10-PY07BBA150S5-M735L58Y
datasheet

Vincotech

flow **Buck-Boost 1**	**650 V / 150 A**

Features

- Battery Buck-Boost
- IGBT S5 + Rapid1S
- f_{sw} 20-50 kHz
- NTC

Target applications

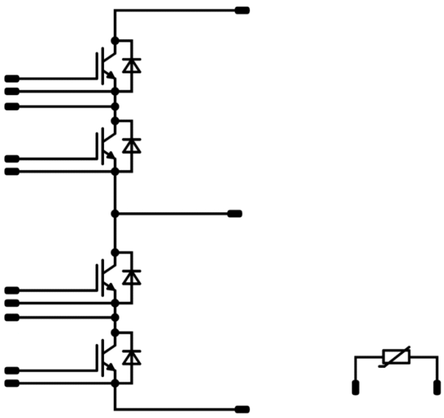
- Power Supply
- UPS

Types

- 10-PY07BBA150S5-M735L58Y

***flow* 1 12mm housing**

Schematic



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	48	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	73	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	40	A
Repetitive peak forward current	I_{FRM}			80	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	58	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	104	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		450	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
Boost Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	70	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	T_s = 150 °C	200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	95	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				min. 12,7	mm
Clearance				8,11	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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0005	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 125 150		1,39 1,48 1,51	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		3100		pF
Output capacitance	C_{oes}							88		
Reverse transfer capacitance	C_{res}							12		
Gate charge	Q_g		15	520	50	25		120		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,29		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	15/0	400	50	25 125 150		26 32 32		ns
Rise time	t_r					25 125 150		7 11 10		
Turn-off delay time	$t_{d(off)}$					25 125 150		126 145 152		
Fall time	t_f					25 125 150		11 25 33		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,9 µC Q_{rFWD} = 3,2 µC Q_{rFWD} = 3,6 µC				25 125 150		0,613 0,722 0,758		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,505 0,786 0,887		

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				40	25 125 150		1,52 1,47 1,45	1,92	V
Reverse leakage current	I_R			650		25			2,1	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,64		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 6192 A/µs di/dt = 5422 A/µs di/dt = 5179 A/µs	15/0	400	50	25 125 150		62 75 80		A
Reverse recovery time	t_{rr}					25 125 150		59 87 97		ns
Recovered charge	Q_r					25 125 150		1,859 3,210 3,632		µC
Reverse recovered energy	E_{rec}					25 125 150		0,461 1,075 1,222		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1550 1357 1542		A/µs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0015	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,43 1,52 1,55	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			100	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		9000		pF
Output capacitance	C_{oes}	f = 1 MHz	0	25		25		260		pF
Reverse transfer capacitance	C_{res}	f = 1 MHz	0	25		25		34		pF
Gate charge	Q_g		15	520	150	25		328		nC
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_{goff} = 2 Ω R_{gon} = 2 Ω	15/0	350	127	25 125 150		31 32 31		ns
Rise time	t_r	R_{goff} = 2 Ω R_{gon} = 2 Ω	15/0	350	127	25 125 150		11 12 12		ns
Turn-off delay time	$t_{d(off)}$	R_{goff} = 2 Ω R_{gon} = 2 Ω	15/0	350	127	25 125 150		152 172 178		ns
Fall time	t_f	R_{goff} = 2 Ω R_{gon} = 2 Ω	15/0	350	127	25 125 150		9 16 19		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,2 µC Q_{rFWD} = 7,6 µC Q_{rFWD} = 8,4 µC	15/0	350	127	25 125 150		1,340 1,782 1,783		mWs
Turn-off energy (per pulse)	E_{off}		15/0	350	127	25 125 150		1,187 1,920 2,147		mWs

Characteristic Values

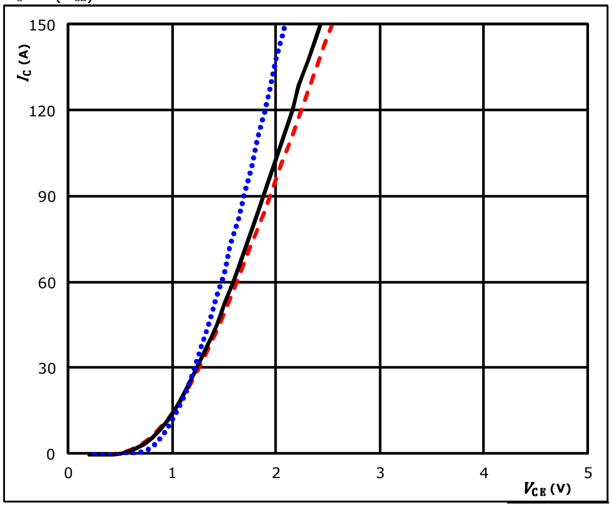
Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,61 1,58 1,57	1,92	V
Reverse leakage current	I_r			650		25			5,3	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,00		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 10473 A/µs di/dt = 9230 A/µs di/dt = 9328 A/µs	15/0	350	127	25 125 150		151 186 192		A
Reverse recovery time	t_{rr}					25 125 150		52 81 89		ns
Recovered charge	Q_r					25 125 150		4,233 7,613 8,417		µC
Reverse recovered energy	E_{rec}					25 125 150		1,084 2,009 2,232		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		7084 3185 3380		A/µs
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

$I_C = f(V_{CE})$

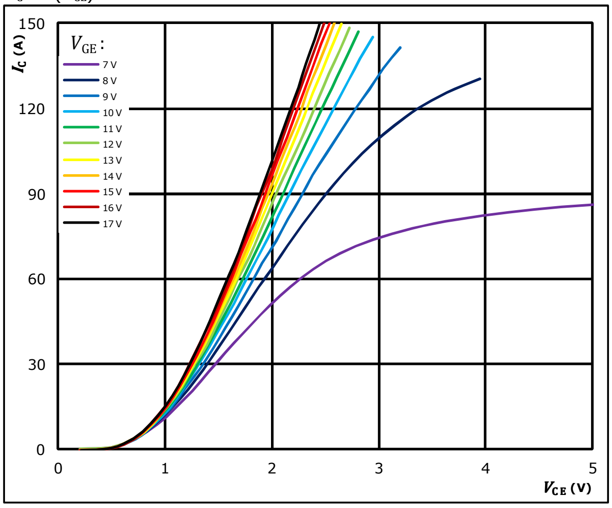


t_p =	250	µs		25 °C	···········
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

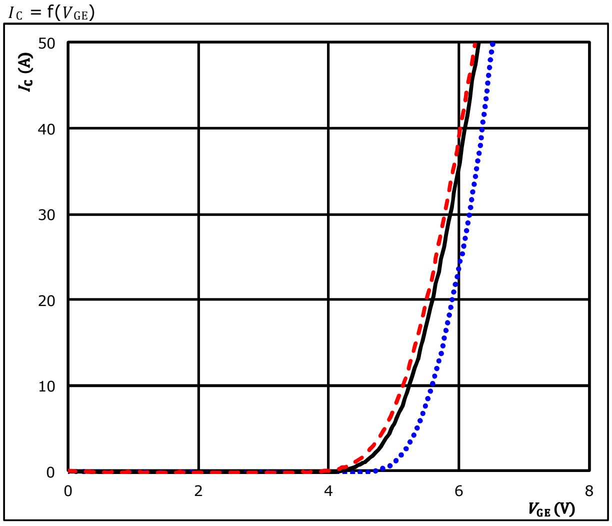


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

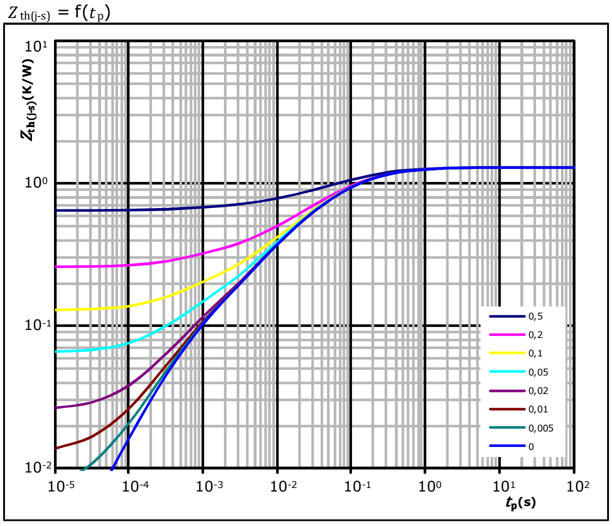


t_p =	100	µs		25 °C	···········
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,29 K/W

IGBT thermal model values

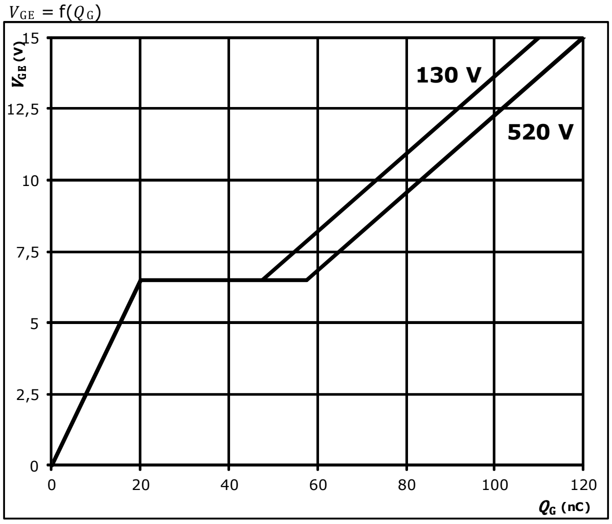
R (K/W)	τ (s)
2,09E-01	5,36E-01
6,00E-01	8,05E-02
3,10E-01	1,69E-02
1,08E-01	4,25E-03
6,63E-02	5,30E-04

