Vincotech

30-F206NIA300SA-M106F
30-P206NIA300SA-M106FY

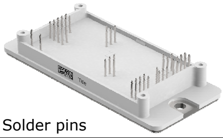
datasheet

***flow* NPC 2** **600 V / 300 A**

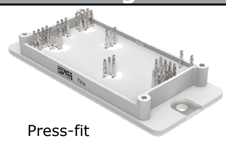
Features

- Neutral-point-Clamped inverter
- High power *flow* 2 housing
- Low Inductance Layout

flow 2 17mm housing



Solder pins

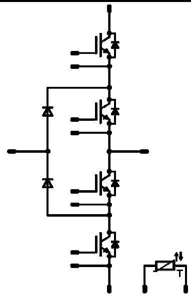


Press-fit

Target Applications

- UPS
- Solar inverters

Schematic



Types

- 30-F206NIA300SA-M106F
- 30-P206NIA300SA-M106FY

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck IGBT					
Collector-emitter break down voltage	V_{CE}			600	V
DC collector current	I_C	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	209 275	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		900	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	331 502	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤150°C V_{GE}=15V		6 360	μs V
Maximum Junction Temperature	T_{jmax}			175	°C
Buck FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
DC forward current	I_F	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	147 197	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	T_c=100°C	900	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	232 352	W
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost IGBT					
Collector-emitter break down voltage	V_{CE}			600	V
DC collector current	I_C	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	208 275	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		900	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	331 502	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤150°C V_{GE}=15V		6 360	μs V
Maximum Junction Temperature	T_{jmax}			175	°C
Boost Inverse Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
DC forward current	I_F	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	166 219	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		900	A
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	232 352	W
Maximum Junction Temperature	T_{jmax}			175	°C
Boost FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
DC forward current	I_F	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	166 219	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		900	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$	T_s=80°C T_c=80°C	232 352	W
Maximum Junction Temperature	T_{jmax}			175	°C
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(T_{jmax} - 25)	°C
Insulation Properties					
Insulation voltage	V_{is}	t=2s	DC voltage	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm
Comparative tracking index	CTI			>200	

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 [°C]	Min	Typ	Max	
Buck IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0048	25 150	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		300	25 150	1,05	1,66 1,87	1,85	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	600		25 150			0,96	mA
Gate-emitter leakage current	I_{GES}		20	0		25 150			700	nA
Integrated Gate resistor	R_{gint}							1		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff}=2 Ω R_{gon}=2 Ω	±15	350	300	25 150		358 366		ns
Rise time	t_r					25 150		51 55		
Turn-off delay time	$t_{d(off)}$					25 150		445 479		
Fall time	t_f					25 150		56 79		
Turn-on energy loss per pulse	E_{on}					25 150		6,14 7,30		mWs
Turn-off energy loss per pulse	E_{off}					25 150		8,02 10,00		
Input capacitance	C_{ies}	f=1MHz	0	25		25		18480		pF
Output capacitance	C_{oss}							1152		
Reverse transfer capacitance	C_{rss}							548		
Gate charge	Q_G		15	480	300	25		1880		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease Thickness≤50um λ = 1 W/mK						0,29		K/W
Thermal resistance chip to case	$R_{th(j-c)}$							0,19		
Buck FWD										
Diode forward voltage	V_F				300	25 125	1,5	2,04 2,20	3,3	V
Peak reverse recovery current	I_{RRM}	R_{goff}=2 Ω	±15	350	30	25 125		143 192		A
Reverse recovery time	t_{rr}					25 125		132 280		ns
Reverse recovered charge	Q_{rr}					25 125		10,6 21,6		μC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		2947 2759		A/μs
Reverse recovered energy	E_{rec}					25 125		2,10 4,59		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease Thickness≤50um λ = 1 W/mK						0,40		K/W
Thermal resistance chip to case	$R_{th(j-c)}$							0,30		

