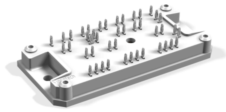
***flow* 3xNPC 1** **650 V / 30 A**

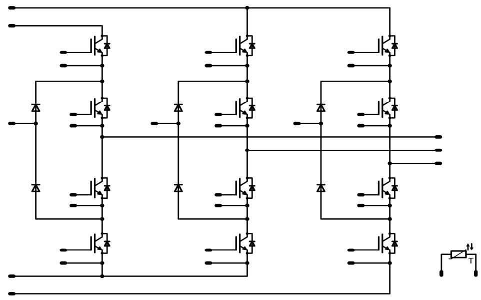
Features
- Neutral-point-Clamped inverter
- Ultra fast switching
- Low Inductance layout
- Very compact design
- Press-fit pins

flow 1 housing



Target Applications
- Solar inverters
- UPS
- SMPS

Schematic



Types
- 10-PY07N3A030SM-M894F08Y

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck IGBT					
Collector-emitter break down voltage	V_{CES}			650	V
DC collector current	I_C	$T_j=T_j$max	T_h=80°C	32	A
Pulsed collector current	I_{CRM}	t_p limited by $T_j$max		90	A
Turn off safe operating area		T_j≤175°C $V_{CE}<=V_{CES}$		90	A
Power dissipation	P_{tot}	$T_j=T_j$max	T_h=80°C	67	W
Gate-emitter peak voltage	V_{GE}			±20	V
Maximum Junction Temperature	T_{jmax}			175	°C
Buck FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
Forward average current	I_{FAV}	$T_j=T_j$max	T_h=80°C	23	A
Surge forward current	I_{FSM}	t_p=10ms		300	A
Power dissipation	P_{tot}	$T_j=T_j$max	T_h=80°C	40	W
Maximum Junction Temperature	T_{jmax}			150	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost IGBT					
Collector-emitter break down voltage	V_{CES}			650	V
DC collector current	I_C	$T_j=T_jmax$	T_h=80°C	30	A
Pulsed collector current	I_{CRM}	t_p limited by T_jmax		90	A
Turn off safe operating area		T_j≤150°C $V_{CE}<=V_{CES}$		90	A
Power dissipation	P_{tot}	$T_j=T_jmax$	T_h=80°C	57	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤150°C V_{GE}=15V		5 400	μs V
Maximum Junction Temperature	T_{jmax}			175	°C
Boost Inverse Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Forward average current	I_{FAV}	$T_j=T_jmax$	T_h=80°C	24	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_jmax		40	A
Power dissipation	P_{tot}	$T_j=T_jmax$	T_h=80°C	40	W
Maximum Junction Temperature	T_{jmax}			175	°C
Boost FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Forward average current	I_{FAV}	$T_j=T_jmax$	T_h=80°C	24	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_jmax		40	A
Power dissipation	P_{tot}	$T_j=T_jmax$	T_h=80°C	40	W
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{op}		-40…+(Tjmax - 25)	°C
Insulation Properties				
Insulation voltage		t=2s DC voltage	4000	V
Creepage distance			min 12,7	mm
Clearance			min 12,7	mm

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
Buck IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0003	Tj=25°C Tj=125°C	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	Tj=25°C Tj=125°C		1,63 1,86	2,22	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	650		Tj=25°C Tj=125°C			0,04	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25°C Tj=125°C			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	Rgoff=16 Ω Rgon=16 Ω	±15	350	30	Tj=25°C Tj=125°C		70 70		ns
Rise time	t_r					Tj=25°C Tj=125°C		8 9		
Turn-off delay time	$t_{d(off)}$					Tj=25°C Tj=125°C		68 81		
Fall time	t_f					Tj=25°C Tj=125°C		8 12		
Turn-on energy loss	E_{on}					Tj=25°C Tj=125°C		0,332 0,489		mWs
Turn-off energy loss	E_{off}					Tj=25°C Tj=125°C		0,147 0,224		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25°C		2100		pF
Output capacitance	C_{oss}							45		
Reverse transfer capacitance	C_{rss}							7,7		
Gate charge	Q_G		±15	520	30	Tj=25°C		70		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Phase-Change Material ʎ=3,4W/mK						1,42		K/W
Buck FWD										
Diode forward voltage	V_F				30	Tj=25°C Tj=125°C		2,33 2,01	2,8	V
Reverse leakage current	I_r			600		Tj=25°C Tj=125°C			100	μA
Peak reverse recovery current	I_{RRM}	Rgon=16 Ω	±15	350	30	Tj=25°C Tj=125°C		32 45		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		23 33		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		0,402 0,929		μC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					Tj=25°C Tj=125°C		3386 4125		A/μs
Reverse recovered energy	E_{rec}					Tj=25°C Tj=125°C		0,045 0,112		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Phase-Change Material ʎ=3,4W/mK						1,76		K/W

Characteristic Values

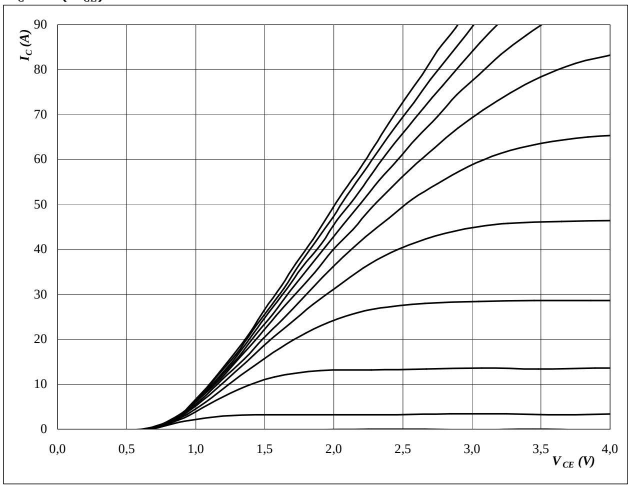
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
Boost IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,00043	Tj=25°C Tj=125°C	5,1	5,8	6,4	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	Tj=25°C Tj=125°C	1,03	1,63 1,75	1,87	V
Collector-emitter cut-off incl diode	I_{CES}		0	650		Tj=25°C Tj=125°C			0,0016	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25°C Tj=125°C			300	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	Rgoff=16 Ω Rgon=16 Ω	±15	350	50	Tj=25°C Tj=125°C		101 100		ns
Rise time	t_r					Tj=25°C Tj=125°C		23 26		
Turn-off delay time	$t_{d(off)}$					Tj=25°C Tj=125°C		143 160		
Fall time	t_f					Tj=25°C Tj=125°C		57 90		
Turn-on energy loss	E_{on}					Tj=25°C Tj=125°C		0,529 0,665		mWs
Turn-off energy loss	E_{off}					Tj=25°C Tj=125°C		0,729 0,979		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25°C		1630		pF
Output capacitance	C_{oss}							108		
Reverse transfer capacitance	C_{rss}							50		
Gate charge	Q_G		15	480	30	Tj=25°C		167		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						1,67		K/W
Boost Inverse Diode										
Diode forward voltage	V_F				20	Tj=25°C Tj=125°C	1,23	1,70 1,58	1,87	V
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						2,37		K/W
Boost FWD										
Diode forward voltage	V_F				30	Tj=25°C Tj=125°C	1,23	1,69 1,55	1,87	V
Reverse leakage current	I_r			650		Tj=25°C Tj=125°C			0,24	μA
Peak reverse recovery current	I_{RRM}	Rgon=16 Ω	±15	350	50	Tj=25°C Tj=125°C		17 21		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		231 297		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		1,20 2,22		μC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					Tj=25°C Tj=125°C		2062 74		A/μs
Reverse recovery energy	E_{rec}					Tj=25°C Tj=125°C		0,319 0,609		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						2,37		K/W
Thermistor										
Rated resistance	R					Tj=25°C		21511		Ω
Deviation of R100	$\Delta_{R/R}$	R100=1486 Ω				Tj=100°C	-4,5		+4,5	%
Power dissipation	P					Tj=25°C		210		mW
Power dissipation constant						Tj=25°C		3,5		mW/K
B-value	B(25/50)					Tj=25°C		3884		K
B-value	B(25/100)					Tj=25°C		3964		K
Vincotech NTC Reference									F	

Buck

Figure 1 IGBT

Typical output characteristics

I_C = f(V_{CE})



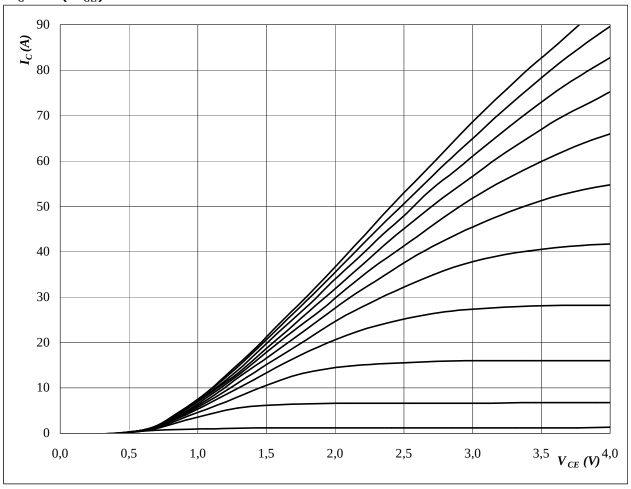
At

t_p =	250	µs
T_j =	25	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

Figure 2 IGBT

Typical output characteristics

I_C = f(V_{CE})



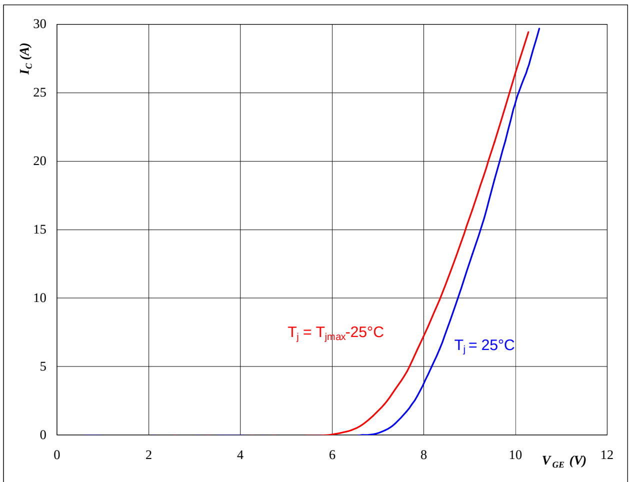
At

t_p =	250	µs
T_j =	125	°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})



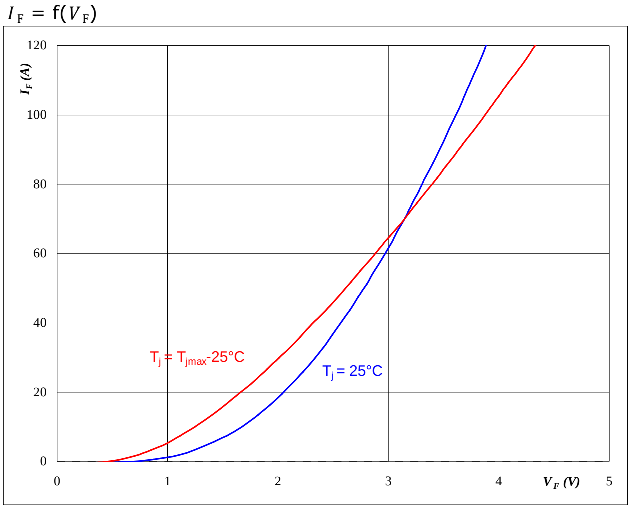
At

t_p =	250	µs
V_{CE} =	10	V

Figure 4 FWD

Typical diode forward current as a function of forward voltage

I_F = f(V_F)