Buck Switch Characteristics

figure 5. IGBT

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

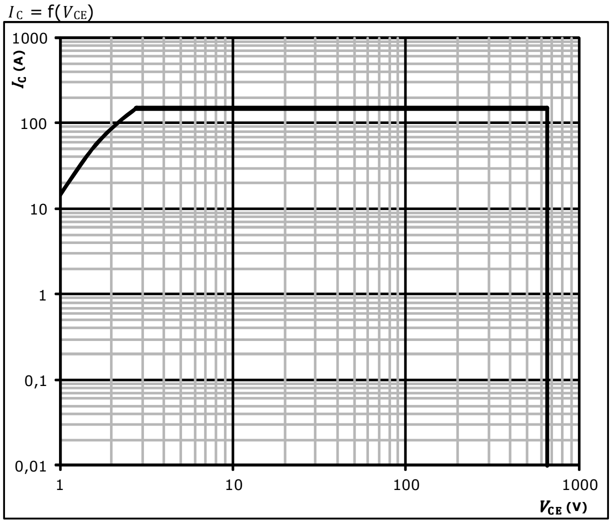


I_C = 50 A

figure 6. IGBT

Safe operating area

$I_C = f(V_{CE})$



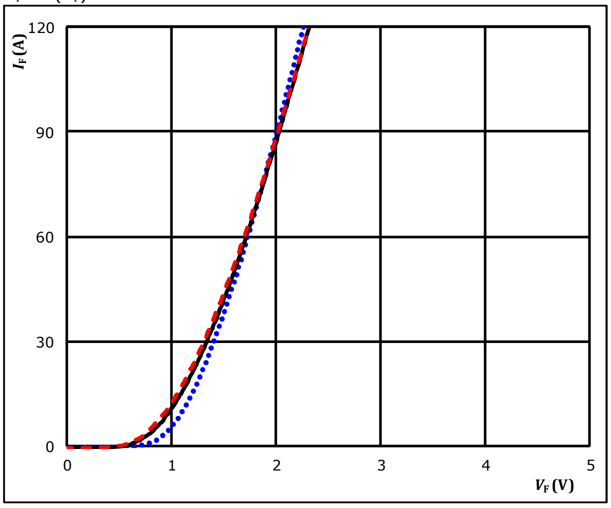
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1.	FWD

Typical forward characteristics

$I_F = f(V_F)$



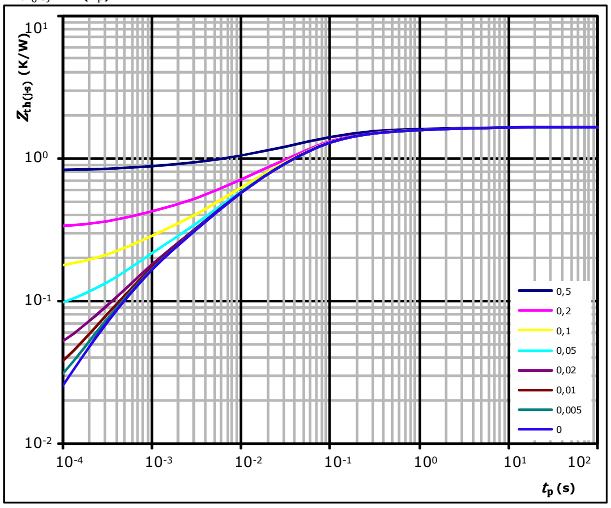
t_p = 250 μs

T_j: 25 °C; 125 °C; 150 °C

figure 2.	FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,64 K/W

FWD thermal model values

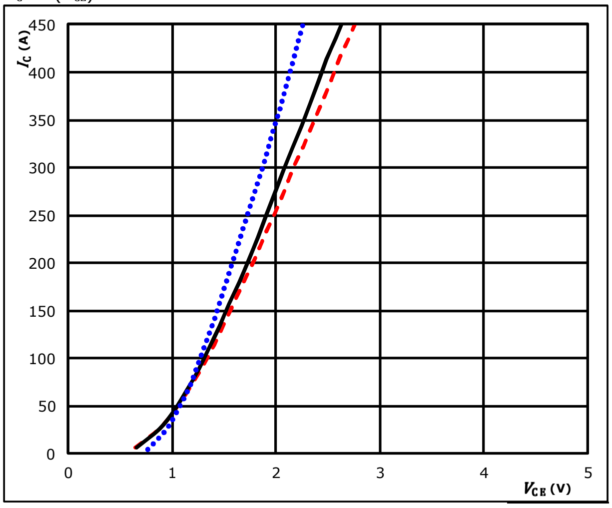
R (K/W)	τ (s)
8,96E-02	3,10E+00
1,81E-01	3,22E-01
7,56E-01	5,84E-02
3,45E-01	1,28E-02
1,67E-01	3,41E-03
9,73E-02	5,41E-04

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

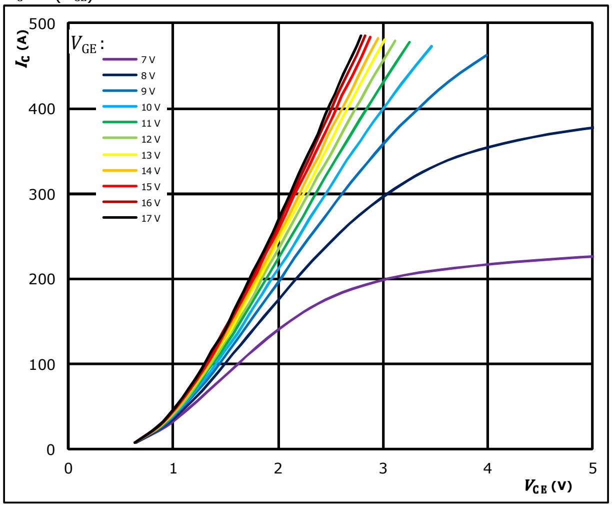


t_p =	250	µs		25 °C	dotted blue
V_{GE} =	15	V	T_j:	125 °C	solid black
				150 °C	dashed red

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 µs

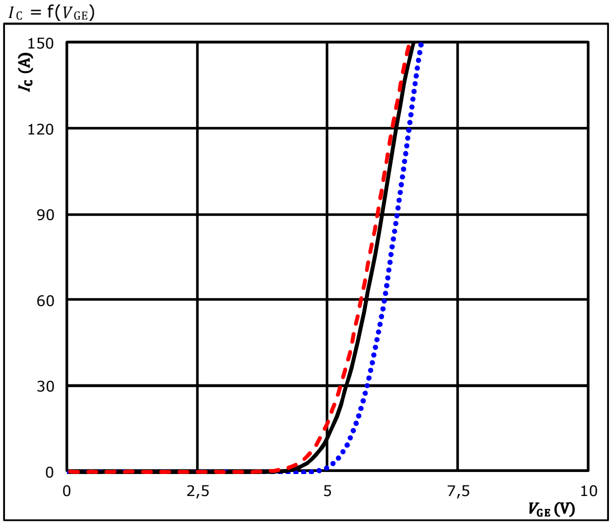
T_j = 150 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

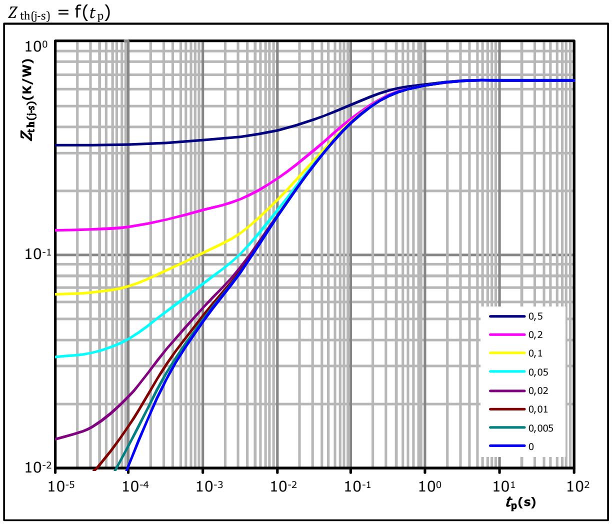


t_p =	100	µs		25 °C	dotted blue
V_{CE} =	10	V	T_j:	125 °C	solid black
				150 °C	dashed red

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

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

IGBT thermal model values

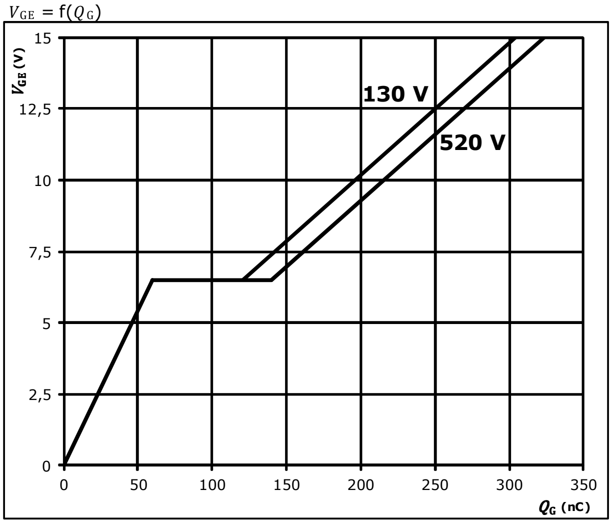
R (K/W)	τ (s)
1,13E-01	8,46E-01
2,91E-01	1,23E-01
1,38E-01	3,33E-02
6,68E-02	8,32E-03
1,32E-02	2,63E-03
3,21E-02	3,23E-04