Characteristic Values

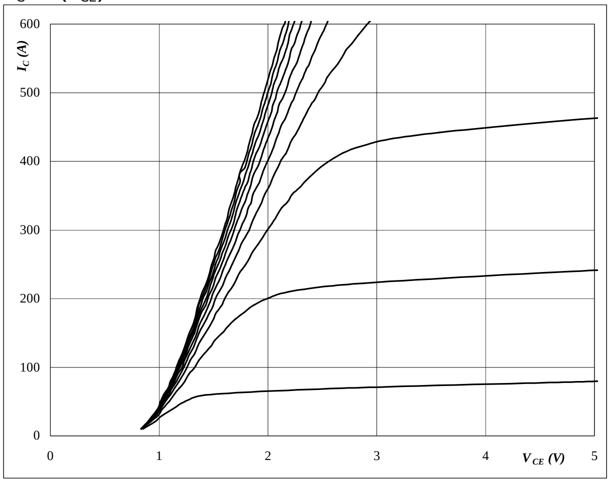
Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Boost IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0048	25 125	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		300	25 125	1,05	1,66 1,87	1,85	V
Collector-emitter cut-off incl diode	I_{CES}		0	600		25 125			0,96	mA
Gate-emitter leakage current	I_{GES}		20	0		25 125			700	nA
Integrated Gate resistor	R_{gint}							1		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff}=2 Ω R_{gon}=2 Ω	±15	350	300	25 125		355 363		ns
Rise time	t_r					25 125		52 56		
Turn-off delay time	$t_{d(off)}$					25 125		450 485		
Fall time	t_f					25 125		50 80		
Turn-on energy loss per pulse	E_{on}					25 125		6,47 7,99		mWs
Turn-off energy loss per pulse	E_{off}					25 125		8,34 10,46		
Input capacitance	C_{ies}	f=1MHz	0	25		25		18480		pF
Output capacitance	C_{oss}							1152		
Reverse transfer capacitance	C_{rss}							548		
Gate charge	Q_G		15	480	300	25		1880		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease Thickness≤50um λ = 1 W/mK						0,29		K/W
Thermal resistance chip to case	$R_{th(j-c)}$							0,19		
Boost Inverse Diode										
Diode forward voltage	V_F				20	25 125	1,5	1,82 1,86	3,3	V
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease Thickness≤50um λ = 1 W/mK						0,41		K/W
Thermal resistance chip to case	$R_{th(j-c)}$							0,27		
Boost FWD										
Diode forward voltage	V_F				300	25 150	1,5	1,82 1,86	3,3	V
Reverse leakage current	I_r			600		25 150			960	µA
Peak reverse recovery current	I_{RRM}	R_{goff}=2 Ω	±15	350	300	25 150		150 199		A
Reverse recovery time	t_{rr}					25 150		145 284		ns
Reverse recovered charge	Q_{rr}					25 150		10,9 22,6		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		3261 2229		A/µs
Reverse recovery energy	E_{rec}					25 150		2,38 5,40		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease Thickness≤50um λ = 1 W/mK						0,41		K/W
Thermal resistance chip to case	$R_{th(j-c)}$							0,27		
Thermistor										
Rated resistance						T=25		22000		Ω
Deviation of R100		R_{100}=1486 Ω				T=100	-5		5	%
Power dissipation						T=25		200		mW
Power dissipation constant						T=25		2		mW/K
B-value		Tol. ±3%				T=25		3950		K
B-value		Tol. ±3%				T=25		3996		K
Vincotech NTC Reference									B	