At

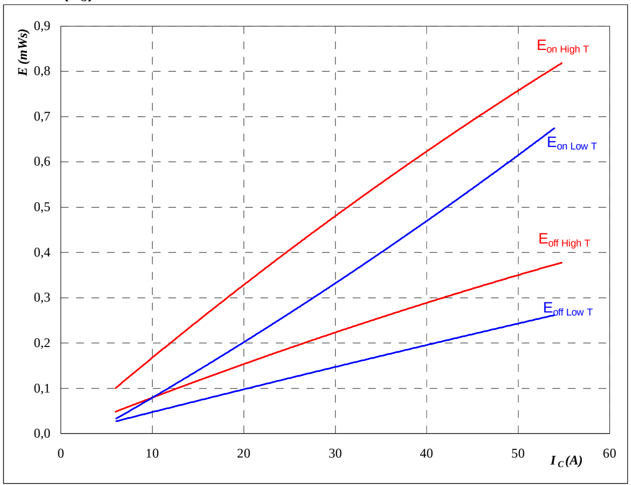
t_p =	250	µs

Buck

Figure 5 IGBT

Typical switching energy losses
as a function of collector current

$E = f(I_C)$



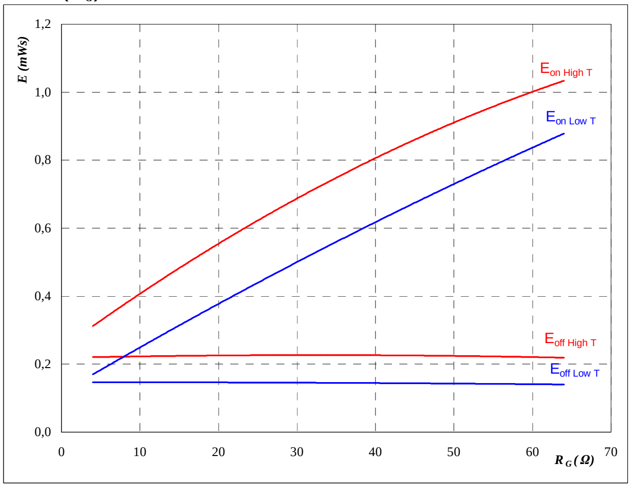
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 6 IGBT

Typical switching energy losses
as a function of gate resistor

$E = f(R_G)$



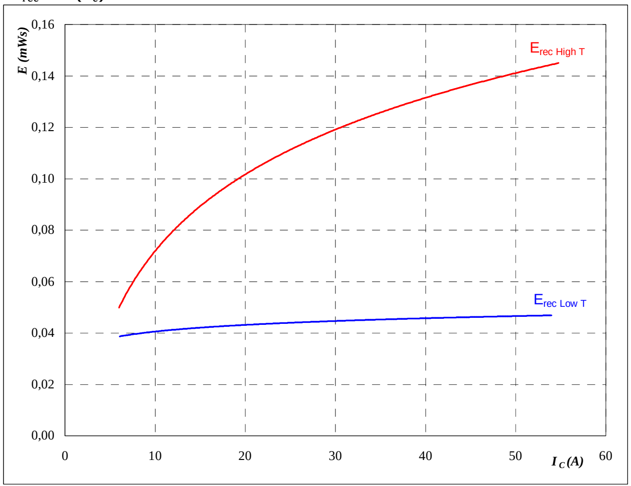
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

Figure 7 FWD

Typical reverse recovery energy loss
as a function of collector current

$E_{rec} = f(I_c)$



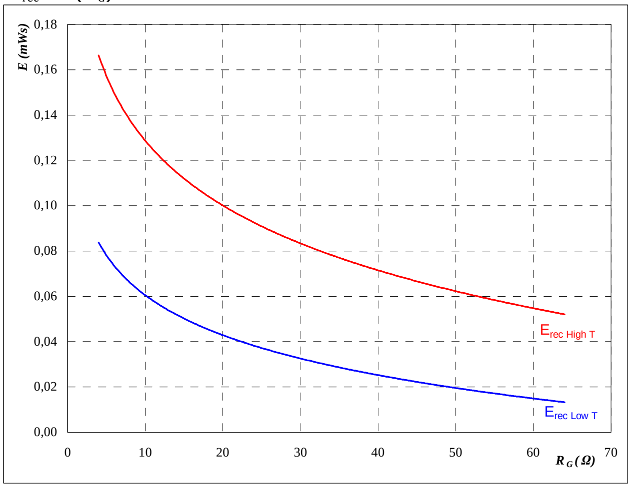
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 8 FWD

Typical reverse recovery energy loss
as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

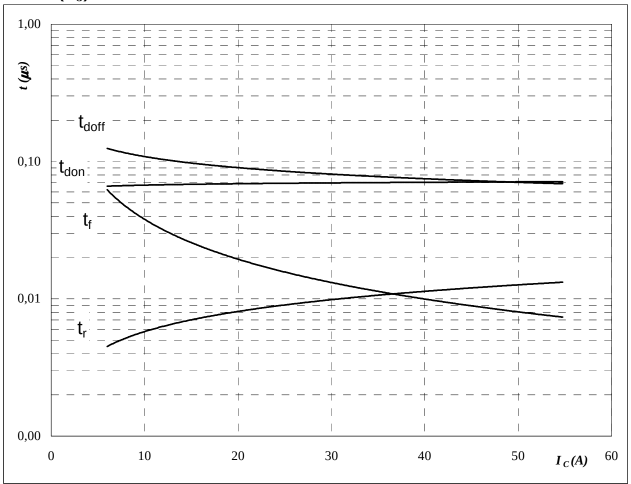
T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

Buck

Figure 9	IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



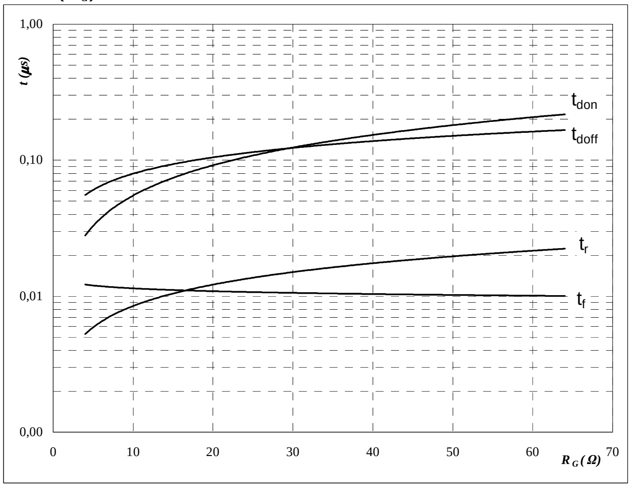
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 10	IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



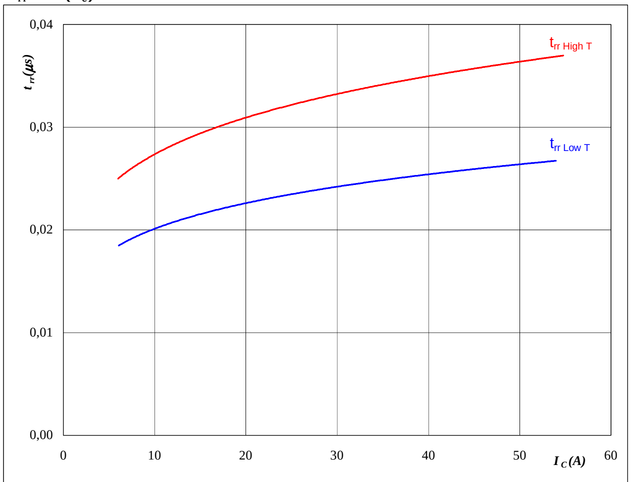
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

Figure 11	FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_c)$



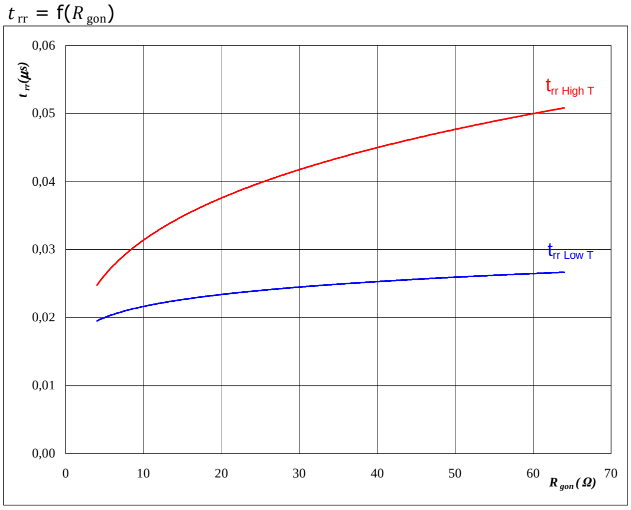
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 12	FWD

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

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



At

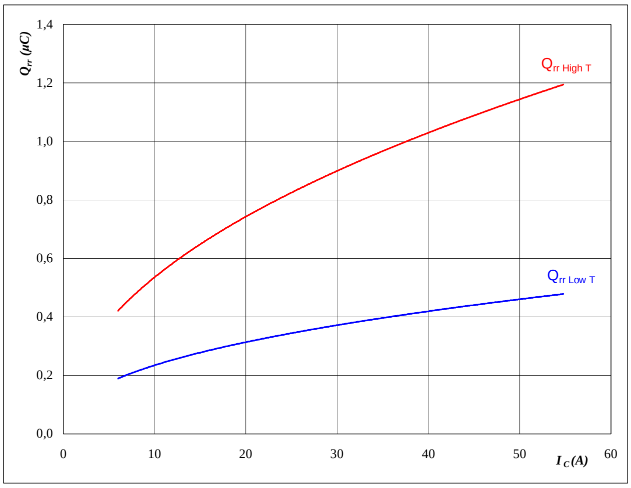
T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Buck

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



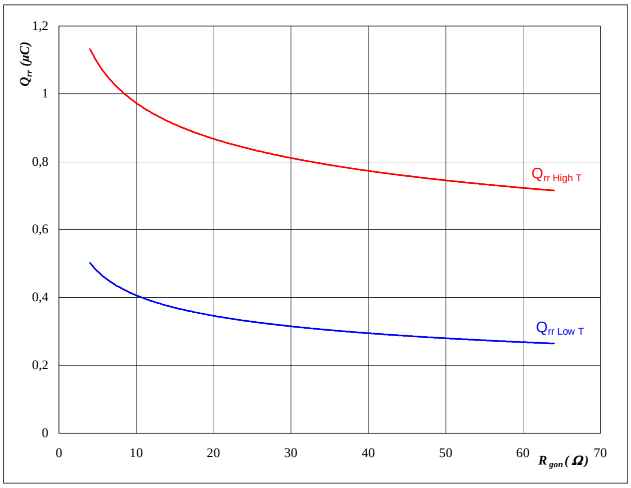
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 14 FWD

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

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



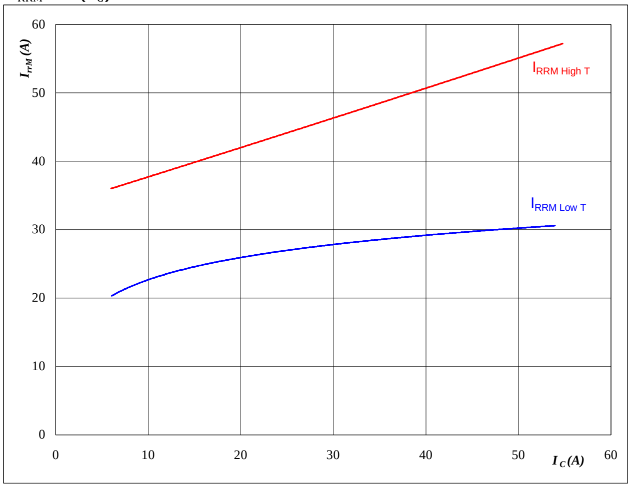
At

T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



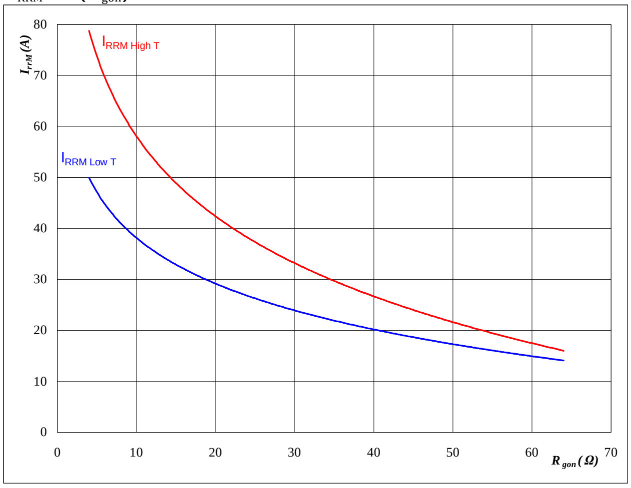
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 16 FWD

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

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



At

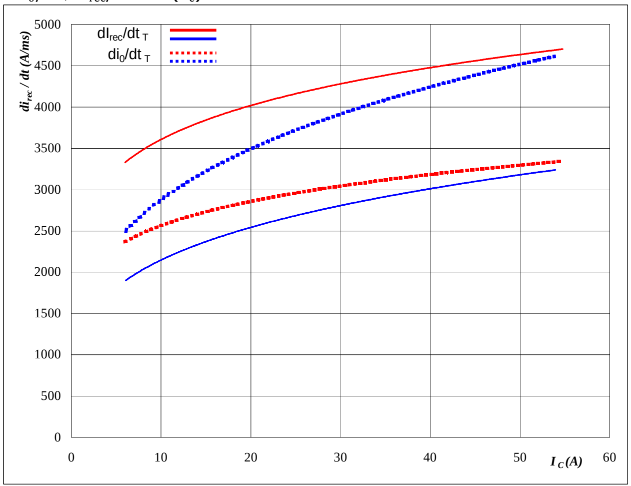
T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Buck