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

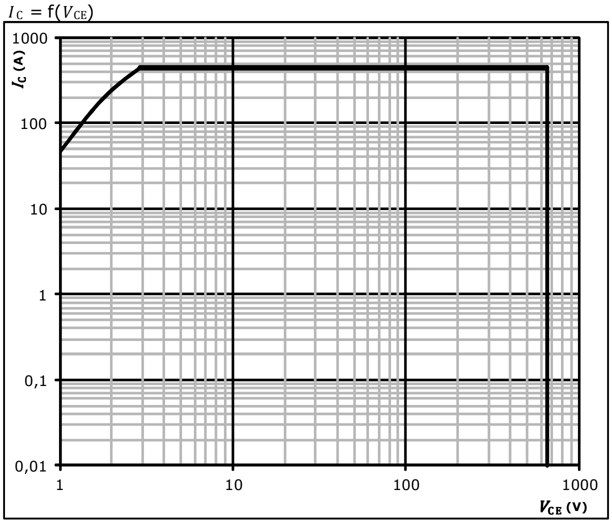


I_C= 150 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



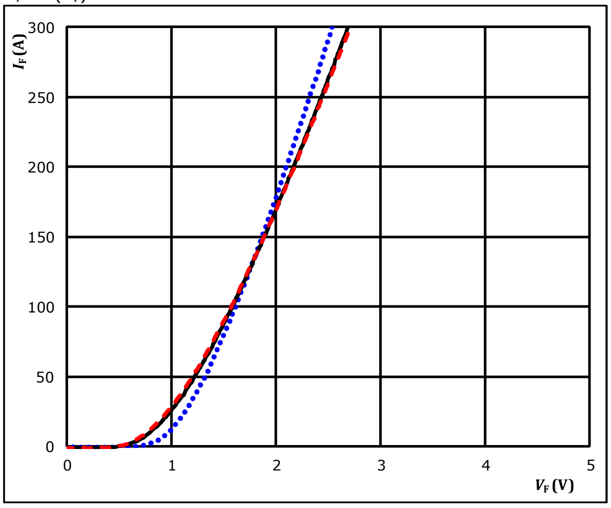
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



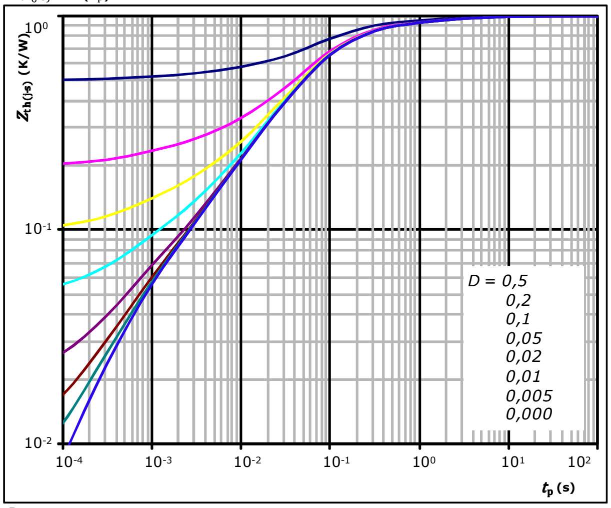
t_p = 250 μs

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

$R_{th(j-s)}$ = 1,00 K/W

FWD thermal model values

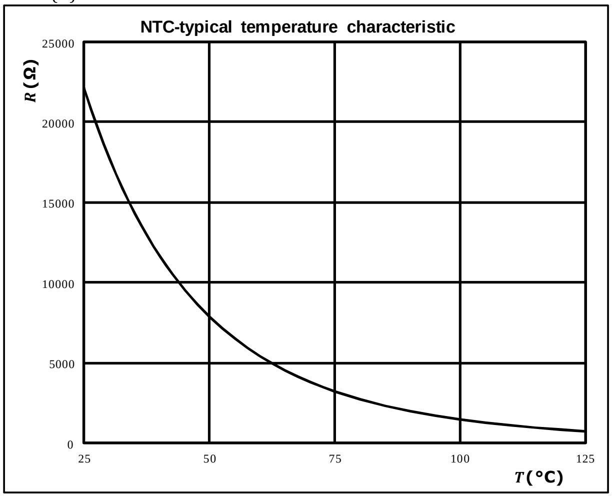
R (K/W)	τ (s)
4,57E-02	5,23E+00
1,09E-01	8,02E-01
3,92E-01	1,26E-01
3,47E-01	3,68E-02
7,19E-02	4,16E-03
3,26E-02	5,44E-04

Thermistor Characteristics

figure 1.	Thermistor

Typical NTC characteristic as a function of temperature

$R = f(T)$

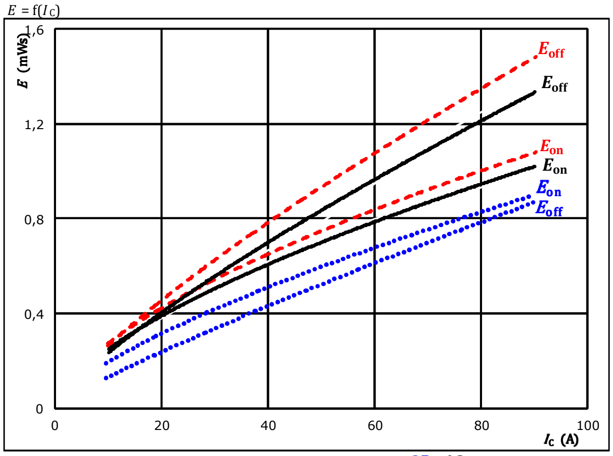


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



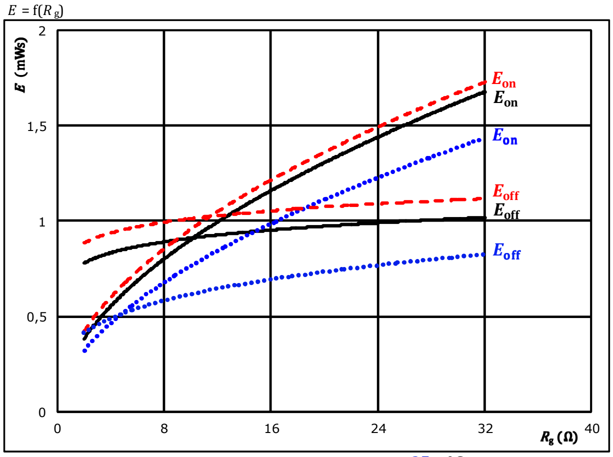
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted blue
V_{GE} =	15/0	V		125 °C	solid black
R_{gon} =	8	Ω		150 °C	dashed red
R_{goff} =	8	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



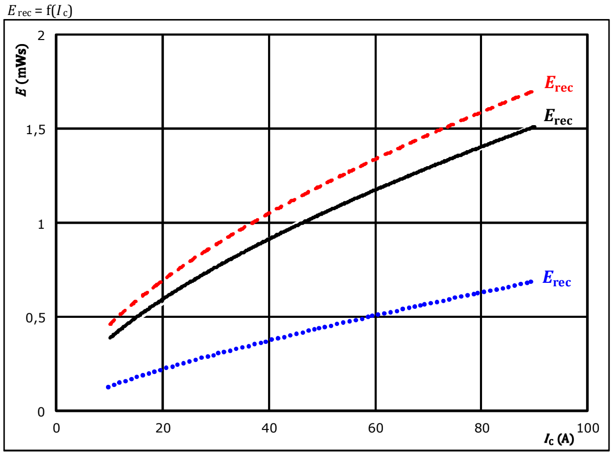
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted blue
V_{GE} =	15/0	V		125 °C	solid black
I_C =	50	A		150 °C	dashed red

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



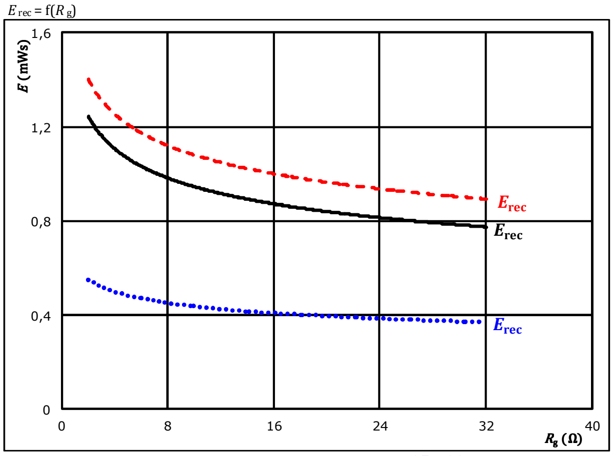
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted blue
V_{GE} =	15/0	V		125 °C	solid black
R_{gon} =	8	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

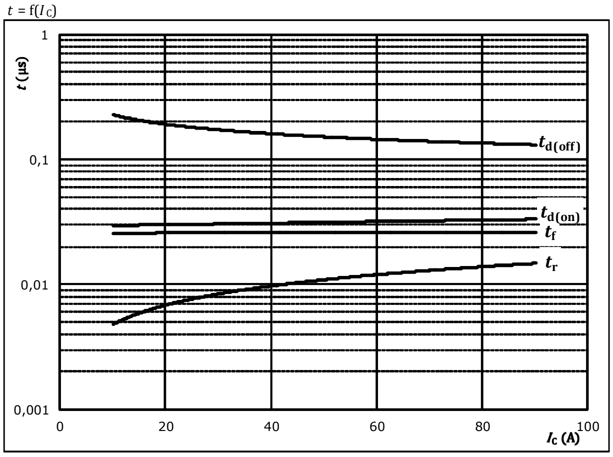
V_{CE} =	400	V	T_j:	25 °C	dotted blue
V_{GE} =	15/0	V		125 °C	solid black
I_C =	50	A		150 °C	dashed red

Buck Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



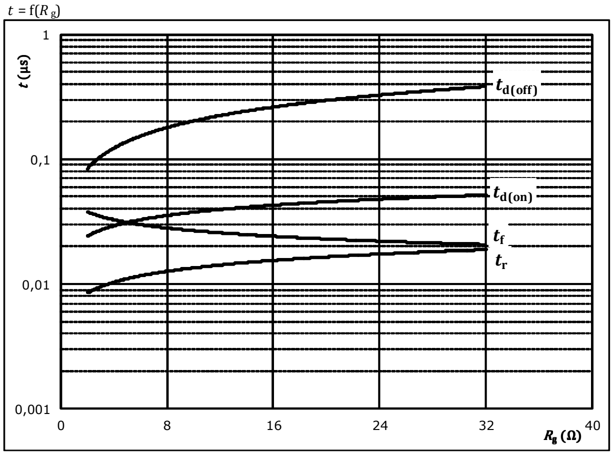
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	15/0	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