Buck

Figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 350 µs

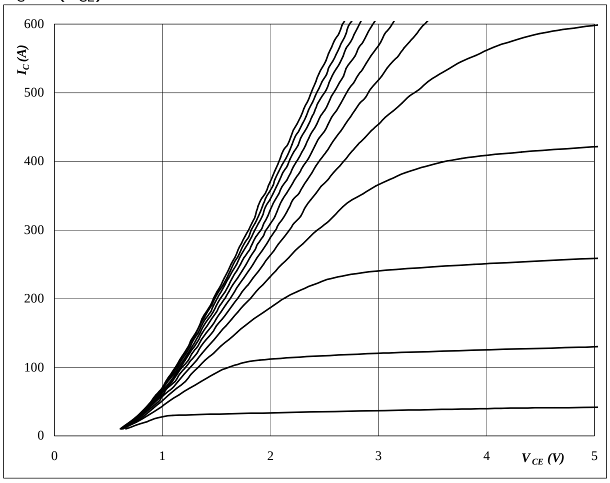
T_j = 25 °C

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 = 350 µs

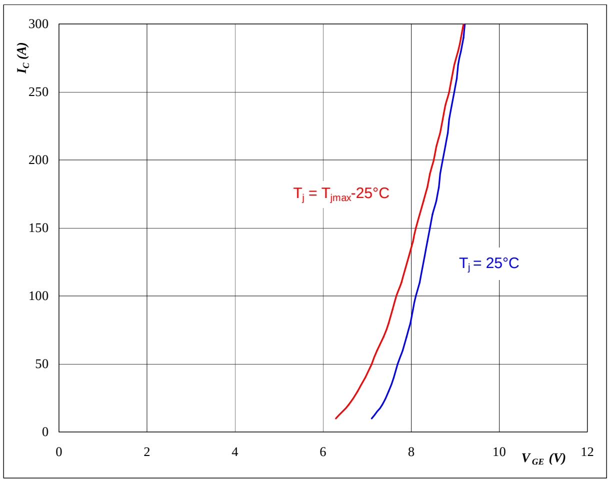
T_j = 150 °C

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

Figure 3 IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



At

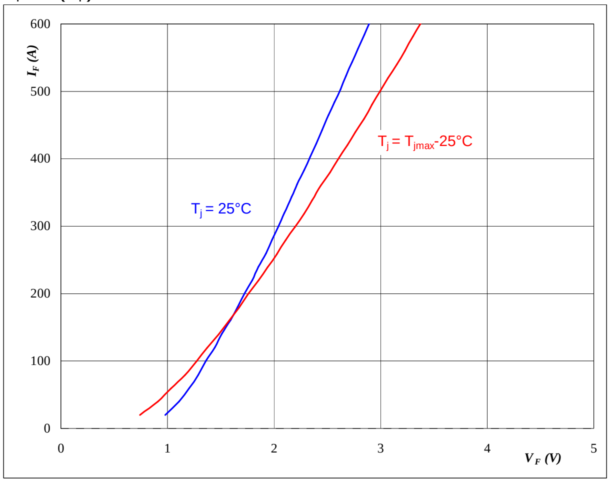
t_p = 350 µs

V_{CE} = 10 V

Figure 4 FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

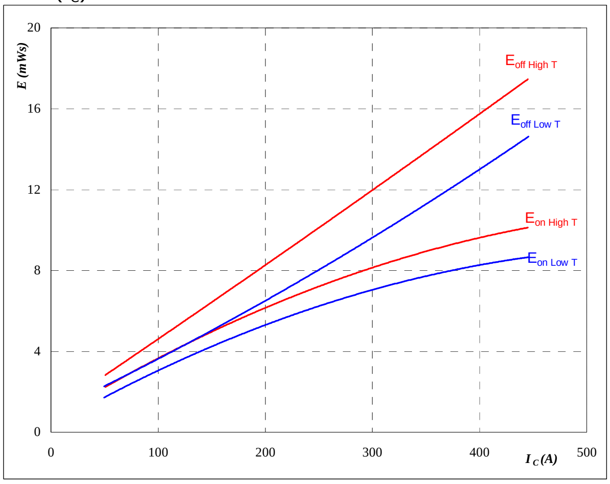
t_p = 350 µs

Buck

Figure 5 IGBT

Typical switching energy losses as a function of collector current

E = f(I_C)



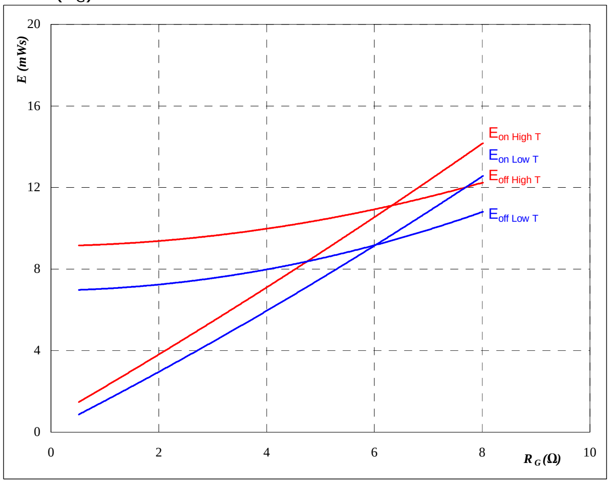
With an inductive load at

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

Figure 6 IGBT

Typical switching energy losses as a function of gate resistor

E = f(R_G)



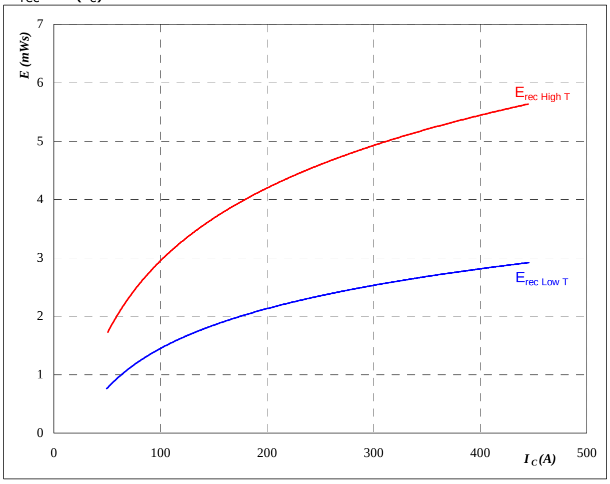
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	249	A