Figure 17 FWD

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

$dI_0/dt, dI_{rec}/dt = f(I_c)$



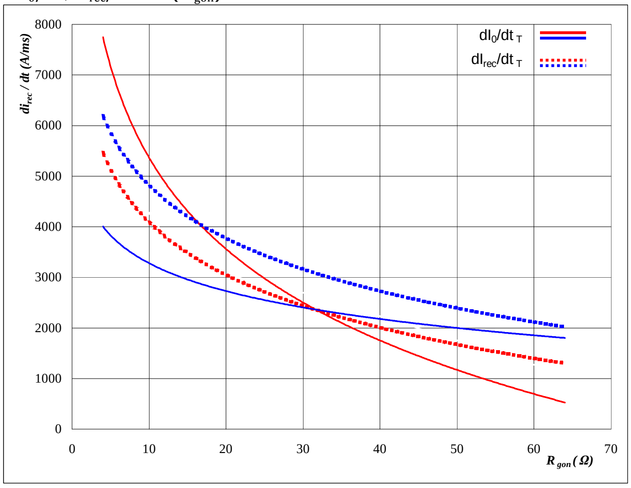
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 18 FWD

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

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



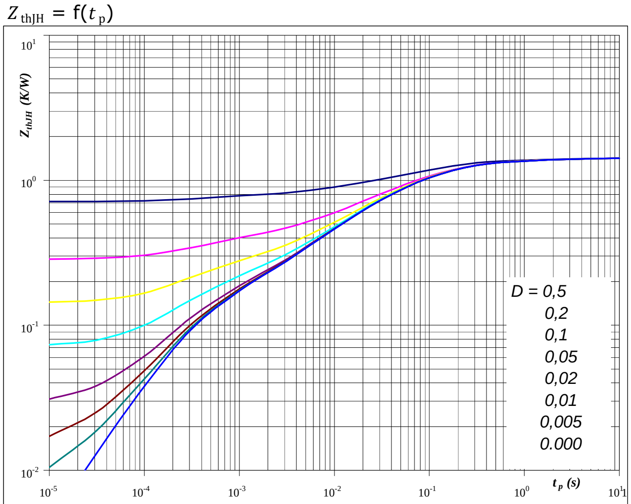
At

T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Figure 19 IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	1,42	K/W

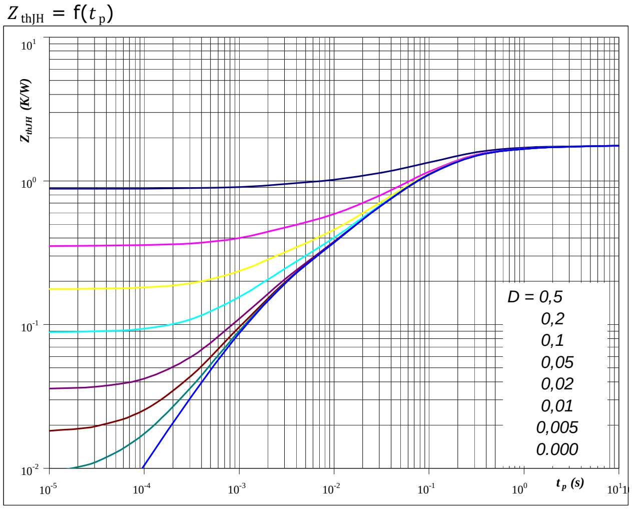
IGBT thermal model values

R (K/W)	Tau (s)
0,05	4,0E+00
0,18	5,0E-01
0,59	8,7E-02
0,36	1,8E-02
0,13	3,3E-03
0,12	3,2E-04

Figure 20 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	1,76	K/W

FWD thermal model values

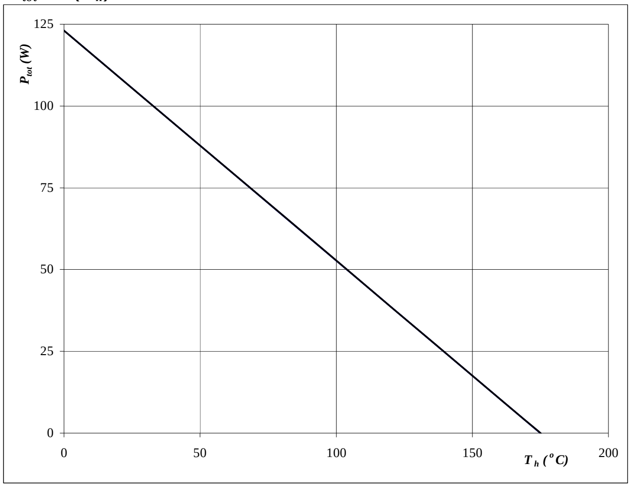
R (K/W)	Tau (s)
0,06	4,8E+00
0,17	7,6E-01
0,70	1,6E-01
0,53	5,1E-02
0,19	1,1E-02
0,12	1,6E-03

Buck

Figure 21 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



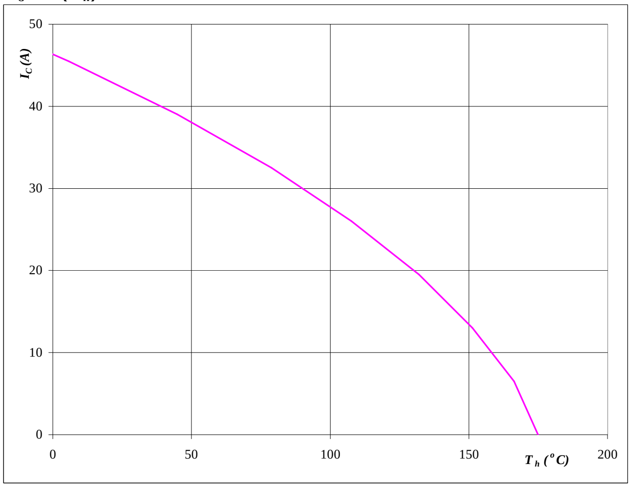
At

T_j = 175 °C

Figure 22 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

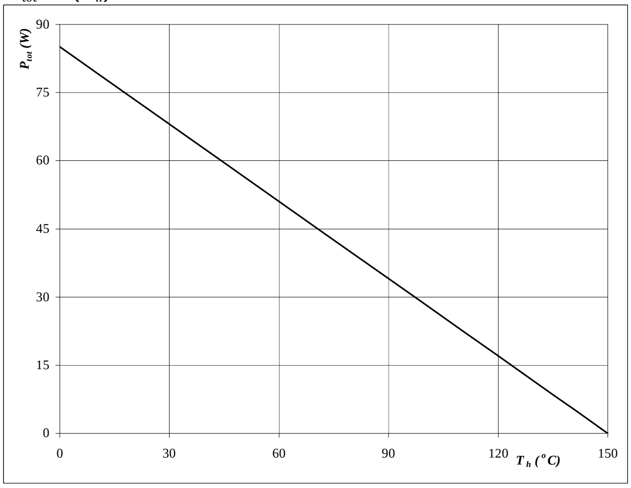
T_j = 175 °C

V_{GE} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



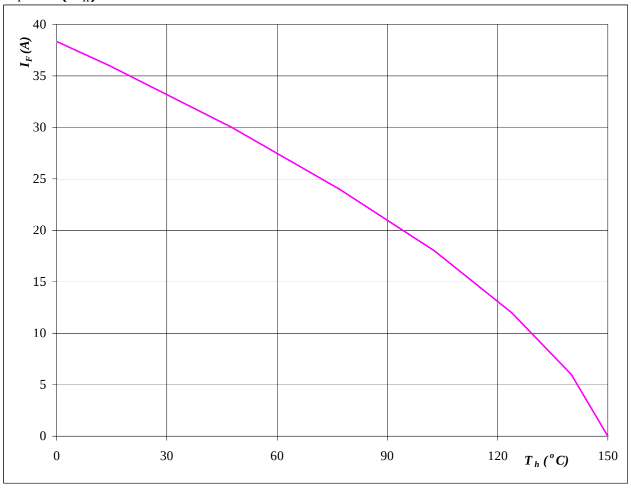
At

T_j = 150 °C

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

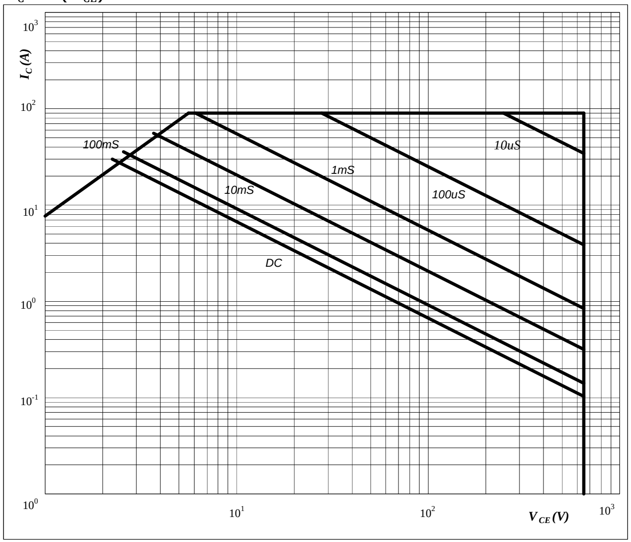
T_j = 150 °C

Buck

Figure 25 IGBT

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



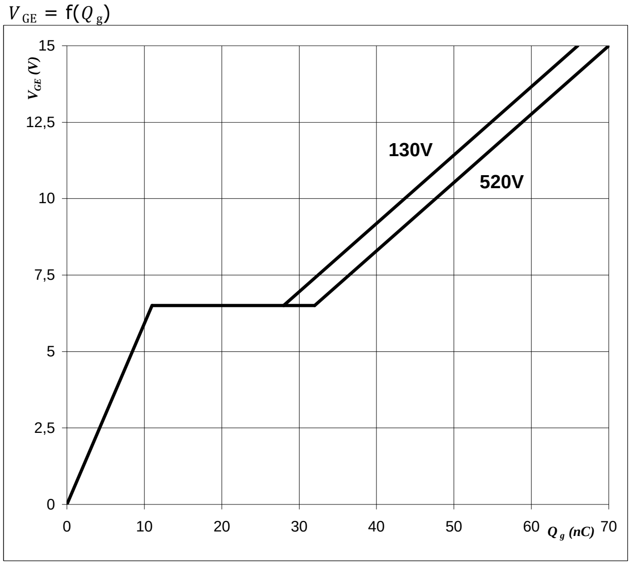
At

D = single pulse
T_h = 80 °C
V_{GE} = ±15 V
T_j = T_{jmax} °C

Figure 26 IGBT

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



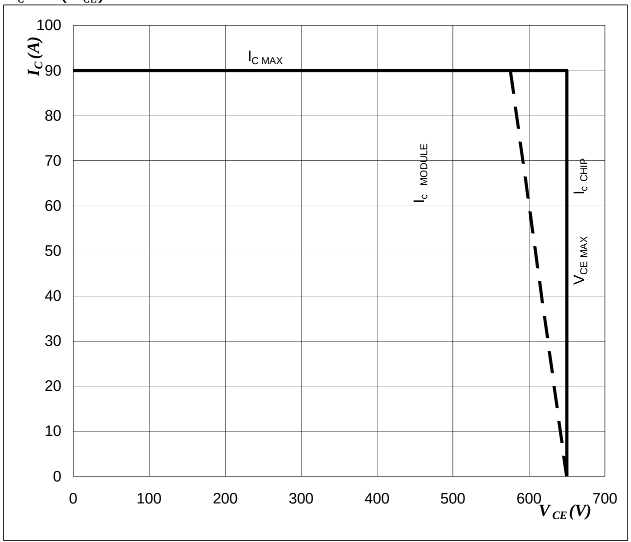
At

I_C = 30 A

Figure 27 IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

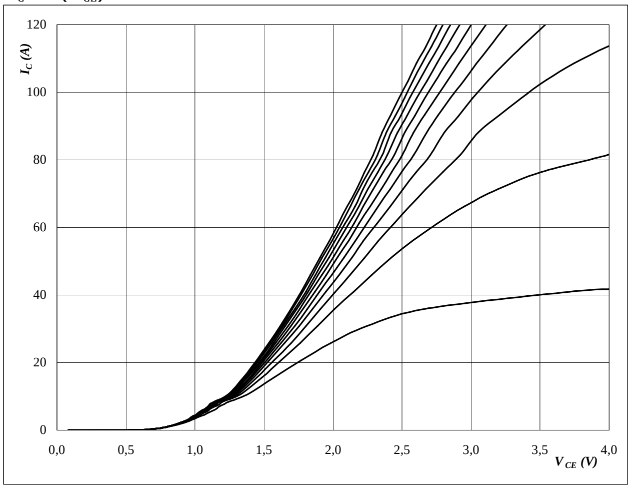
T_j = 125 °C
R_{gon} = 16 Ω
R_{goff} = 16 Ω