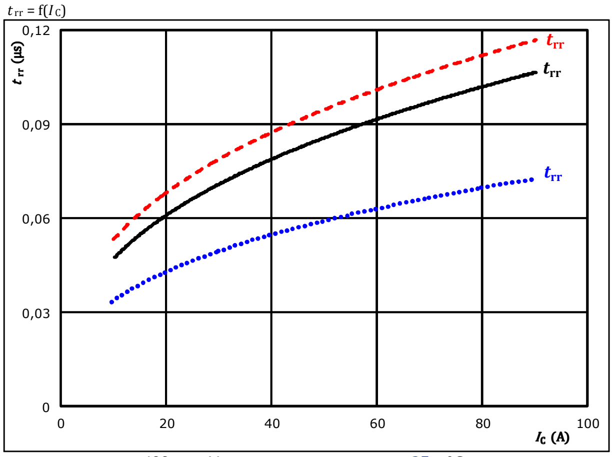
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	15/0	V
I_C =	50	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

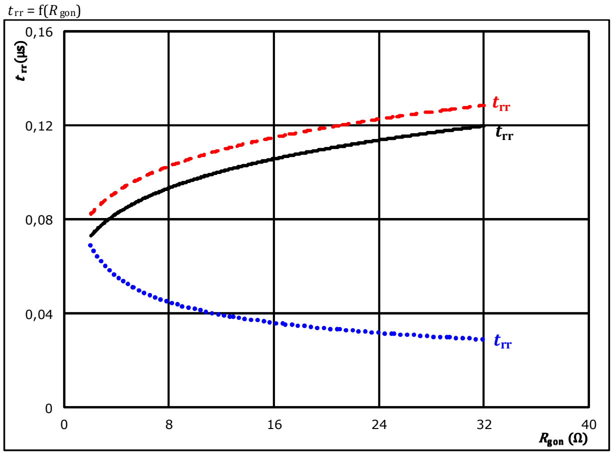


At						
V_{CE} =	400	V		25	°C	dotted (blue)
V_{GE} =	15/0	V	T_j:	125	°C	solid (black)
R_{gon} =	8	Ω		150	°C	dashed (red)

figure 8. FWD

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

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



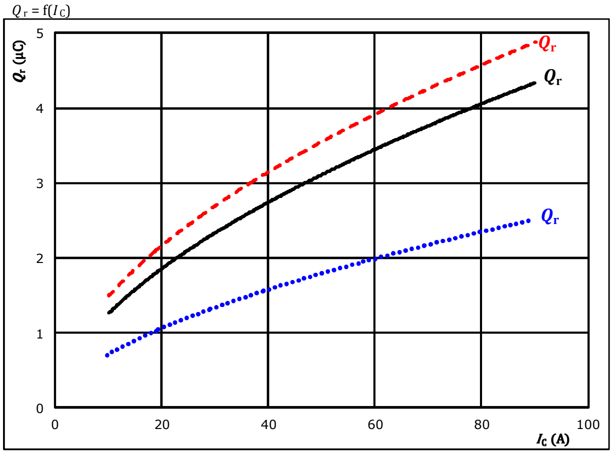
At						
V_{CE} =	400	V		25	°C	dotted (blue)
V_{GE} =	15/0	V	T_j:	125	°C	solid (black)
I_C =	50	A		150	°C	dashed (red)

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

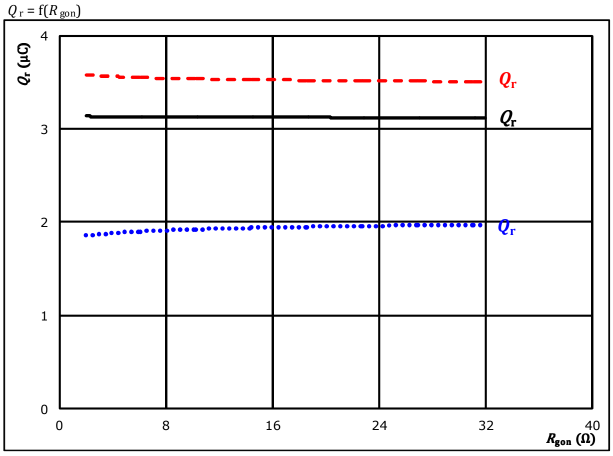


At	V_{CE} =	400	V		25 °C	············
	V_{GE} =	15/0	V	T_j:	125 °C	———
	R_{gon} =	8	Ω		150 °C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

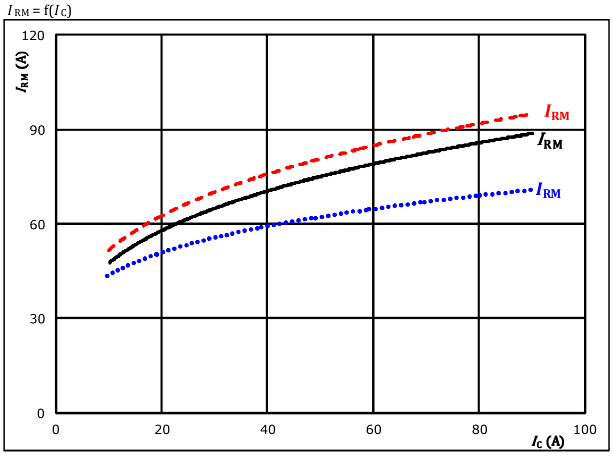


At	V_{CE}=	400	V		25 °C	············
	V_{GE} =	15/0	V	T_j:	125 °C	———
	I_C=	50	A		150 °C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

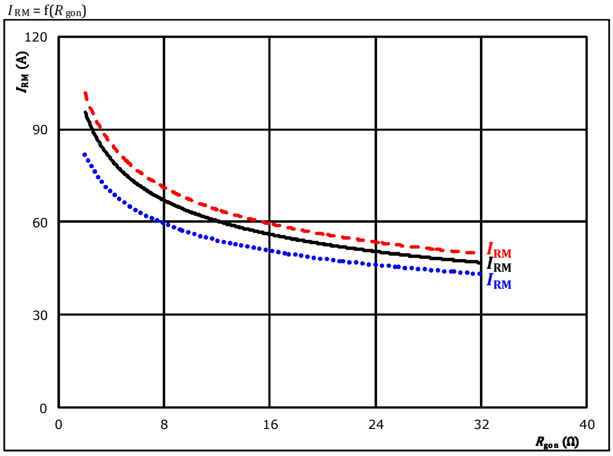


At	V_{CE}:	400	V		25 °C	············
	V_{GE} =	15/0	V	T_j:	125 °C	———
	R_{gon} =	8	Ω		150 °C	– – –

figure 12. **FWD**

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

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



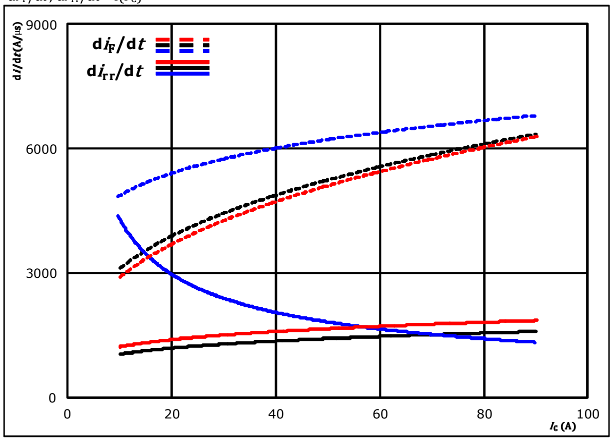
At	V_{CE} =	400	V		25 °C	············
	V_{GE} =	15/0	V	T_j:	125 °C	———
	I_C =	50	A		150 °C	– – –

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)

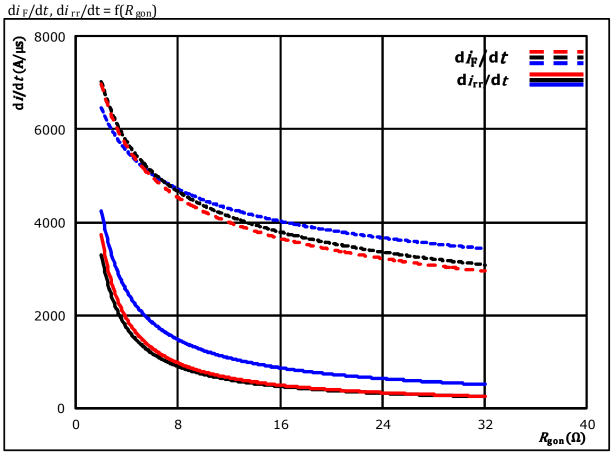


At						
V_{CE} =	400	V	T_j:	25	°C	··············
V_{GE} =	15/0	V		125	°C	———
R_{gon} =	8	Ω		150	°C	– – –

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})

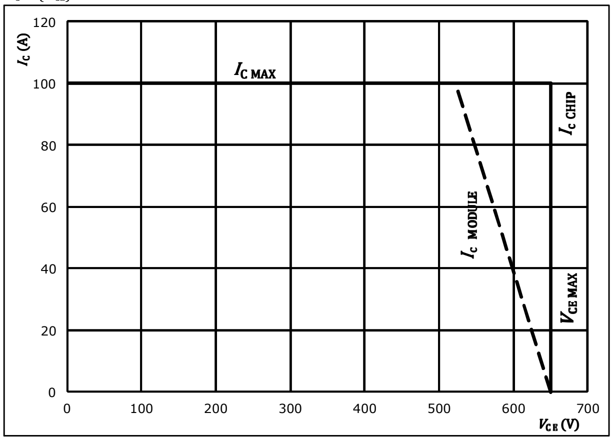


At						
V_{CE} =	400	V	T_j:	25	°C	··············
V_{GE} =	15/0	V		125	°C	———
I_C =	50	A		150	°C	– – –

figure 15. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At		
T_j =	175	°C
R_{gon} =	8	Ω
R_{goff} =	8	Ω

