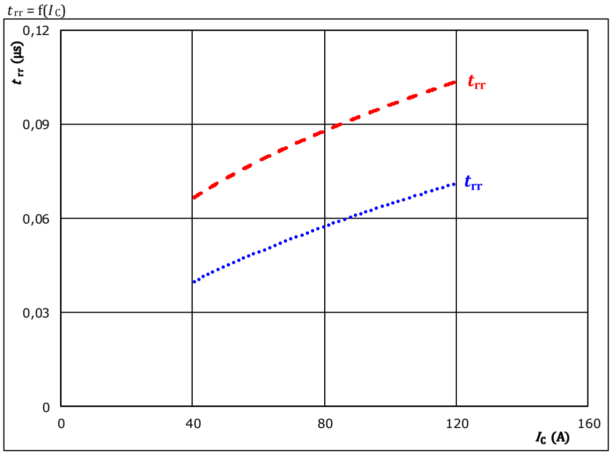
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
I_C =	120	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

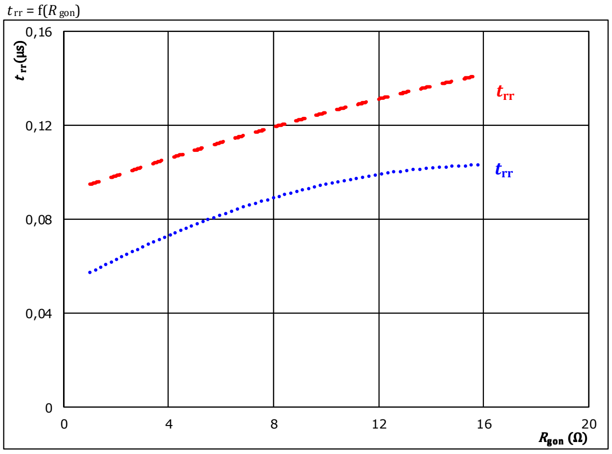
V_{CE}=	350	V
V_{GE} =	-5 / 15	V
R_{gon} =	4	Ω

T_j: 25 °C (dotted), 125 °C (dashed)

figure 8. **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 =	120	A

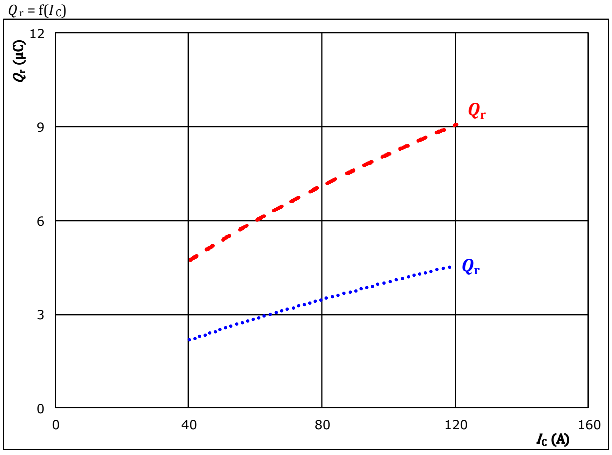
T_j: 25 °C (dotted), 125 °C (dashed)

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



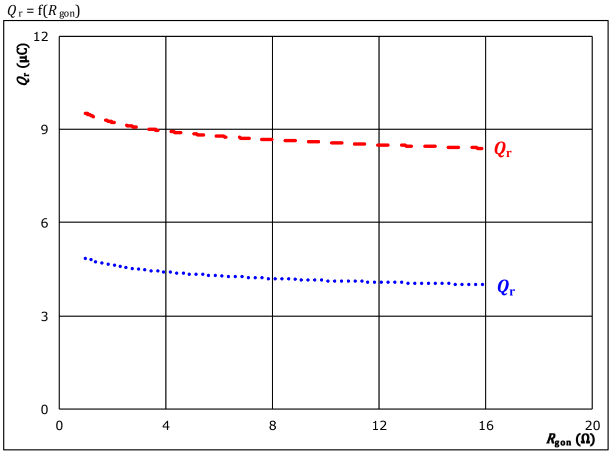
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
R_{gon} =	4	Ω			