Figure 7 FWD

Typical reverse recovery energy loss as a function of collector current

E_{rec} = f(I_c)



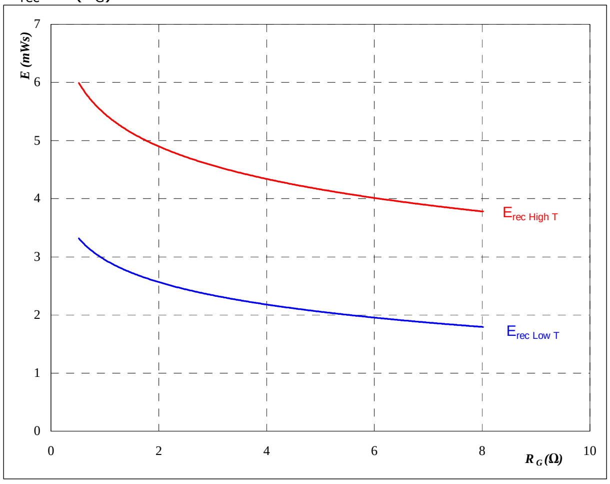
With an inductive load at

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

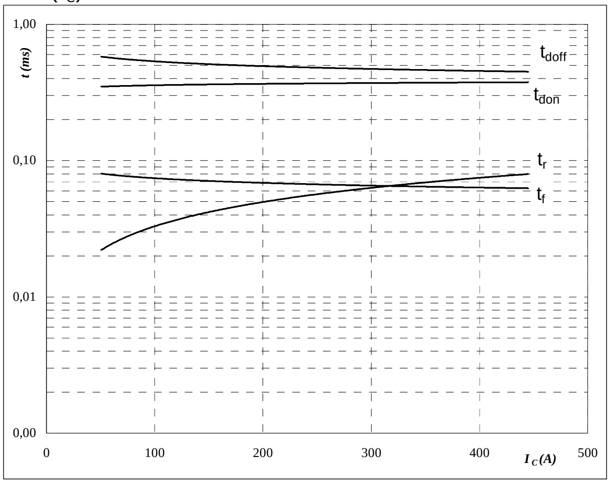
T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	249	A

Buck

Figure 9 IGBT

Typical switching times as a function of collector current

t = f(I_C)



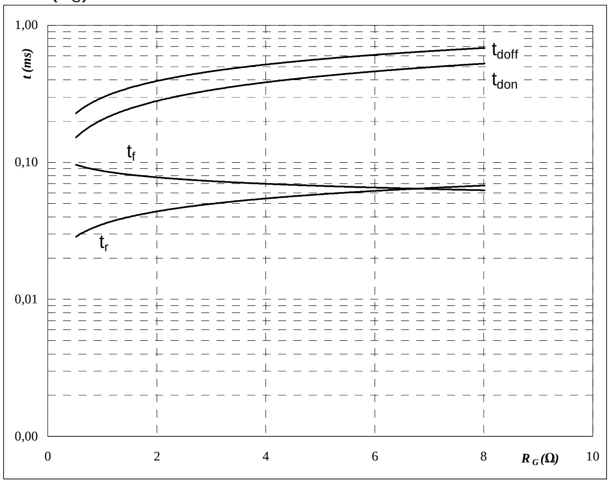
With an inductive load at

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

Figure 10 IGBT

Typical switching times as a function of gate resistor

t = f(R_G)



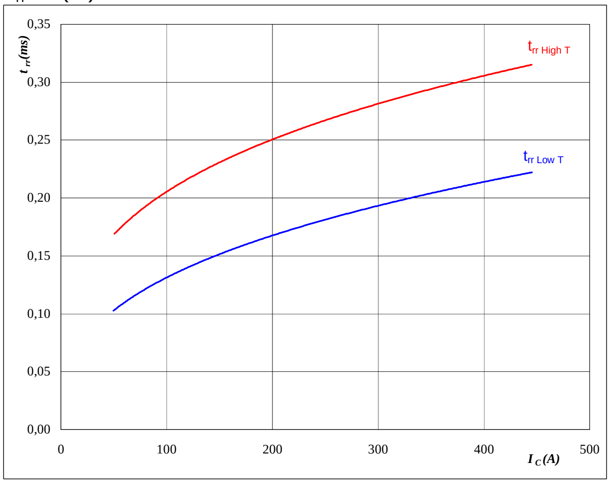
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	249	A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(Ic)