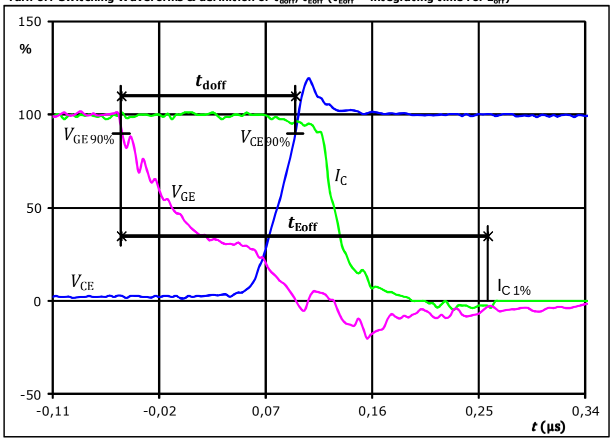
Buck Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

figure 1. IGBT

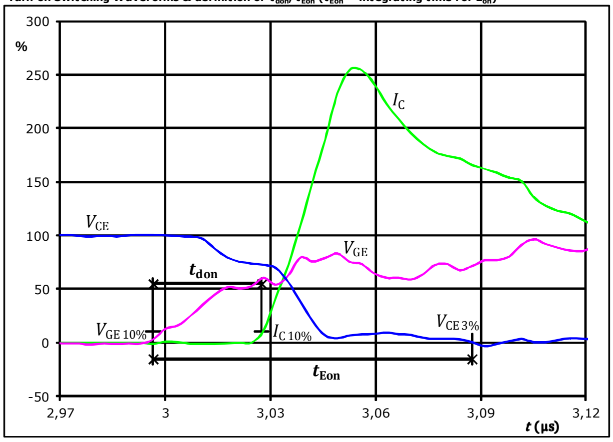
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	50	A
t_{doff} =	0,145	µs
t_{Eoff} =	0,309	µs

figure 2. IGBT

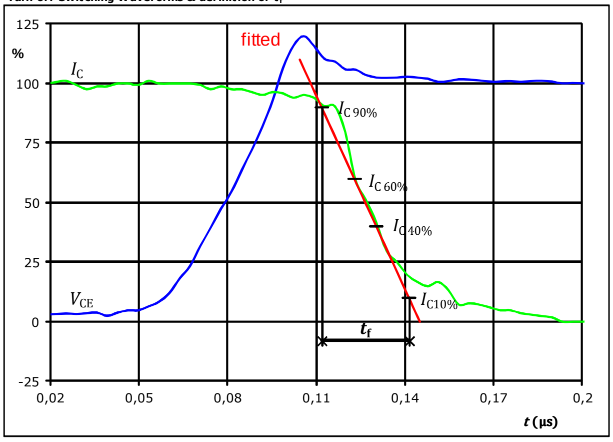
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	50	A
t_{don} =	0,032	µs
t_{Eon} =	0,091	µs

figure 3. IGBT

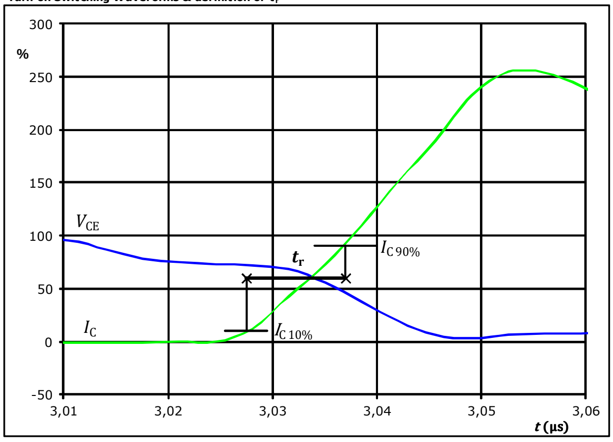
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	50	A
t_f =	0,025	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

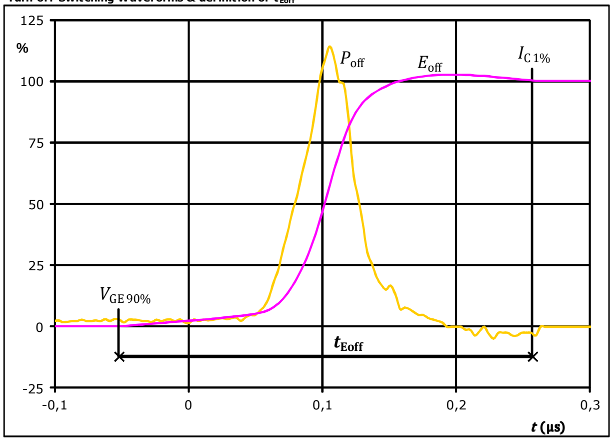


$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	50	A
t_r =	0,011	µs

Buck Switching Characteristics

figure 5.	IGBT

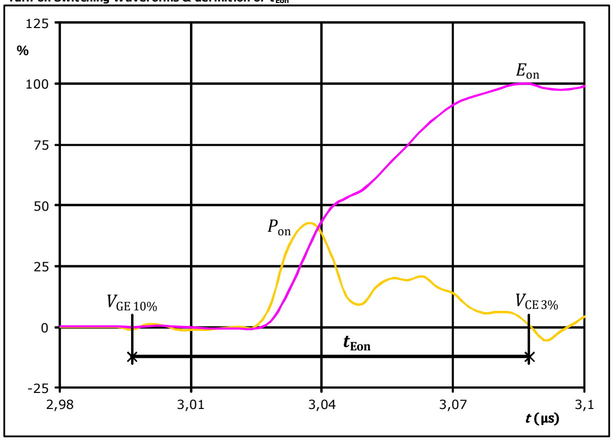
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	20,00	kW
E_{off} (100%) =	0,79	mJ
t_{Eoff} =	0,31	μs

figure 6.	IGBT

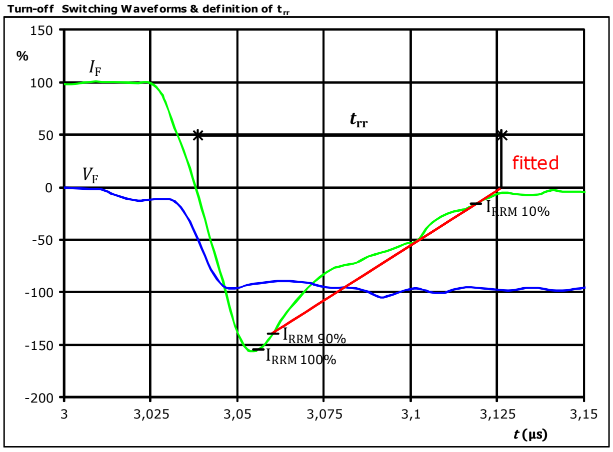
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	20,00	kW
E_{on} (100%) =	0,72	mJ
t_{Eon} =	0,09	μs

figure 7.	FWD

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

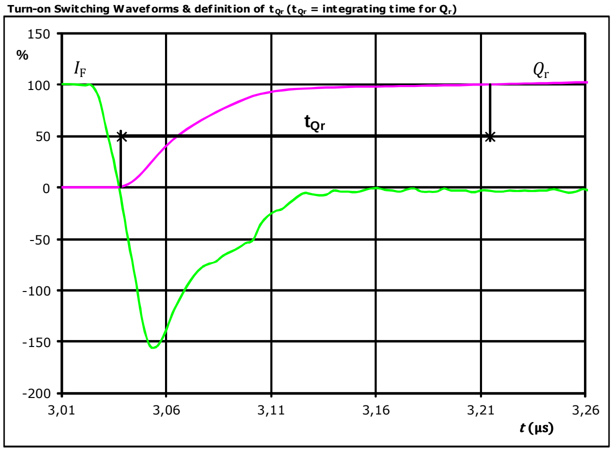


V_F (100%) =	400	V
I_F (100%) =	50	A
I_{RRM} (100%) =	-75	A
t_{rr} =	0,087	μs

Buck Switching Characteristics

figure 8. **FWD**

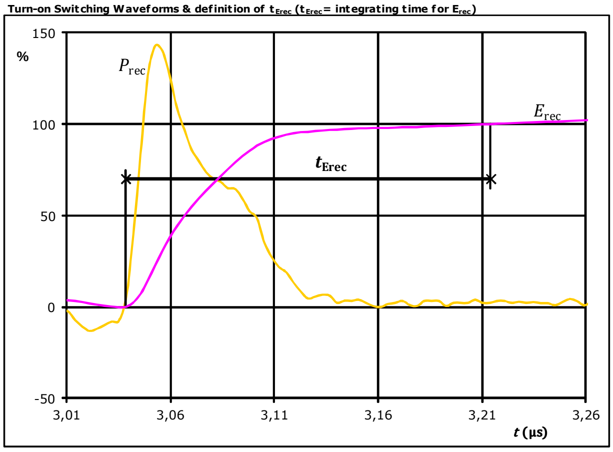
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	50	A
Q_r (100%) =	3,21	µC
t_{Qr} =	0,18	µs

figure 9. **FWD**

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



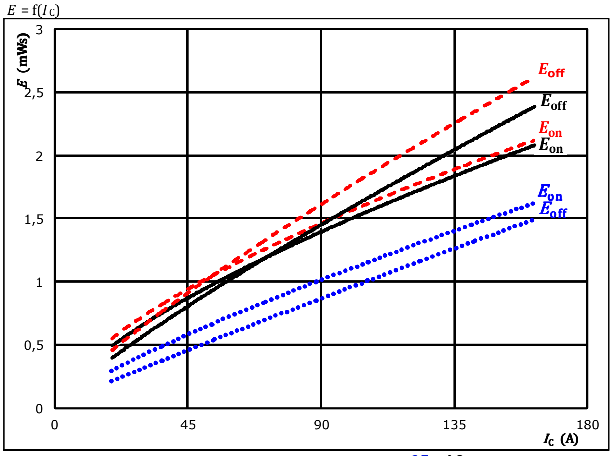
P_{rec} (100%) =	20,00	kW
E_{rec} (100%) =	1,08	mJ
t_{Erec} =	0,18	µs