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



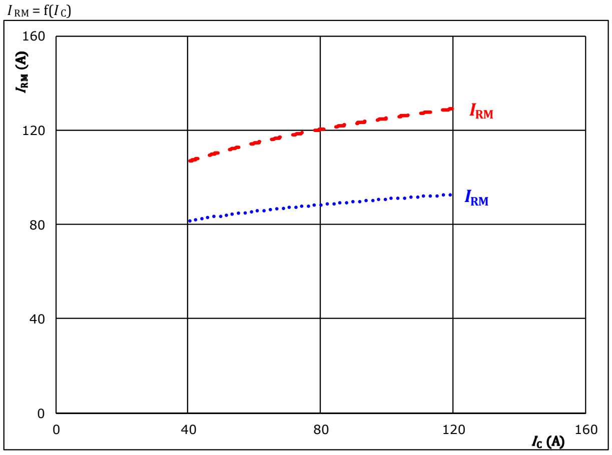
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C=	120	A			

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



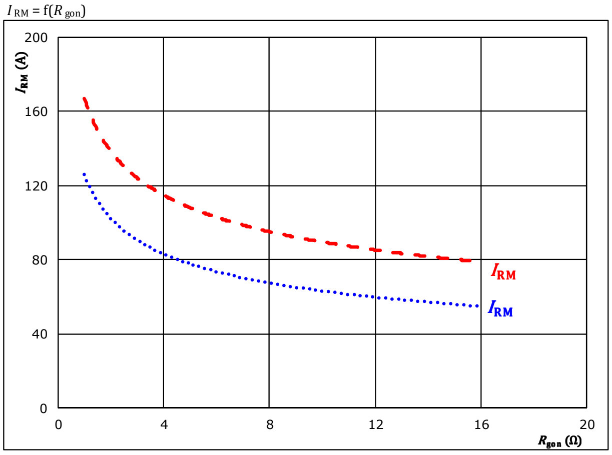
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
R_{gon} =	4	Ω			

figure 12. **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

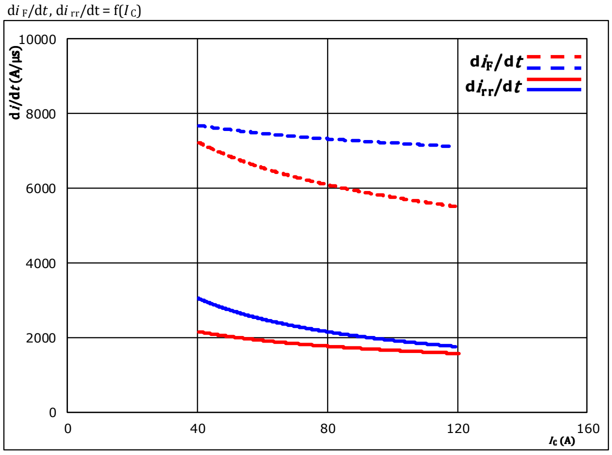
V_{CE}=	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	– – – –
I_C=	120	A			

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



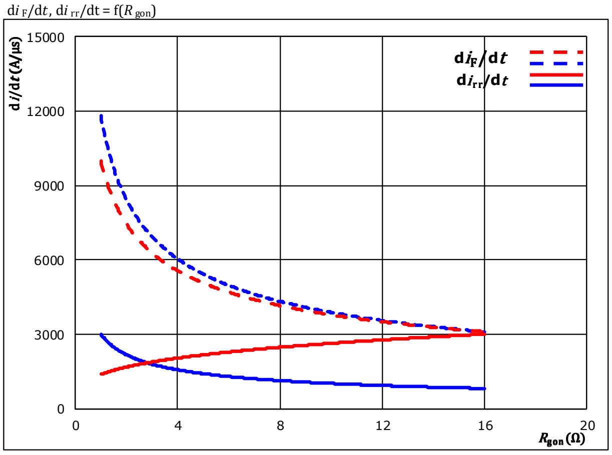
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
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, $di_{rr}/dt = f(R_{gon})$