Boost

Figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



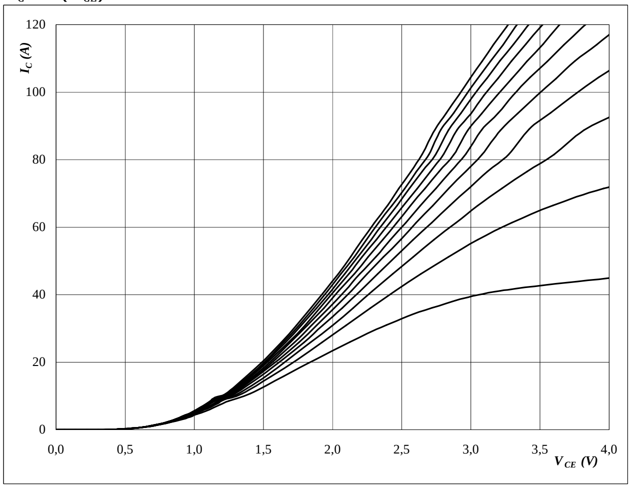
At

t_p =	250	µs
T_j =	25	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

Figure 2 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



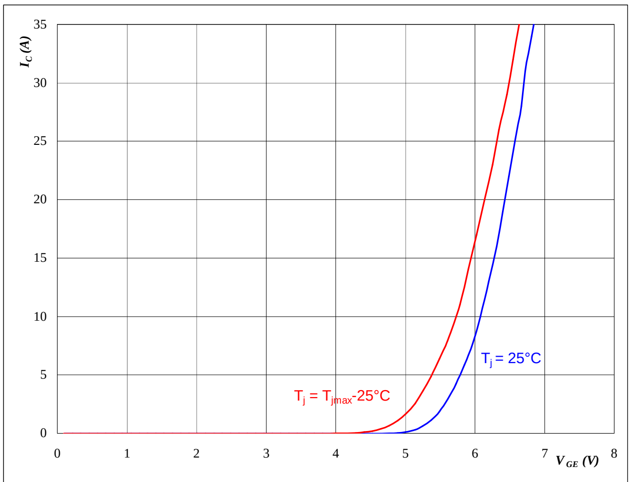
At

t_p =	250	µs
T_j =	125	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

Figure 3 IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



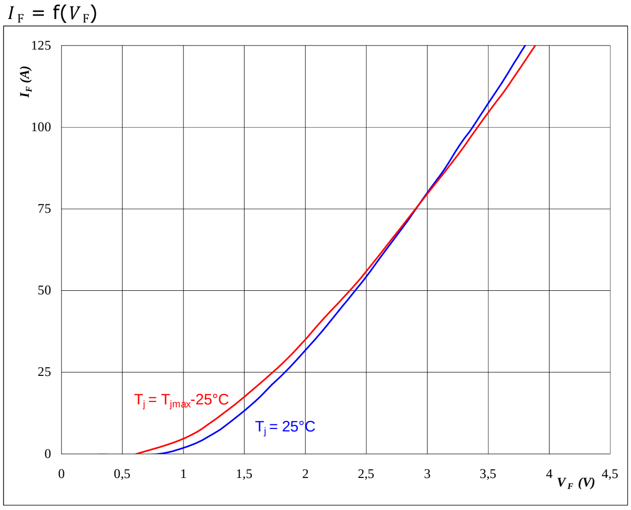
At

t_p =	250	µs
V_{CE} =	10	V

Figure 4 FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

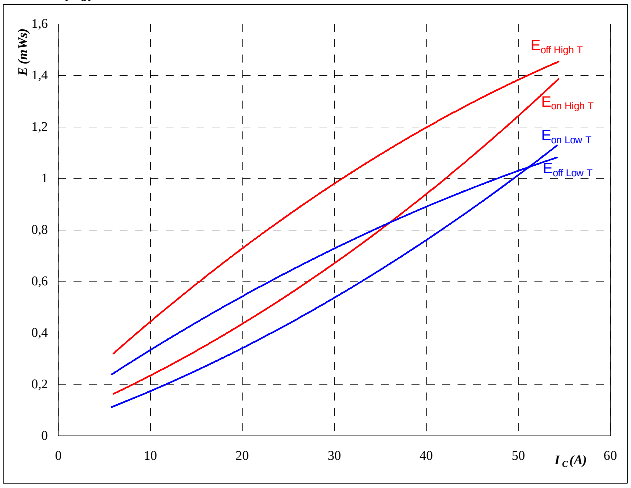
t_p =	250	µs

Boost

Figure 5 IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



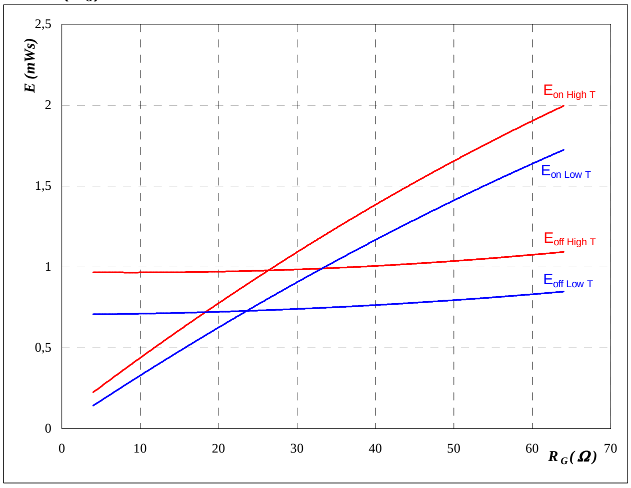
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 6 IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



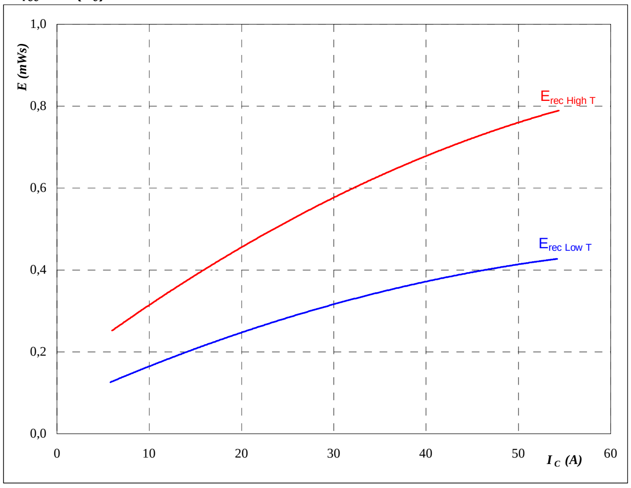
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

Figure 7 FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_c)$



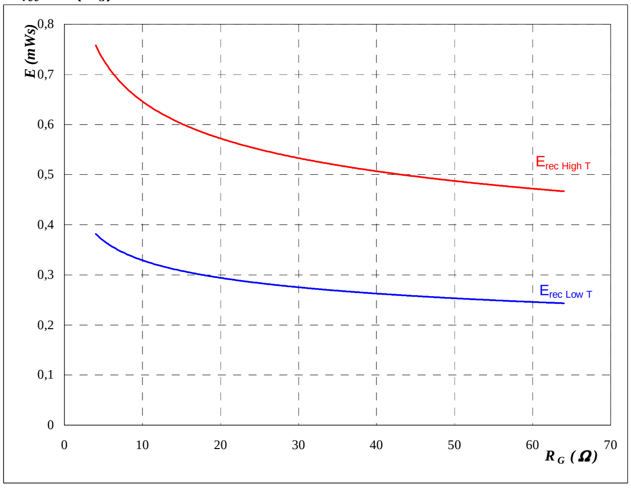
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 8 FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

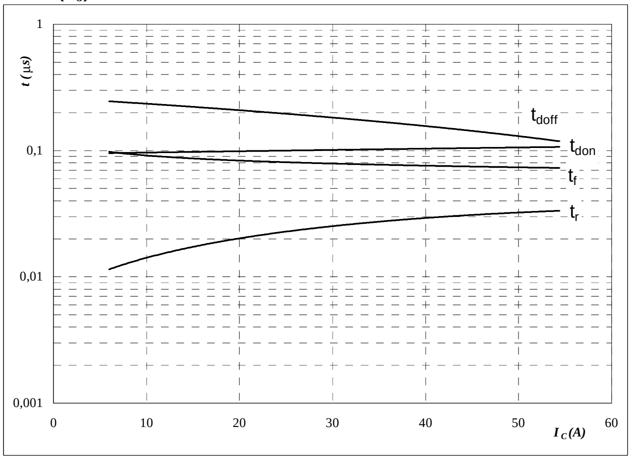
T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

Boost

Figure 9 IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



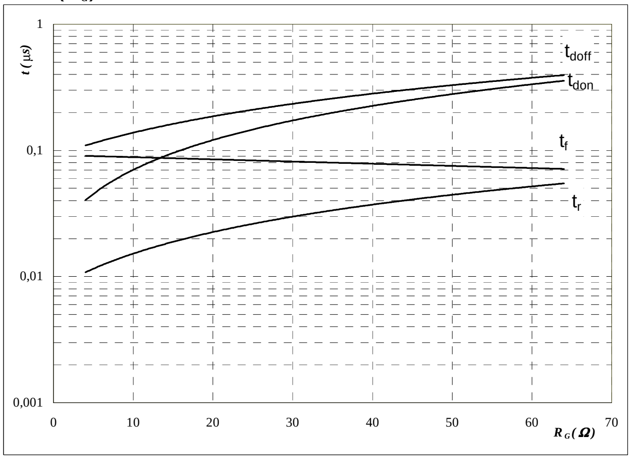
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 10 IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



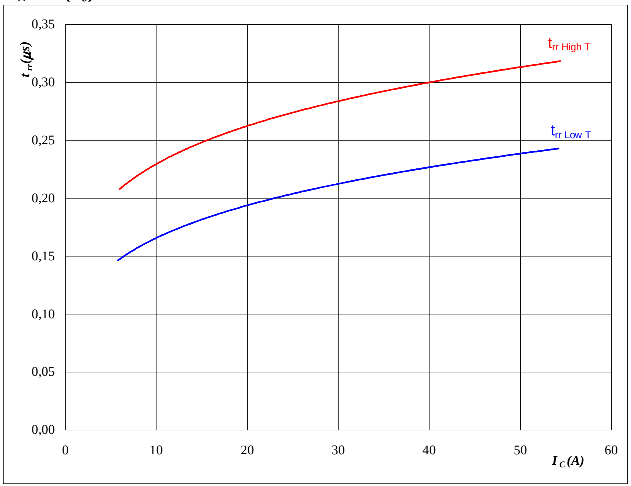
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_c)$



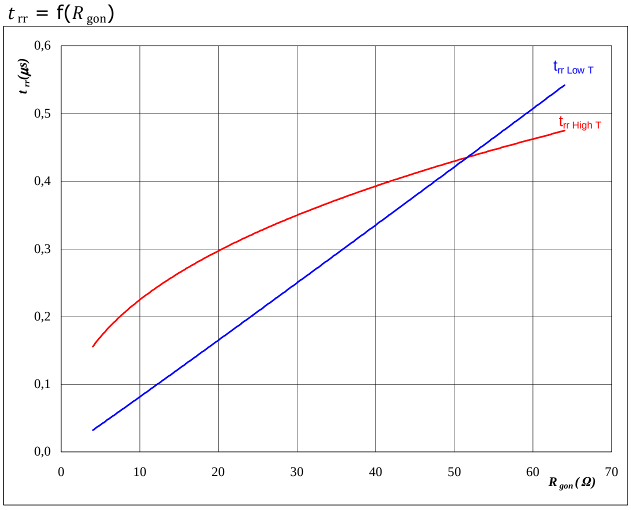
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 12 FWD

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

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



At

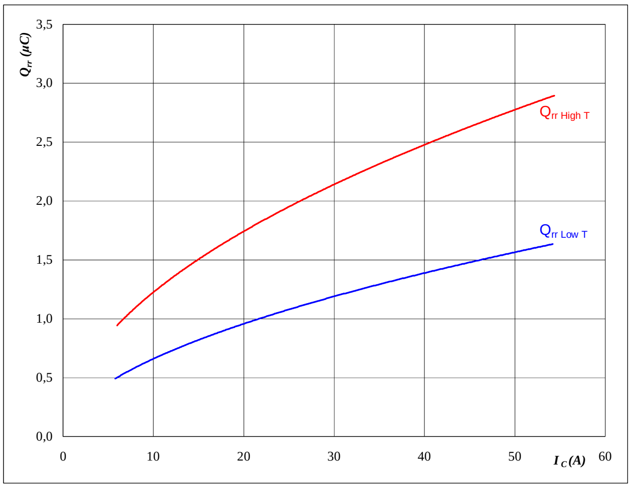
T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Boost