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



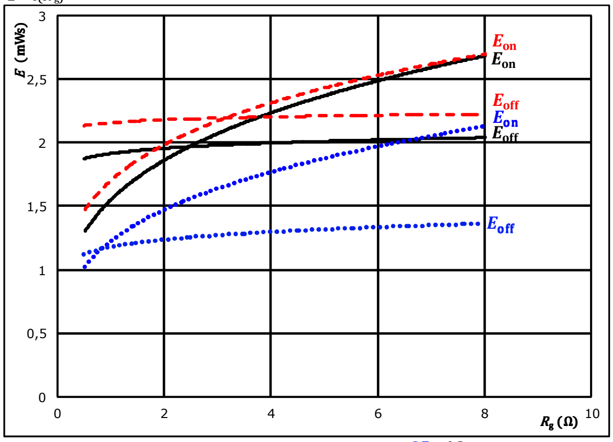
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C	•••••••••••••
V_{GE} =	15/0	V	125 °C	———
R_{gon} =	2	Ω	150 °C	– – – –
R_{goff} =	2	Ω		

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



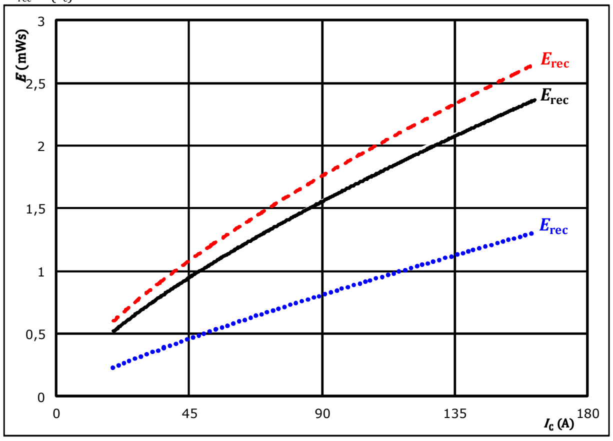
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C	•••••••••••••
V_{GE} =	15/0	V	125 °C	———
I_C =	127	A	150 °C	– – – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



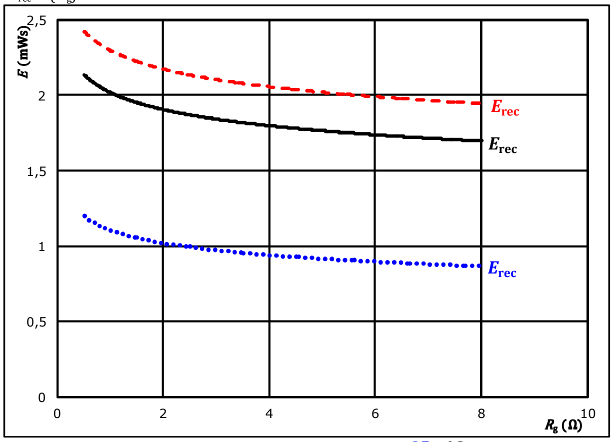
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C	•••••••••••••
V_{GE} =	15/0	V	125 °C	———
R_{gon} =	2	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

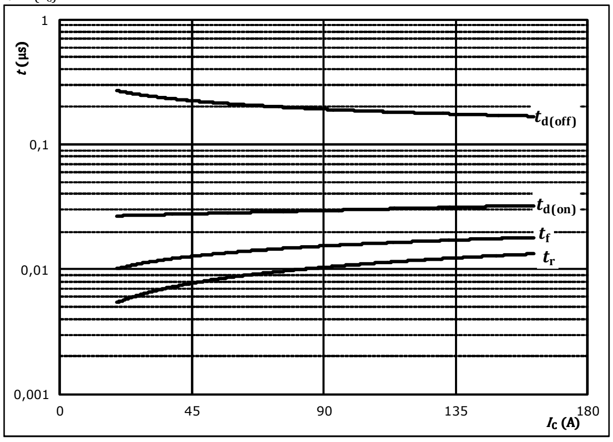
V_{CE} =	350	V	T_j: 25 °C	•••••••••••••
V_{GE} =	15/0	V	125 °C	———
I_C =	127	A	150 °C	– – – –

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



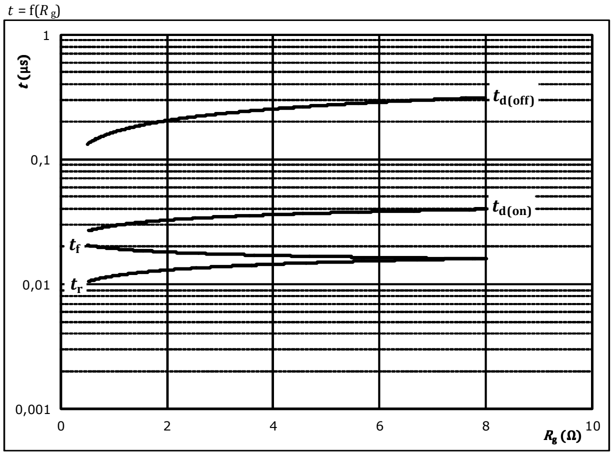
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	15/0	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



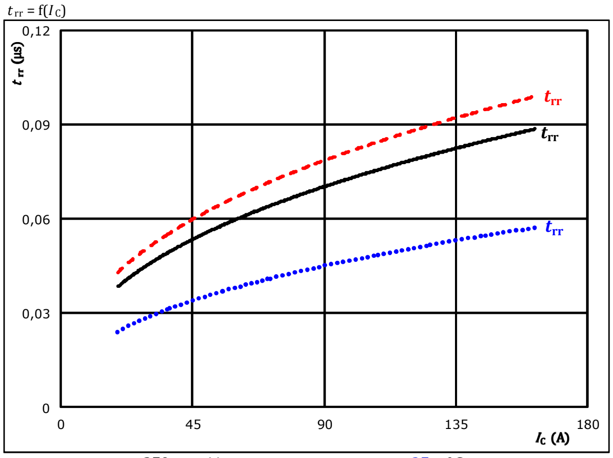
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	15/0	V
I_C =	127	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

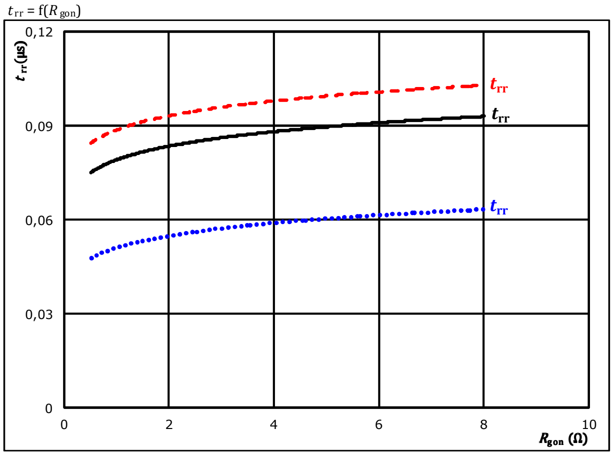


At						
V_{CE} =	350	V		25	°C	dotted (blue)
V_{GE} =	15/0	V	T_j:	125	°C	solid (black)
R_{gon} =	2	Ω		150	°C	dashed (red)

figure 8. **FWD**

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

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



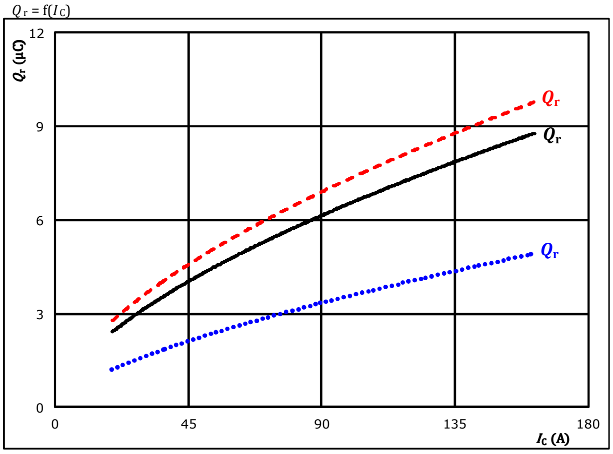
At						
V_{CE} =	350	V		25	°C	dotted (blue)
V_{GE} =	15/0	V	T_j:	125	°C	solid (black)
I_C =	127	A		150	°C	dashed (red)