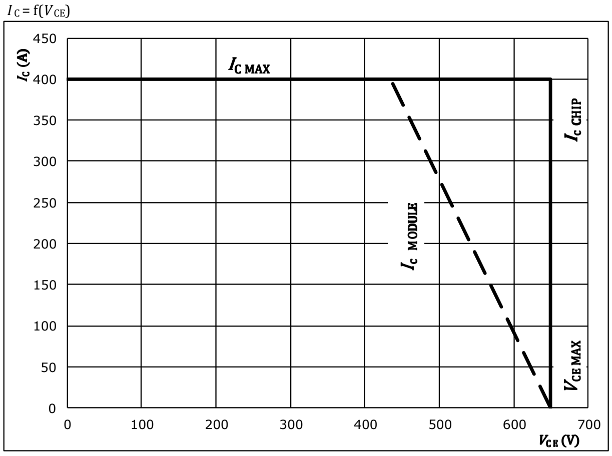
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C=	120	A		

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

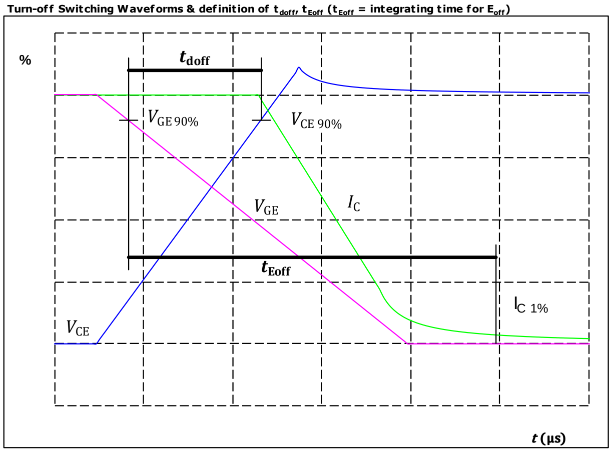
T_j =	125	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Boost Switching Definitions

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

figure 1. IGBT

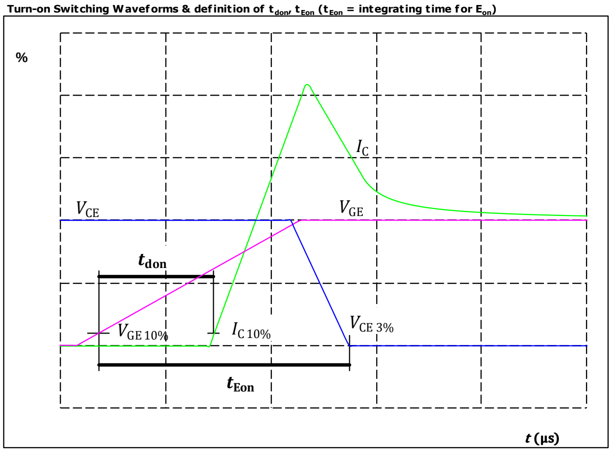
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{doff} =	171	ns

figure 2. IGBT

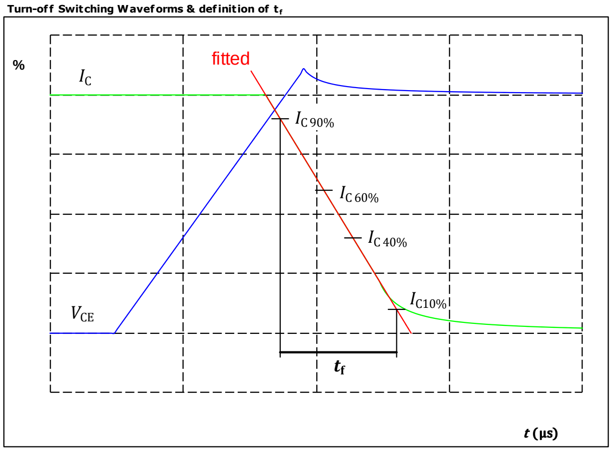
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{don} =	62	ns