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



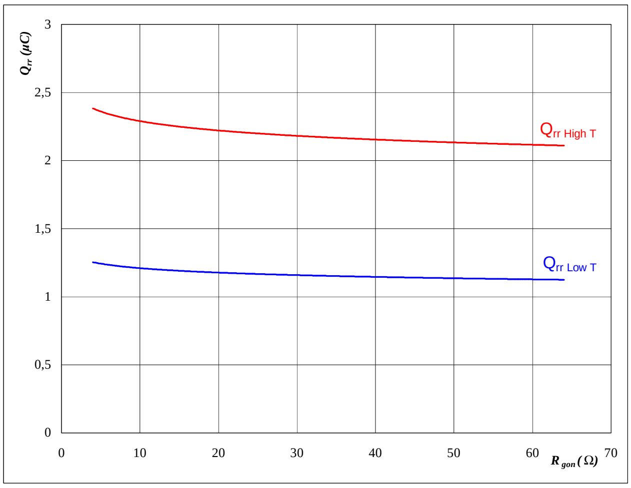
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 14 FWD

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

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



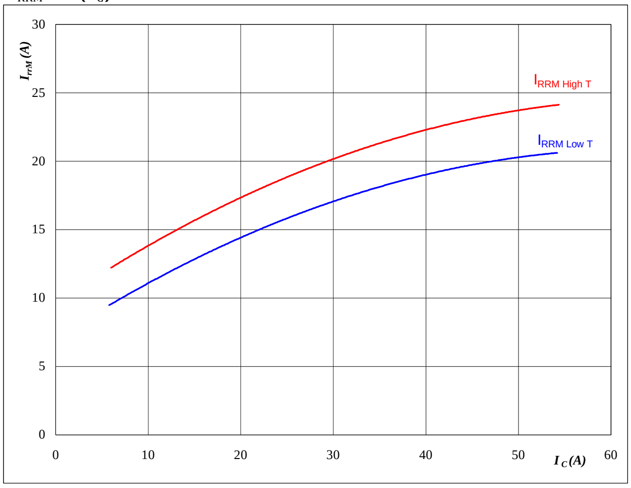
At

T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



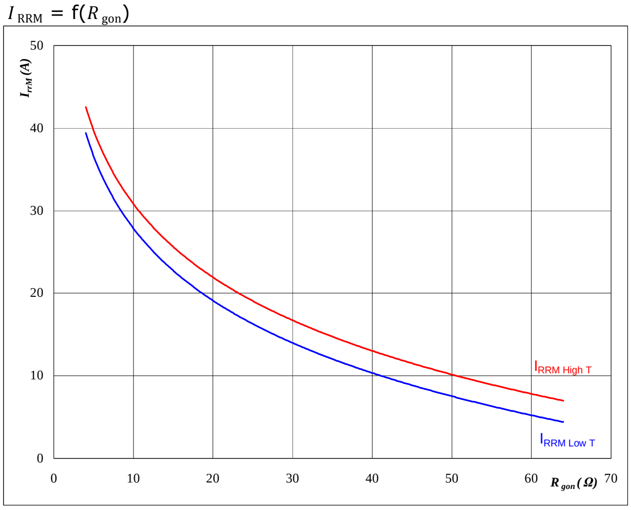
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 16 FWD

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

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



At

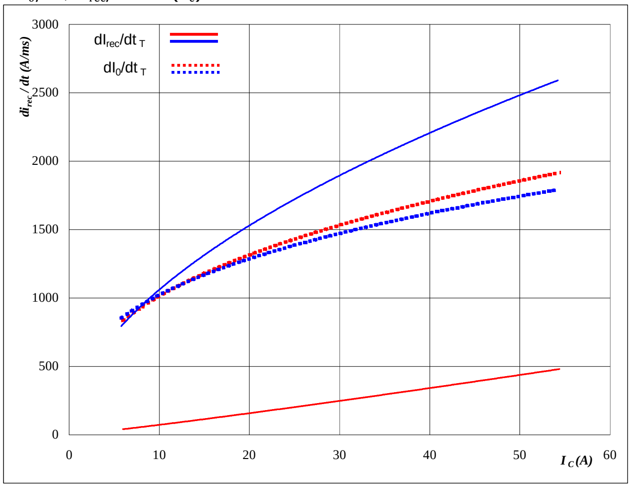
T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Boost

Figure 17 FWD

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

$dI_0/dt, dI_{rec}/dt = f(I_C)$



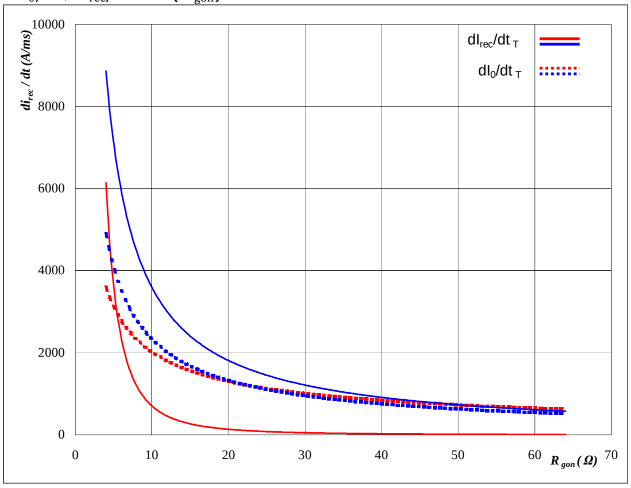
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 18 FWD

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

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



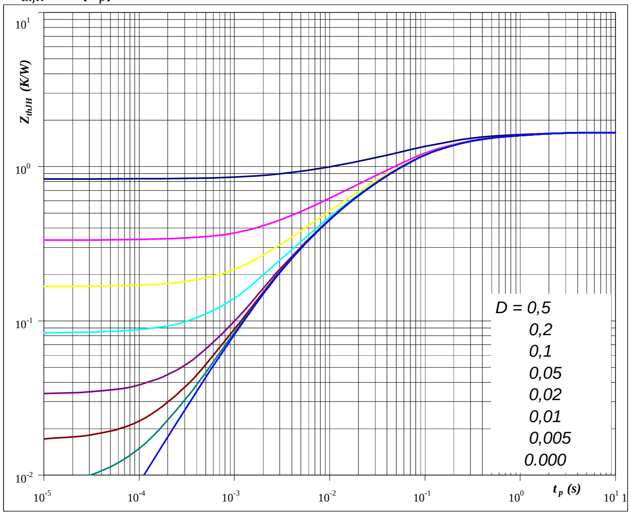
At

T_j =	25/125	°C
V_R =	350	V
I_F =	30	A
V_{GE} =	±15	V

Figure 19 IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	1,67	K/W

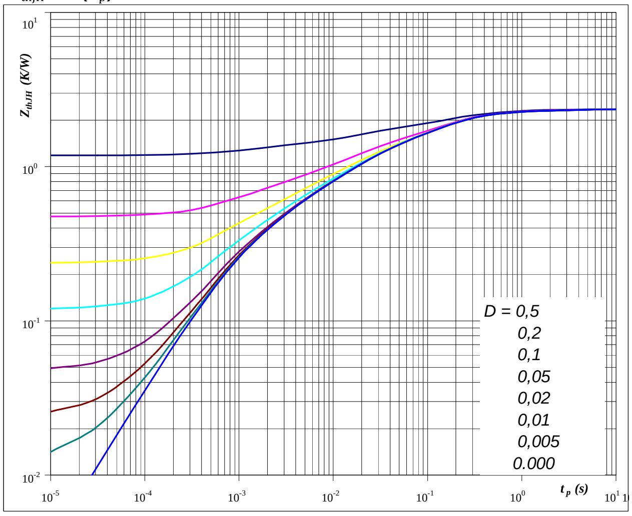
IGBT thermal model values

R (K/W)	Tau (s)
0,18	1,056
0,37	0,172
0,64	0,055
0,32	0,013
0,15	0,0030

Figure 20 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	2,37	K/W

FWD thermal model values

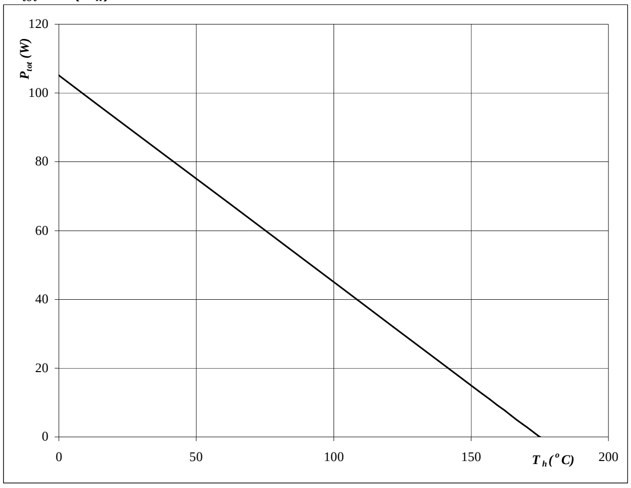
R (K/W)	Tau (s)
0,05	8,9E+00
0,14	1,1E+00
0,69	2,0E-01
0,57	6,4E-02
0,62	9,9E-03
0,30	1,0E-03