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

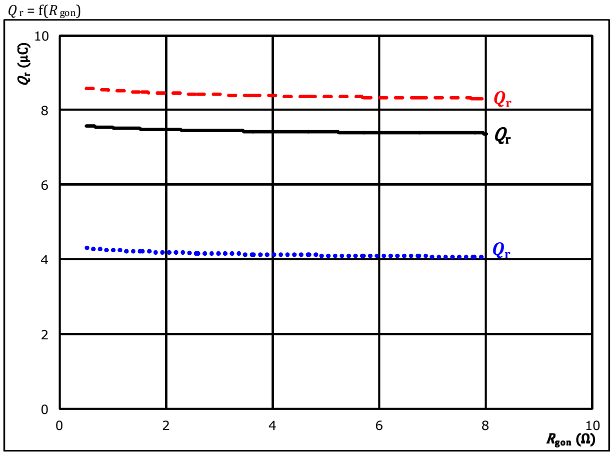


At					
V_{CE} =	350	V		25	°C
V_{GE} =	15/0	V	T_j:	125	°C
R_{gon} =	2	Ω		150	°C

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

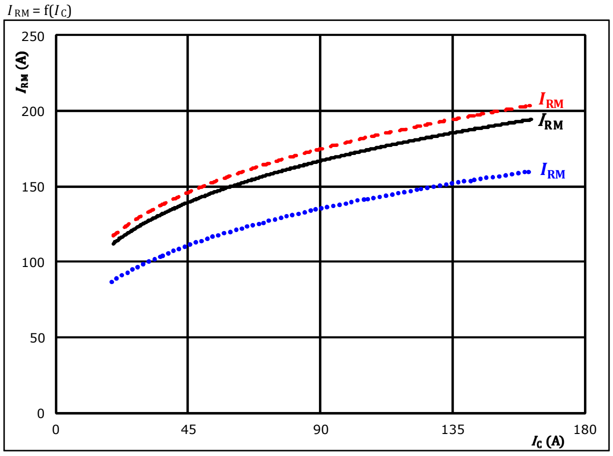


At					
V_{CE}=	350	V		25	°C
V_{GE} =	15/0	V	T_j:	125	°C
I_C=	127	A		150	°C

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

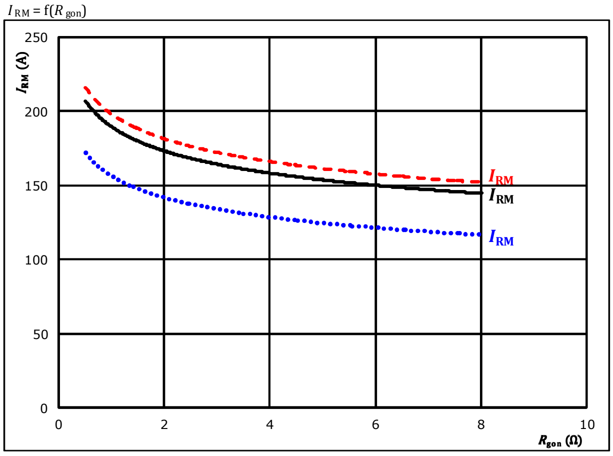


At					
V_{CE}:	350	V		25	°C
V_{GE} =	15/0	V	T_j:	125	°C
R_{gon} =	2	Ω		150	°C

figure 12. **FWD**

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

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



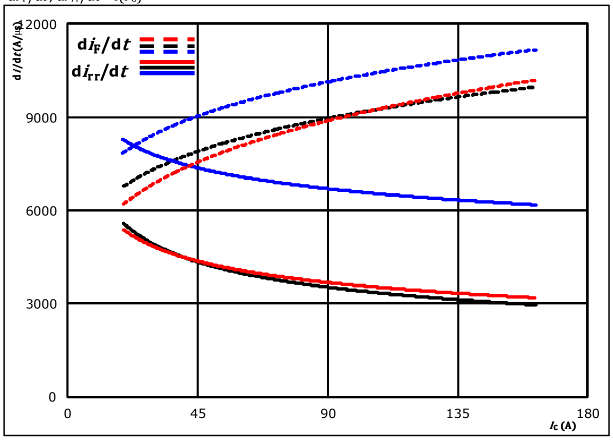
At					
V_{CE} =	350	V		25	°C
V_{GE} =	15/0	V	T_j:	125	°C
I_C =	127	A		150	°C

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)

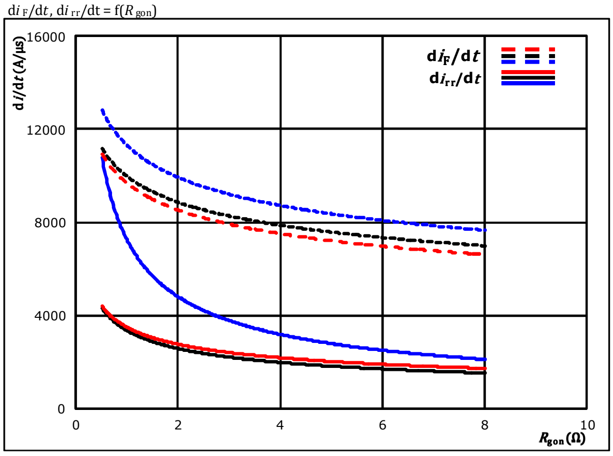


At						
V_{CE} =	350	V		25	°C	dotted
V_{GE} =	15/0	V	T_j:	125	°C	solid
R_{gon} =	2	Ω		150	°C	dashed

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})

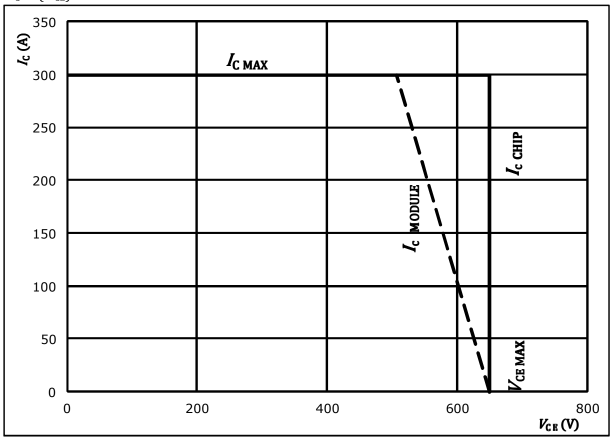


At						
V_{CE} =	350	V		25	°C	dotted
V_{GE} =	15/0	V	T_j:	125	°C	solid
I_C =	127	A		150	°C	dashed

figure 15. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

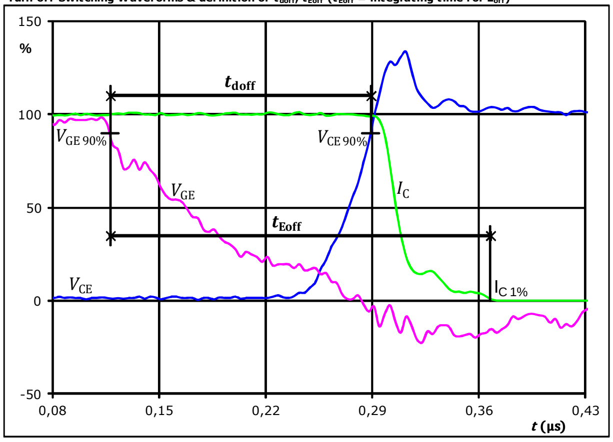
T_j =	175	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Boost Switching Definitions

General conditions		
T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. **IGBT**

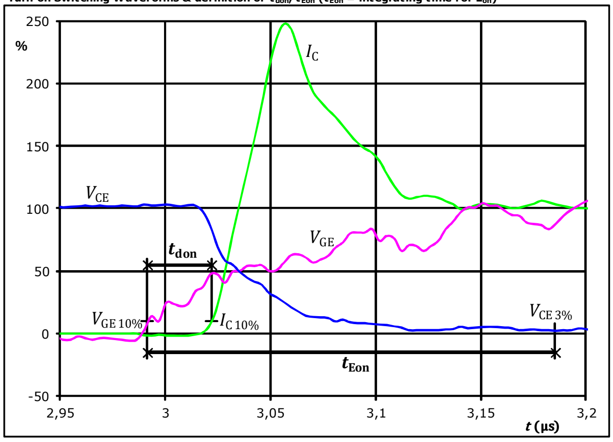
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_{doff} =	0,172	µs
t_{Eoff} =	0,249	µs

figure 2. **IGBT**

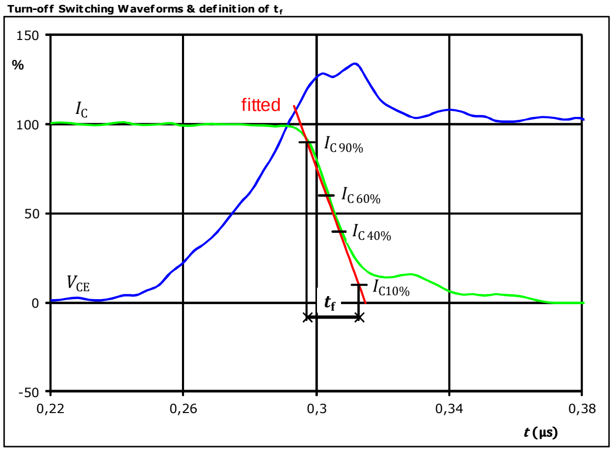
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_{don} =	0,032	µs
t_{Eon} =	0,194	µs

figure 3. **IGBT**

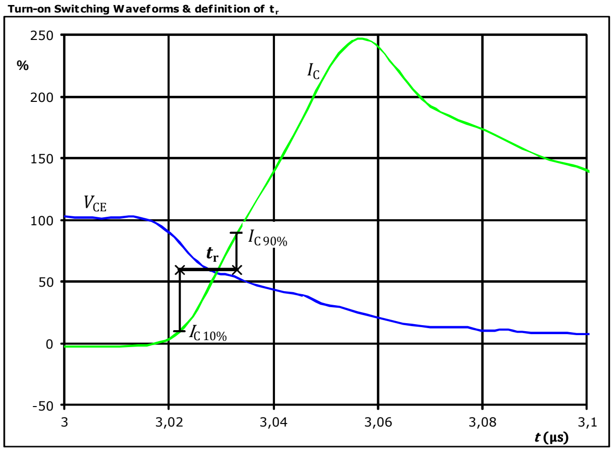
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_f =	0,016	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

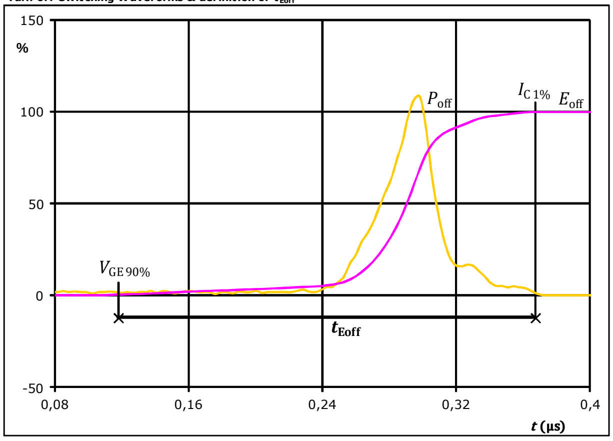


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_r =	0,012	µs

Boost Switching Characteristics

figure 5. **IGBT**

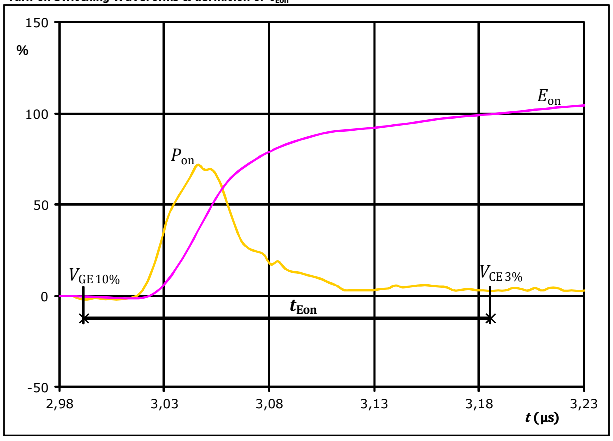
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	44,24	kW
E_{off} (100%) =	1,92	mJ
t_{Eoff} =	0,25	µs