figure 3. IGBT

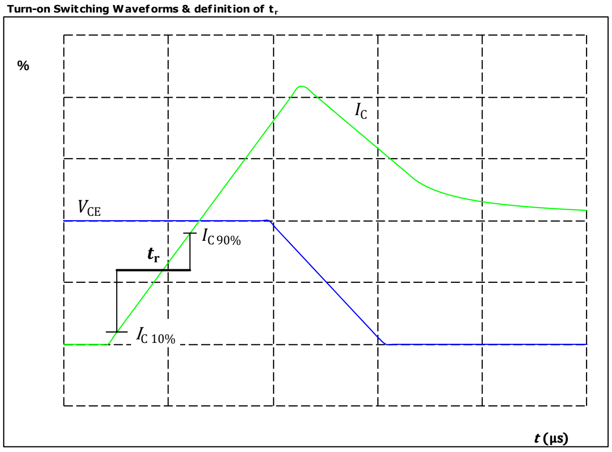
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_f =	12	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

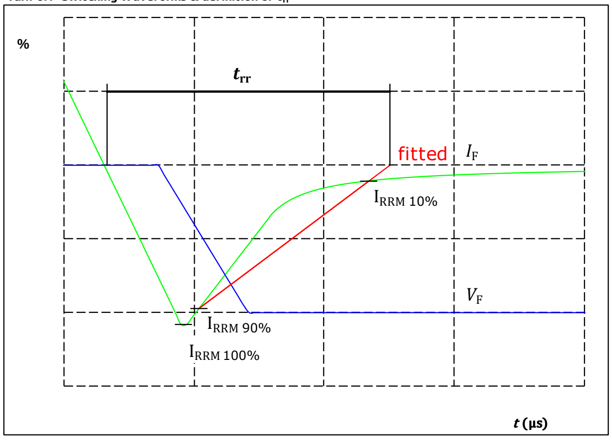


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_r =	14	ns

Boost Switching Characteristics

figure 5. **FWD**

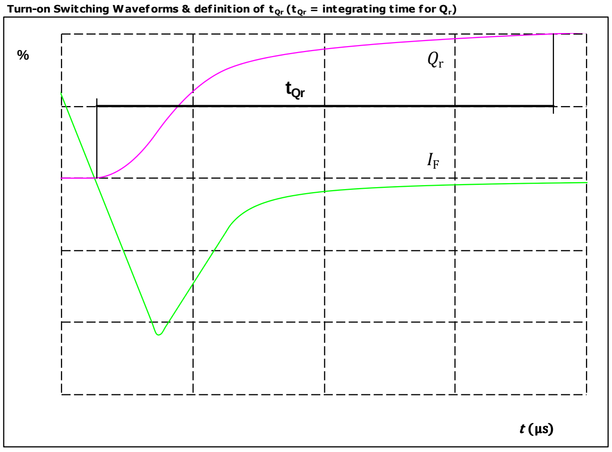
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	120	A
I_{RRM} (100%) =	129	A
t_{rr} =	103	ns

figure 6. **FWD**

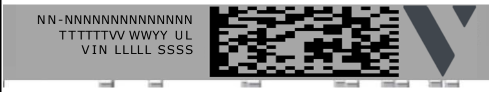
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	120	A
Q_r (100%) =	9,16	µC

Ordering Code & Marking

Version	Ordering Code
without thermal paste 12mm housing with solder pins	10-FY07NPA200SM02-L366F08
without thermal paste 12mm housing with press-fit pins	10-PY07NPA200SM02-L366F08Y
with thermal paste 12mm housing with solder pins	10-FY07NPA200SM02-L366F08-/3/
with thermal paste 12mm housing with press-fit pins	10-PY07NPA200SM02-L366F08Y-/3/