Boost

Figure 21 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



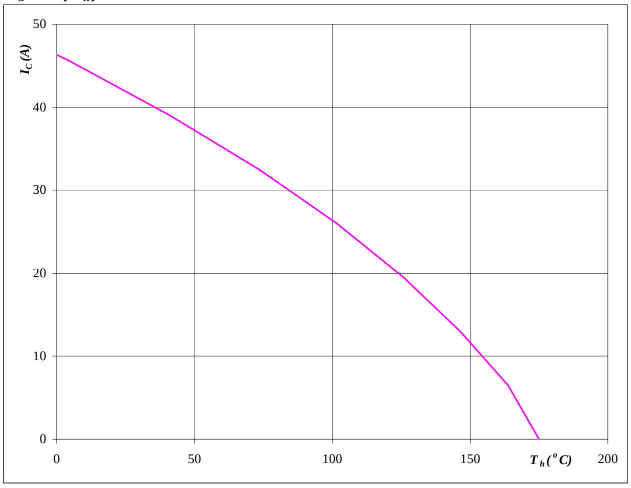
At

T_j = 175 ºC

Figure 22 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

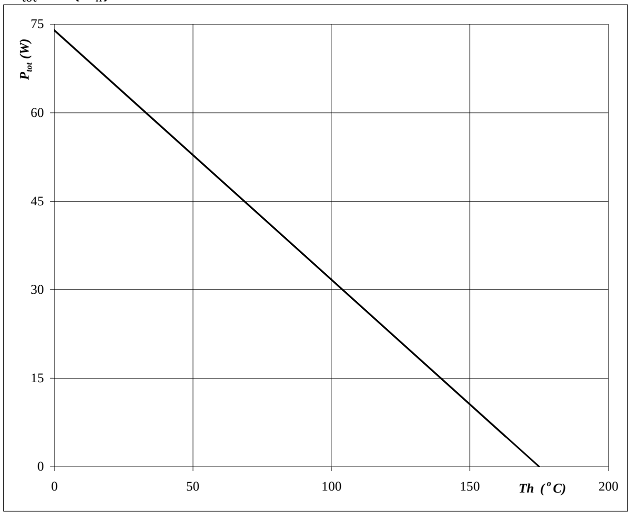
T_j = 175 ºC

V_{GE} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



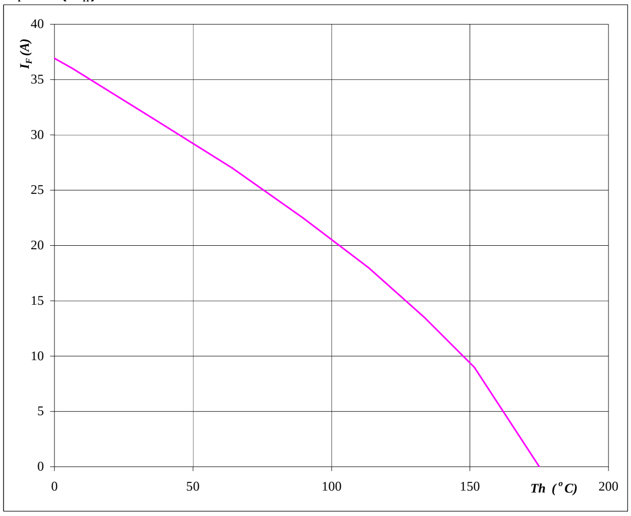
At

T_j = 175 ºC

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

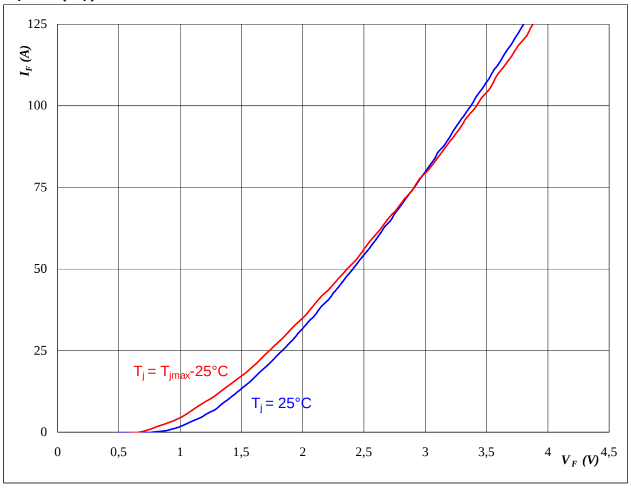
T_j = 175 ºC

Boost Inverse Diode

Figure 25 Boost Inverse Diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



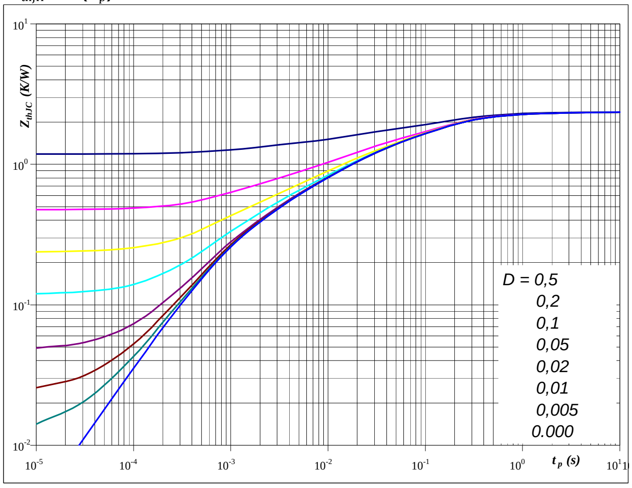
At

t_p = 250 µs

Figure 26 Boost Inverse Diode

Diode transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

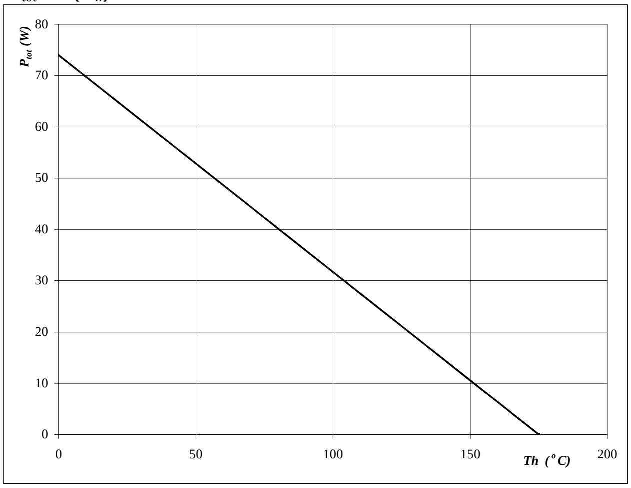
D = t_p / T

R_{thJH} = 2,37 K/W

Figure 27 Boost Inverse Diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



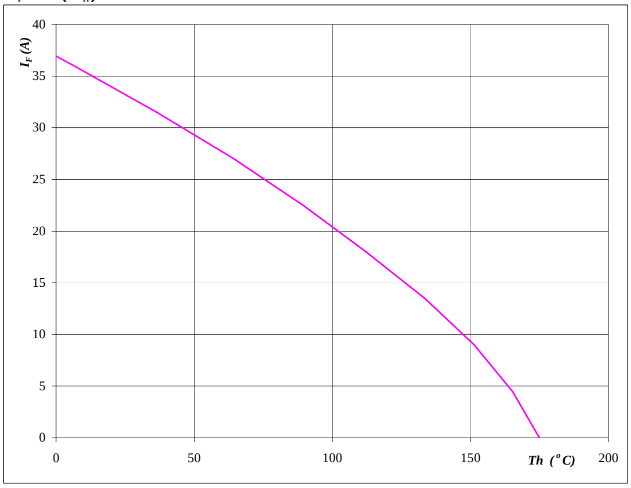
At

T_j = 175 ºC

Figure 28 Boost Inverse Diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

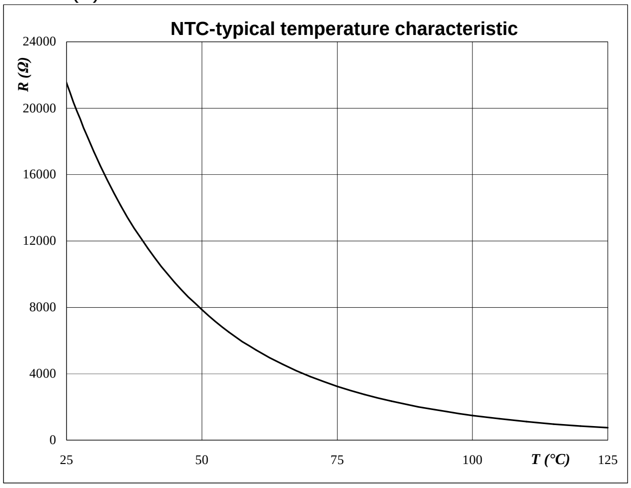
T_j = 175 ºC

Thermistor

Figure 1	Thermistor

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$



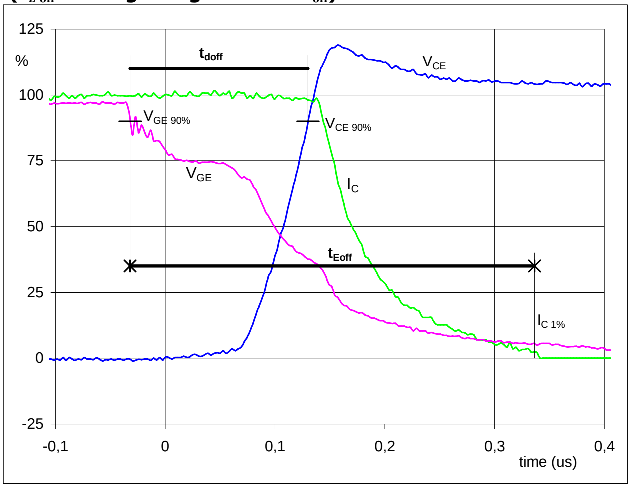
Switching Definitions BOOST

General conditions

T_j	=	125 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

Figure 1 Boost IGBT

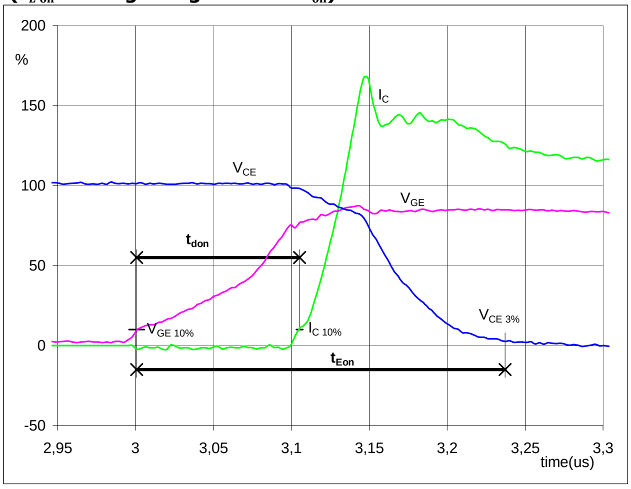
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} ($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	30	A
t_{doff} =	0,16	μs
$t_{E\,off}$ =	0,37	μs

Figure 2 Boost IGBT

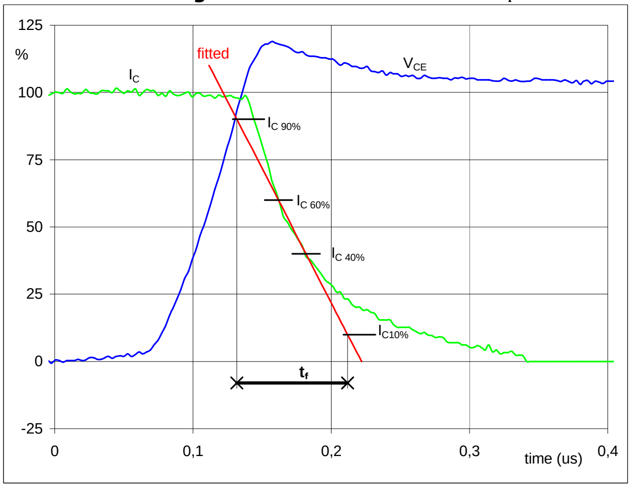
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} ($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	30	A
t_{don} =	0,100	μs
$t_{E\,on}$ =	0,24	μs

Figure 3 Boost IGBT

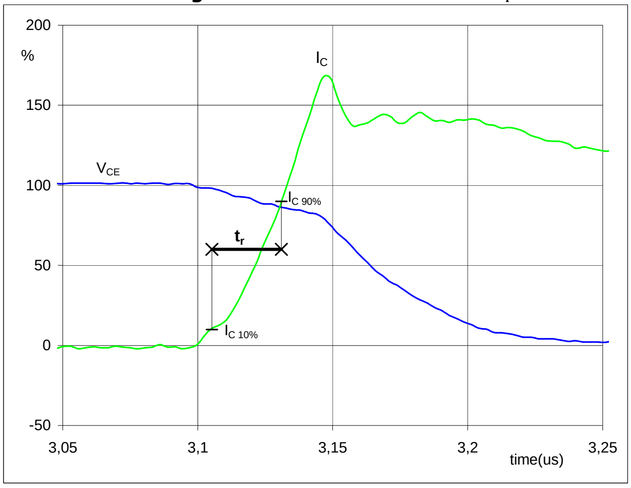
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	350	V
I_C (100%) =	30	A
t_f =	0,09	μs

Figure 4 Boost IGBT

Turn-on Switching Waveforms & definition of t_r

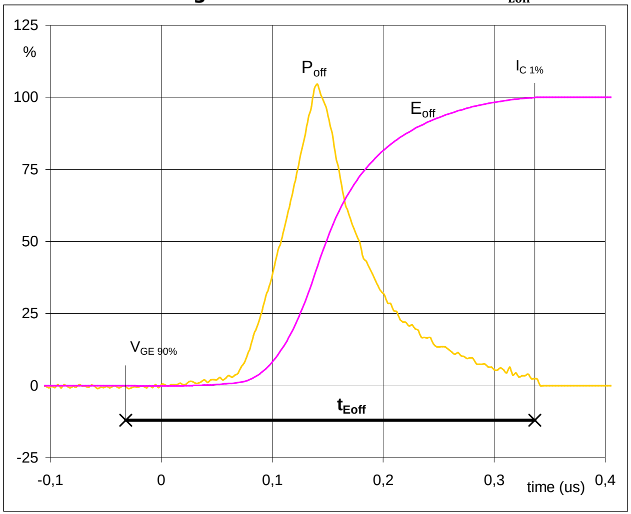


V_C (100%) =	350	V
I_C (100%) =	30	A
t_r =	0,026	μs

Switching Definitions BOOST

Figure 5 Boost IGBT

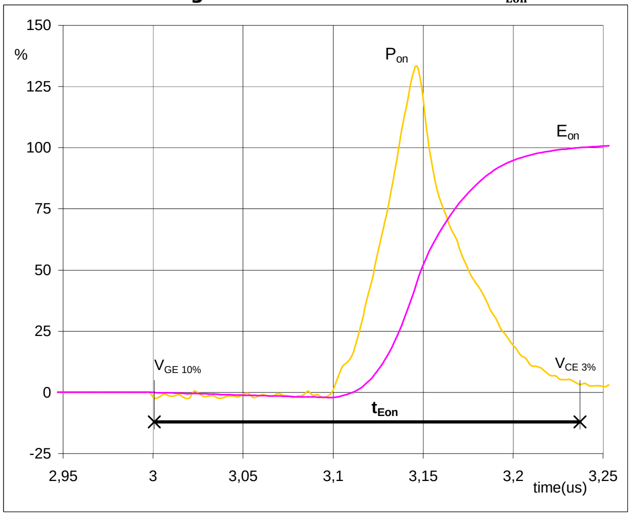
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	10,54	kW
E_{off} (100%) =	0,98	mJ
$t_{E\,off}$ =	0,37	μs