figure 6. **IGBT**

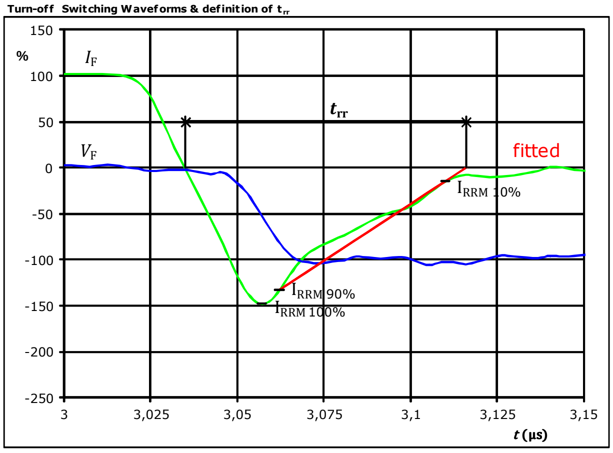
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	44,24	kW
E_{on} (100%) =	1,78	mJ
t_{Eon} =	0,19	µs

figure 7. **FWD**

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

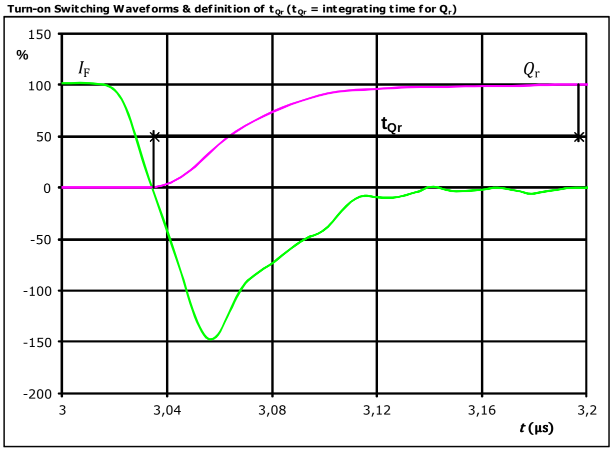


V_F (100%) =	350	V
I_F (100%) =	126	A
I_{RRM} (100%) =	-186	A
t_{rr} =	0,081	µs

Boost Switching Characteristics

figure 8.	FWD

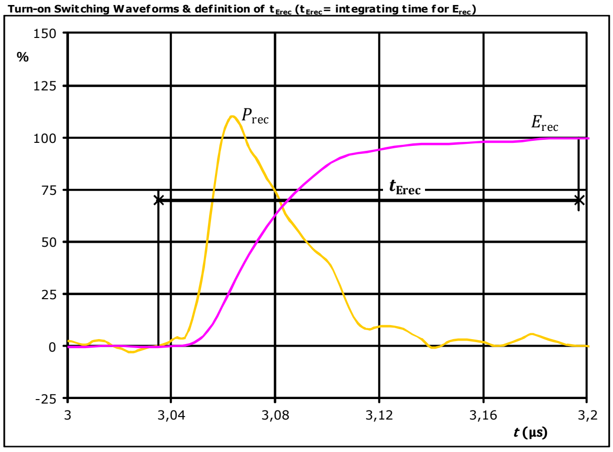
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	126	A
Q_r (100%) =	7,61	µC
t_{Qr} =	0,16	µs

figure 9.	FWD

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

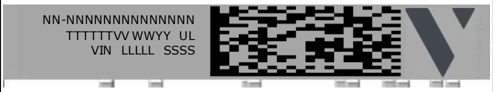


P_{rec} (100%) =	44,24	kW
E_{rec} (100%) =	2,01	mJ
t_{Erec} =	0,16	µs

Vincotech

Ordering Code & Marking

Version	Ordering Code
without thermal paste 12 mm housing with press-fit pins	10-PY07BBA150S5-M735L58Y
with thermal paste 12 mm housing with press-fit pins	10-PY07BBA150S5-M735L58Y-/3/

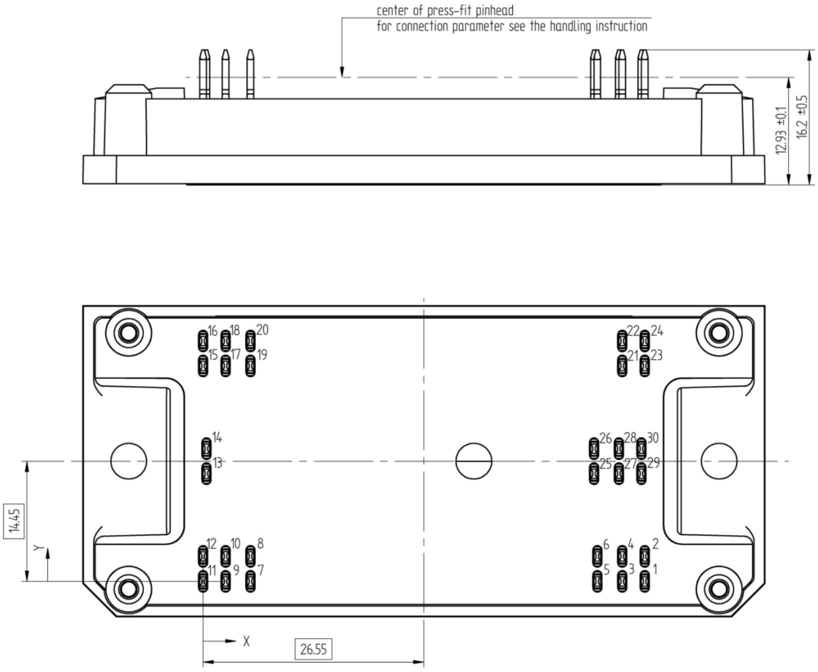


	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

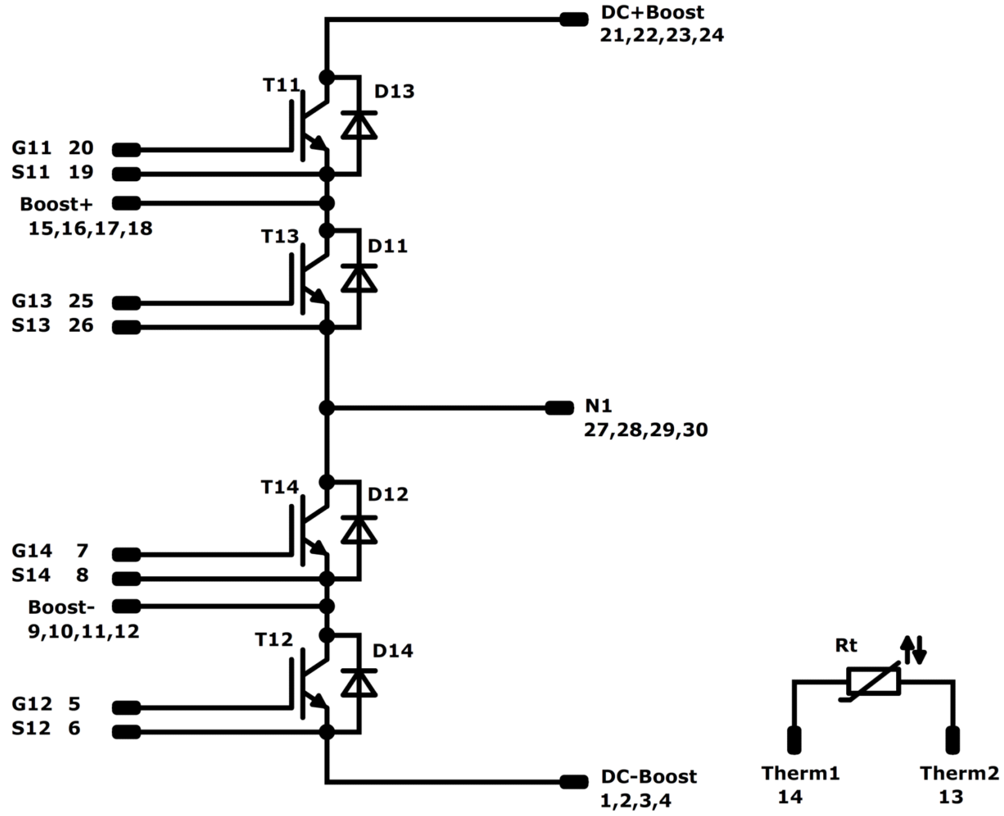
Pin table

Pin	X	Y	Function
1	53,1	0	DC-Boost
2	53,1	3	DC-Boost
3	50,4	0	DC-Boost
4	50,4	3	DC-Boost
5	47,4	0	G12
6	47,4	3	S12
7	5,7	0	G14
8	5,7	3	S14
9	2,7	0	Boost-
10	2,7	3	Boost-
11	0	0	Boost-
12	0	3	Boost-
13	0,4	12,95	Therm2
14	0,4	15,95	Therm1
15	0	25,9	Boost+
16	0	28,9	Boost+
17	2,7	25,9	Boost+
18	2,7	28,9	Boost+
19	5,7	25,9	S11
20	5,7	28,9	G11
21	50,4	25,9	DC+Boost
22	50,4	28,9	DC+Boost
23	53,1	25,9	DC+Boost
24	53,1	28,9	DC+Boost
25	47	12,95	G13
26	47	15,95	S13
27	50	12,95	N1
28	50	15,95	N1
29	52,7	12,95	N1
30	52,7	15,95	N1



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	IGBT	650 V	50 A	Buck Switch	
D11, D12	FWD	650 V	40 A	Buck Diode	
T13, T14	IGBT	650 V	150 A	Boost Switch	
D13, D14	FWD	650 V	100 A	Boost Diode	
Rt	NTC			Thermistor	

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

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 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-PY07BBA150S5-M735L58Y-D2-14	03 Nov. 2017	Header change	1