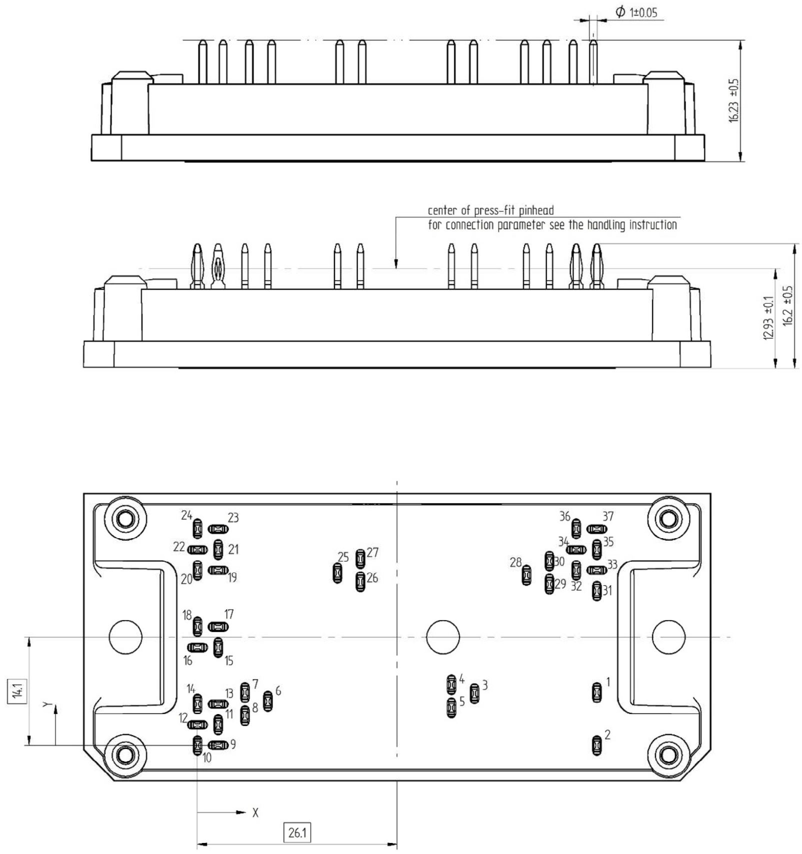


	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

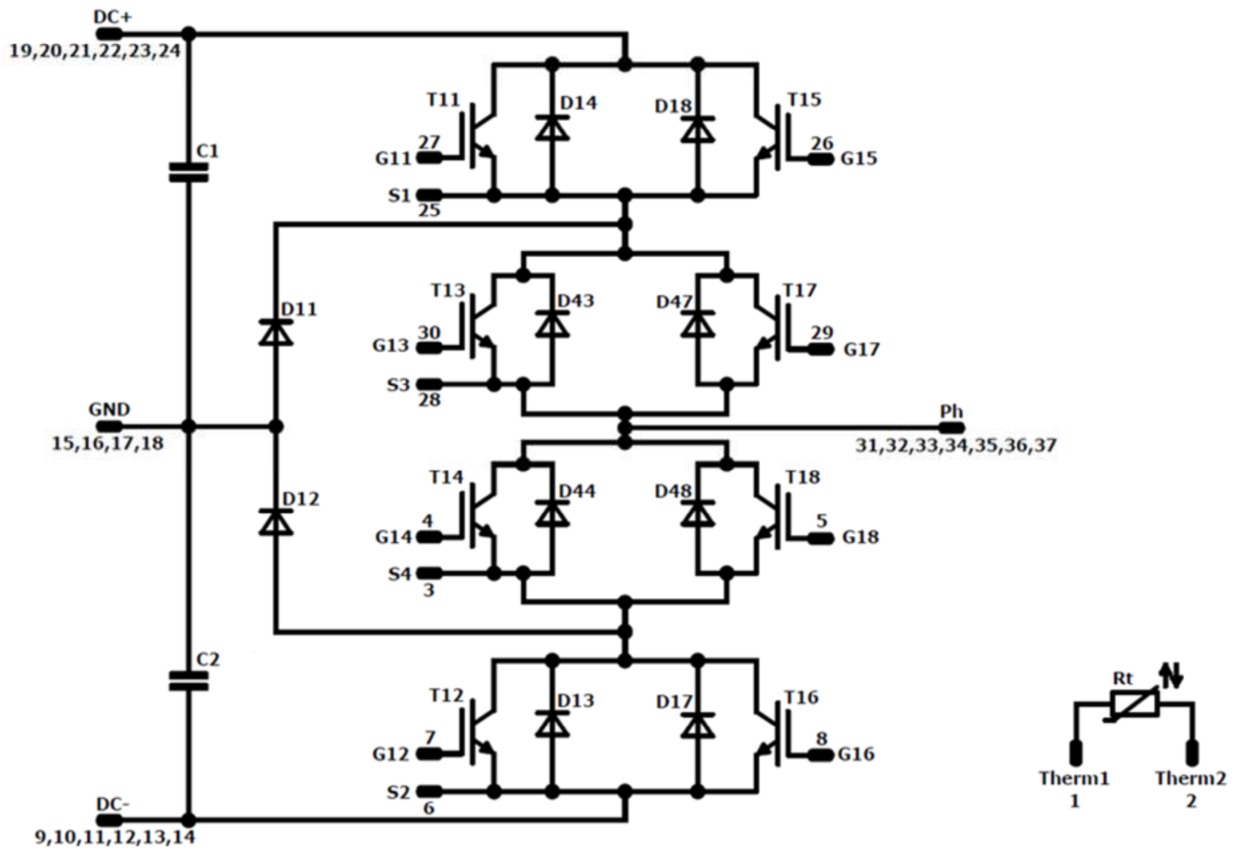
Pin table

Pin	X	Y	Function
1	52,2	6,9	Therm1
2	52,2	0	Therm2
3	36,2	6,75	S4
4	33,2	7,9	G14
5	33,2	4,9	G18
6	9,2	5,75	S2
7	6,2	6,9	G12
8	6,2	3,9	G16
9	2,7	0	DC-
10	0	0	DC-
11	2,7	2,7	DC-
12	0	2,7	DC-
13	2,7	5,4	DC-
14	0	5,4	DC-
15	2,7	12,75	GND
16	0	12,75	GND
17	2,7	15,45	GND
18	0	15,45	GND
19	2,7	22,8	DC+
20	0	22,8	DC+
21	2,7	25,5	DC+
22	0	25,5	DC+
23	2,7	28,2	DC+
24	0	28,2	DC+
25	18,3	22,45	S1
26	21,3	21,3	G15
27	21,3	24,3	G11
28	43	22,15	S3
29	46	21	G17
30	46	24	G13
31	52,2	20,1	Ph
32	49,5	22,8	Ph
33	52,2	22,8	Ph
34	49,5	25,5	Ph
35	52,2	25,5	Ph
36	49,5	28,2	Ph
37	52,2	28,2	Ph



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
T11, T12, T15, T16	IGBT	650V	100A	Buck Switch	
D11, D12	FWD	650V	200A	Buck Diode	
T13, T14, T17, T18	IGBT	650V	100A	Out. Boost Switch	
D13, D14, D17, D18	FWD	650V	100A	Out. Boost Diode	
D43, D44, D47, D48	FWD	650V	100A	Out. Boost Inverse Diode	
C1, C2	Capacitor	630V	-	DC Link Capacitor	
Rt	NTC	-	-	Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for if no series packaging available packages see vincotech.com website.

Package data
Package data for if no series packaging available 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-xY07NPA200SM02-L366F08x-D5-14	19 Dec. 2018	Thermistor type has been changed to Tateyama	8