Figure 6 Boost IGBT

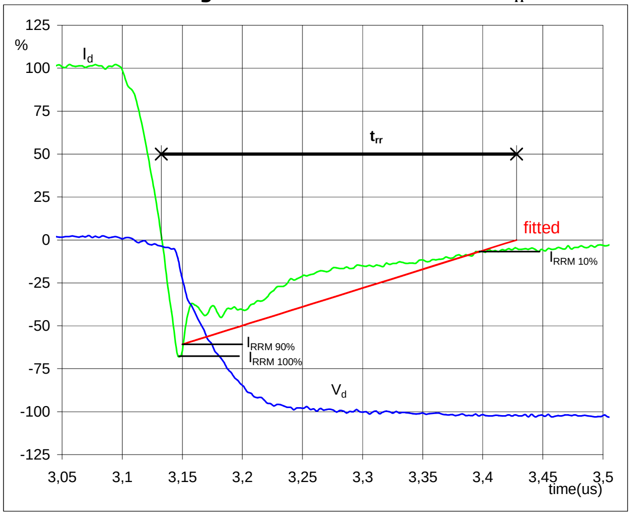
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	10,54	kW
E_{on} (100%) =	0,67	mJ
$t_{E\,on}$ =	0,24	μs

Figure 7 Boost IGBT

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

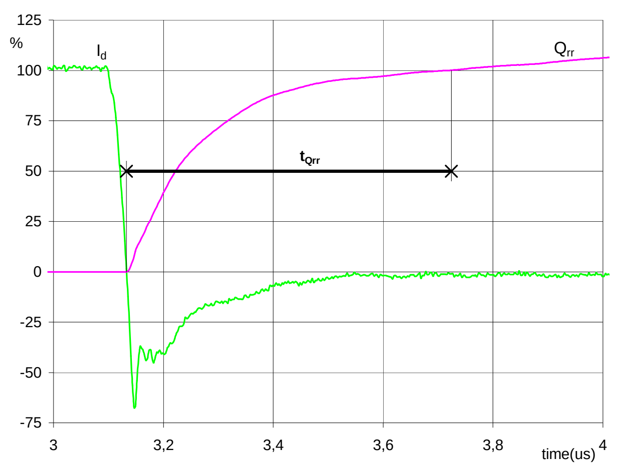


V_d (100%) =	350	V
I_d (100%) =	30	A
I_{RRM} (100%) =	-21	A
t_{rr} =	0,30	μs

Switching Definitions BOOST

Figure 8 Boost FWD

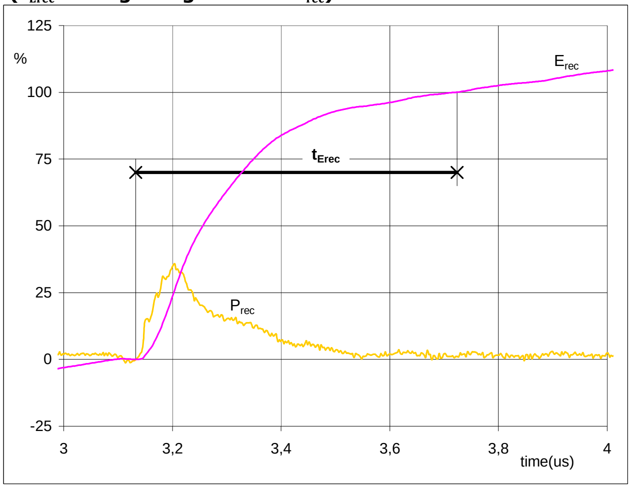
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_d (100%) =	30	A
Q_{rr} (100%) =	2,22	μC
$t_{Q\,rr}$ =	0,59	μs

Figure 9 Boost FWD

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

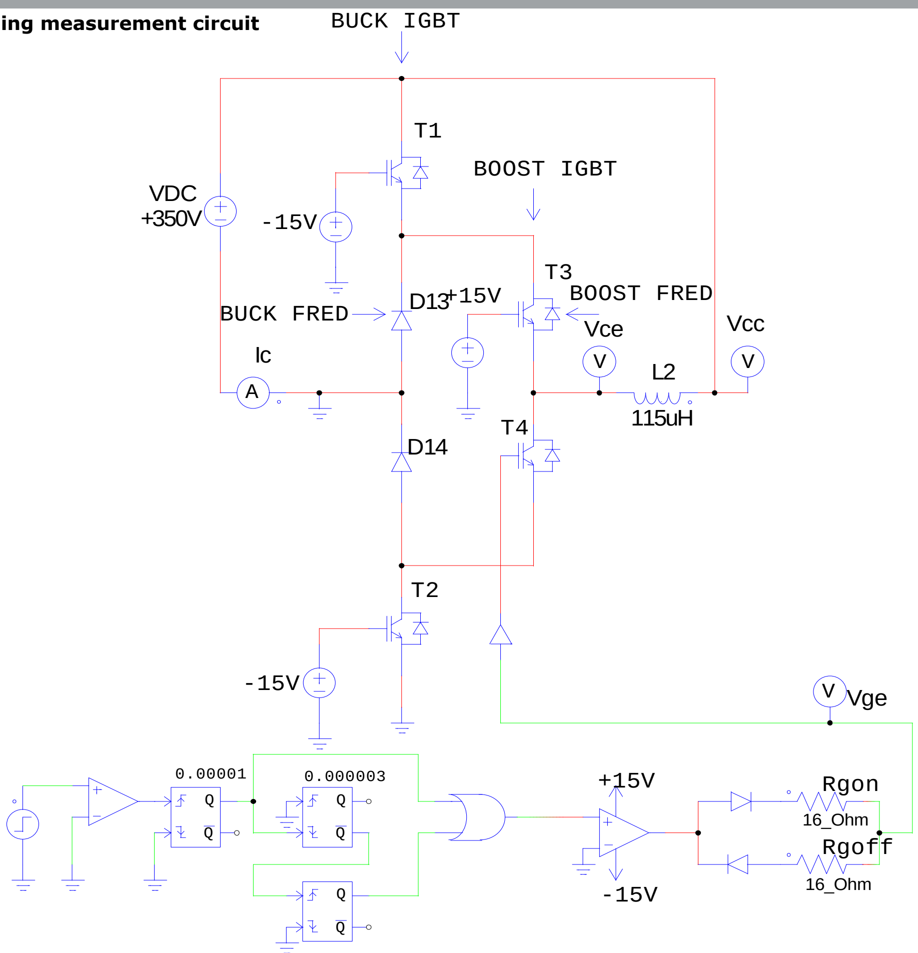


P_{rec} (100%) =	10,54	kW
E_{rec} (100%) =	0,61	mJ
$t_{E\,rec}$ =	0,59	μs

Measurement circuit

Figure 10

BOOST stage switching measurement circuit



Vincotech

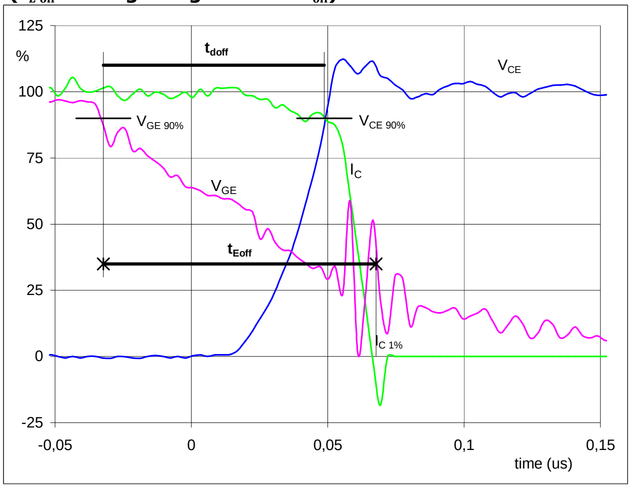
Switching Definitions BUCK

General conditions

T_j	=	125 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

Figure 1 BUCK IGBT

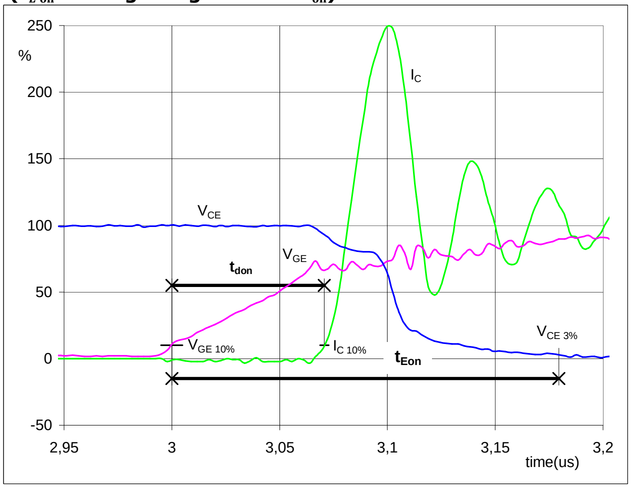
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	30	A
t_{doff} =	0,08	μs
$t_{E\,off}$ =	0,10	μs

Figure 2 BUCK IGBT

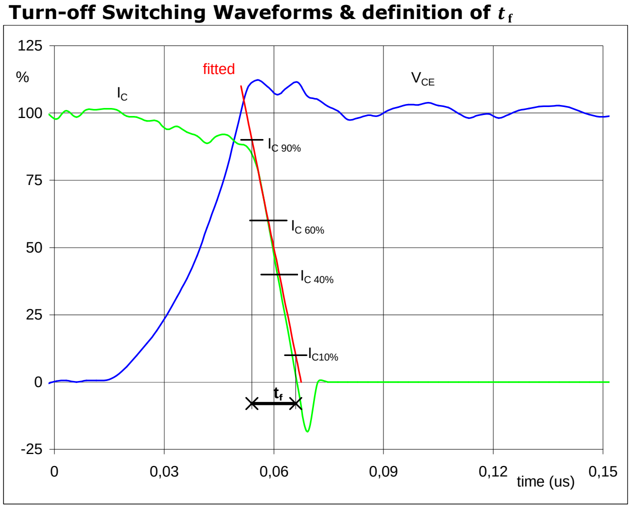
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	30	A
t_{don} =	0,07	μs
$t_{E\,on}$ =	0,18	μs

Figure 3 BUCK IGBT

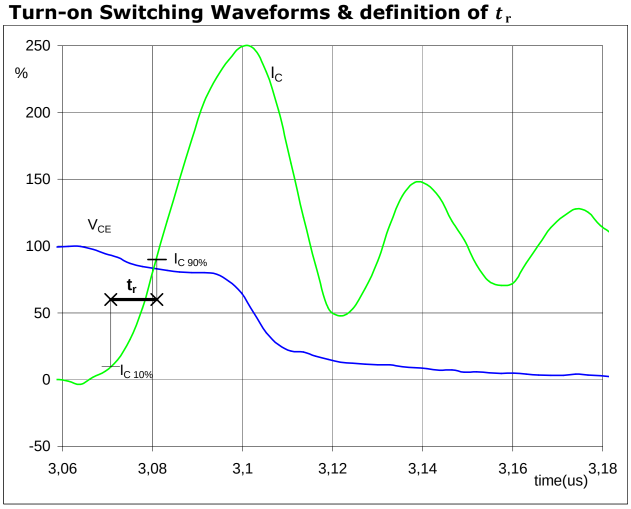
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	350	V
I_C (100%) =	30	A
t_f =	0,01	μs

Figure 4 BUCK IGBT

Turn-on Switching Waveforms & definition of t_r

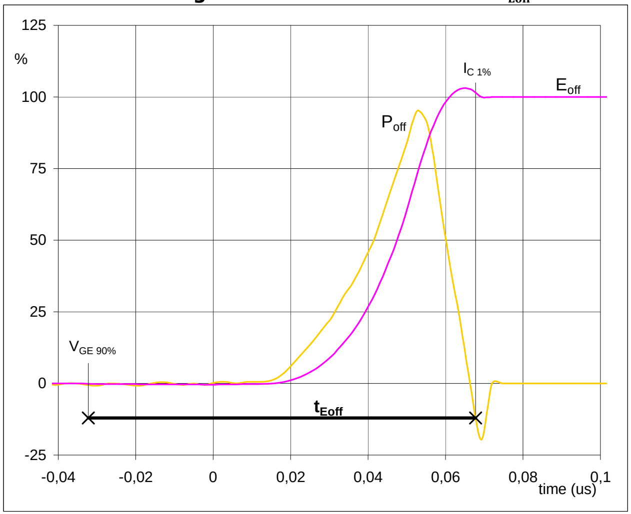


V_C (100%) =	350	V
I_C (100%) =	30	A
t_r =	0,01	μs

Switching Definitions BUCK

Figure 5 BUCK IGBT

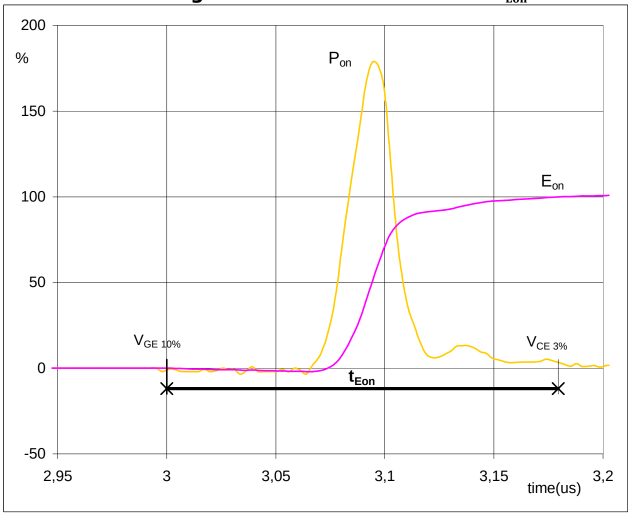
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	10,53	kW
E_{off} (100%) =	0,22	mJ
$t_{E\ off}$ =	0,10	μs

Figure 6 BUCK IGBT

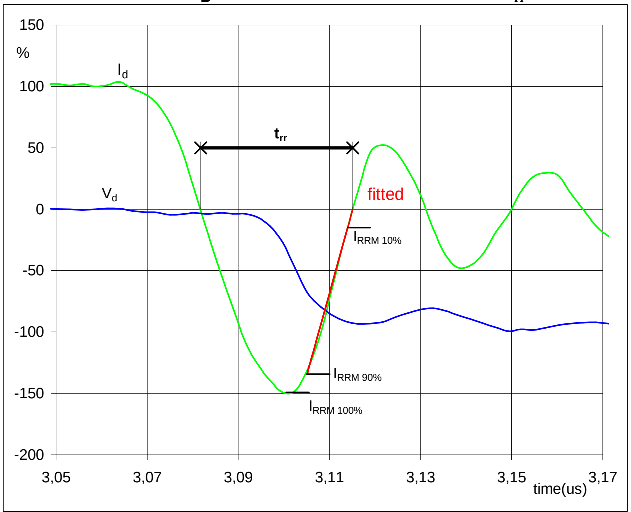
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	10,53	kW
E_{on} (100%) =	0,49	mJ
$t_{E\ on}$ =	0,18	μs

Figure 7 BUCK IGBT

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

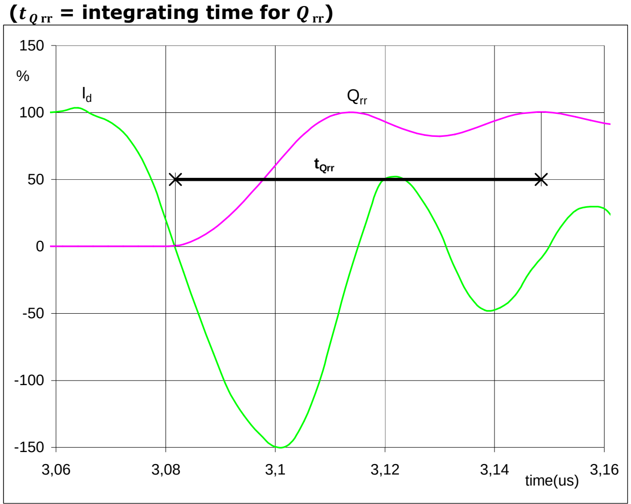


V_d (100%) =	350	V
I_d (100%) =	30	A
I_{RRM} (100%) =	-45	A
t_{rr} =	0,03	μs

Switching Definitions BUCK

Figure 8 BUCK FWD

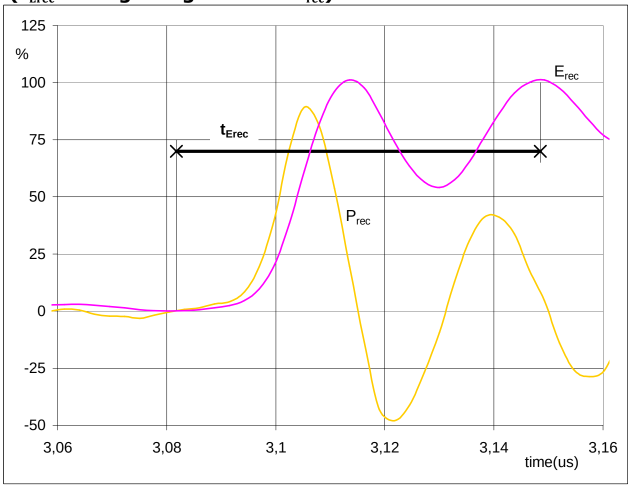
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_d (100%) =	30	A
Q_{rr} (100%) =	0,93	μC
$t_{Q\,rr}$ =	0,07	μs

Figure 9 BUCK FWD

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

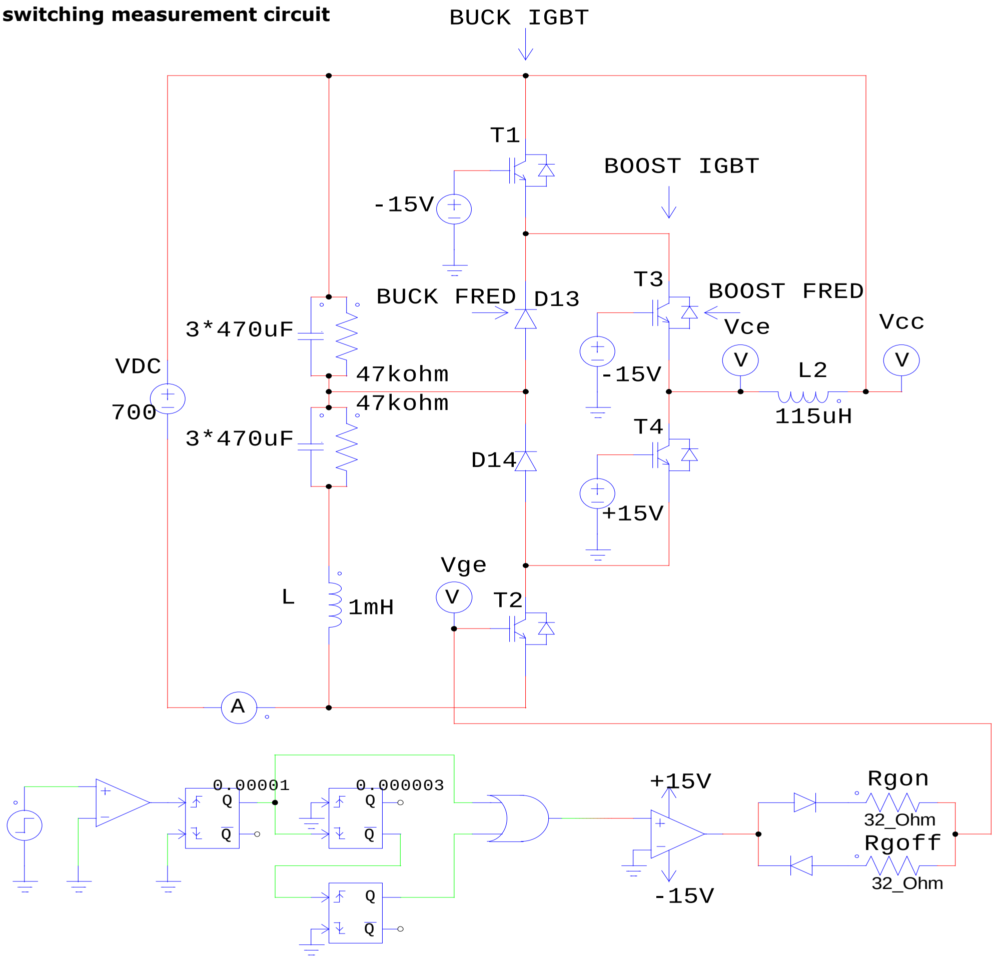


P_{rec} (100%) =	10,53	kW
E_{rec} (100%) =	0,11	mJ
$t_{E\,rec}$ =	0,07	μs

Measurement circuit

Figure 10

BUCK stage switching measurement circuit



Ordering Code and Marking - Outline - Pinout

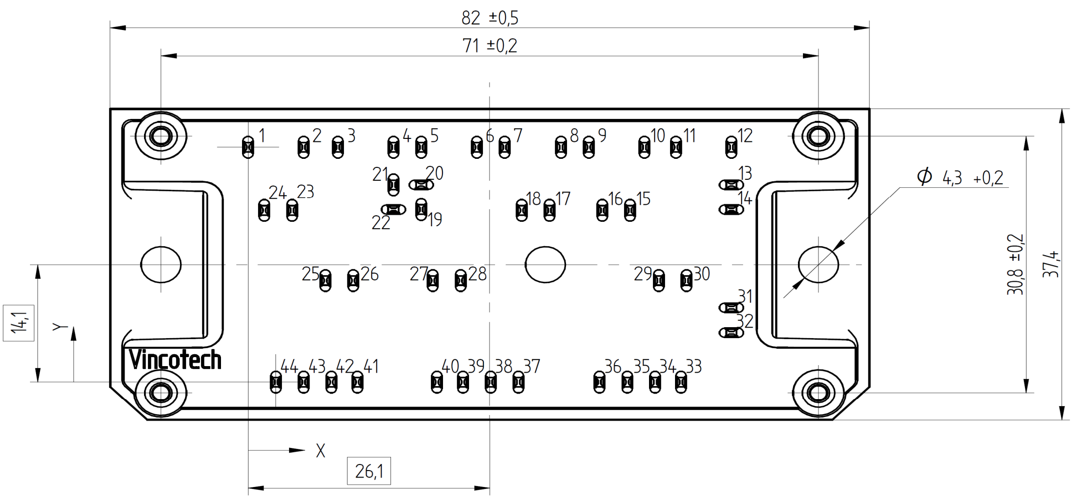
Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
Standard in flow1 12mm housing	10-PY07N3A030SM-M894F08Y	M894F08Y	M894F08Y

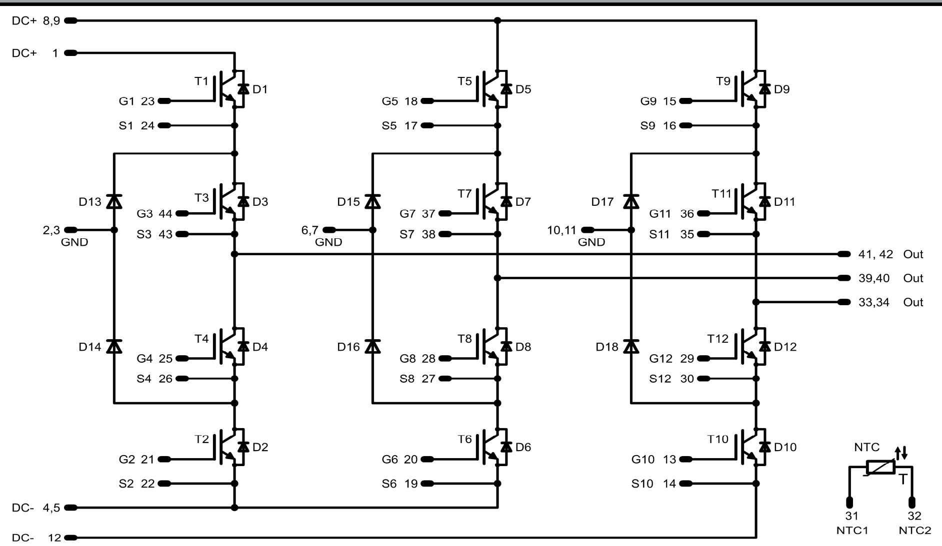
Outline

Pin table		
Pin	X	Y
1	0	28,2
2	6	28,2
3	9,7	28,2
4	15,7	28,2
5	18,7	28,2
6	24,7	28,2
7	27,7	28,2
8	33,8	28,2
9	36,8	28,2
10	42,8	28,2
11	46,2	28,2
12	52,2	28,2
13	52,2	23,7
14	52,2	20,7
15	41,25	20,6
16	38,25	20,6
17	32,55	20,6
18	29,55	20,6
19	18,7	20,7
20	18,7	23,7
21	15,7	23,7
22	15,7	20,7
23	4,75	20,6
24	1,75	20,6
25	8,35	12,2
26	11,35	12,2
27	19,95	12,2
28	22,95	12,2
29	44,35	12,2
30	47,35	12,2
31	52,2	8,9
32	52,2	5,9
33	46,75	0
34	43,95	0
35	40,95	0

Pin table		
Pin	X	Y
36	37,95	0
37	29,2	0
38	26,2	0
39	23,2	0
40	20,4	0
41	11,8	0
42	9	0
43	6	0
44	3	0



Pinout



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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.