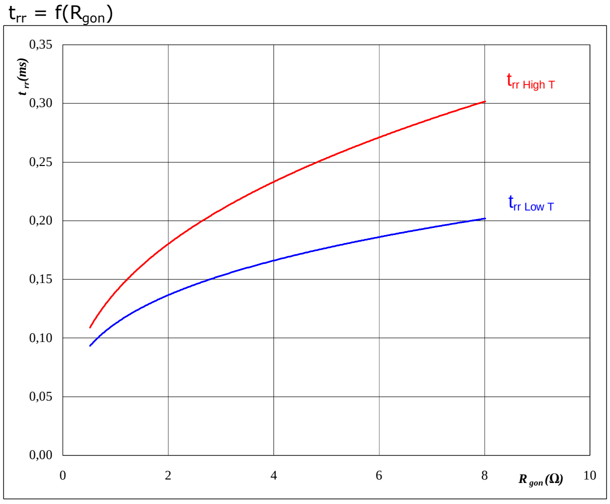
At

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

Figure 12 FWD

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

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



At

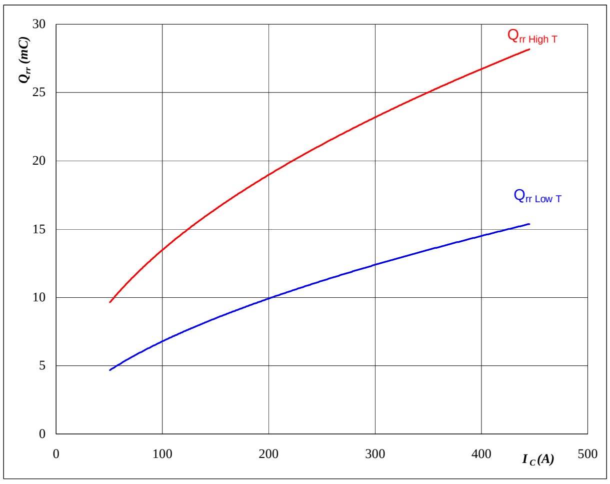
T_j =	25/125	°C
V_R =	350	V
I_F =	249	A
V_{GE} =	±15	V

Buck

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



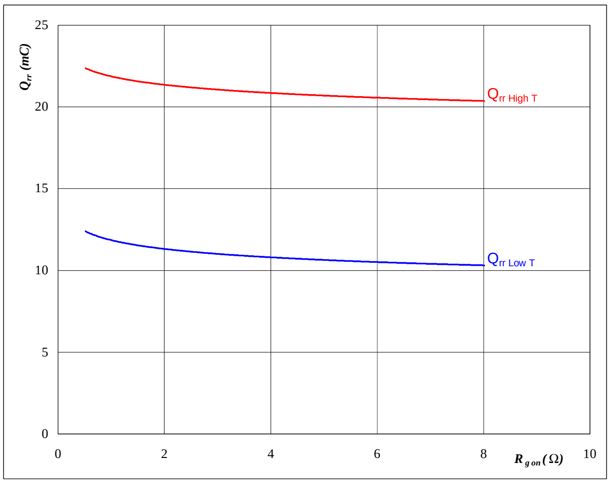
At

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

Figure 14 FWD

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

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



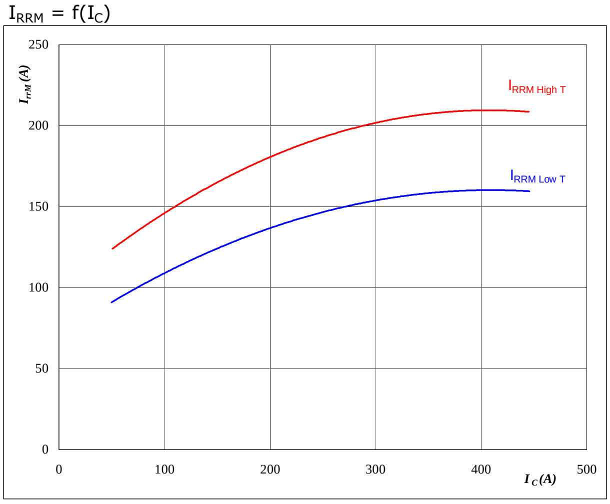
At

T_j =	25/125	°C
V_R =	350	V
I_F =	249	A
V_{GE} =	±15	V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



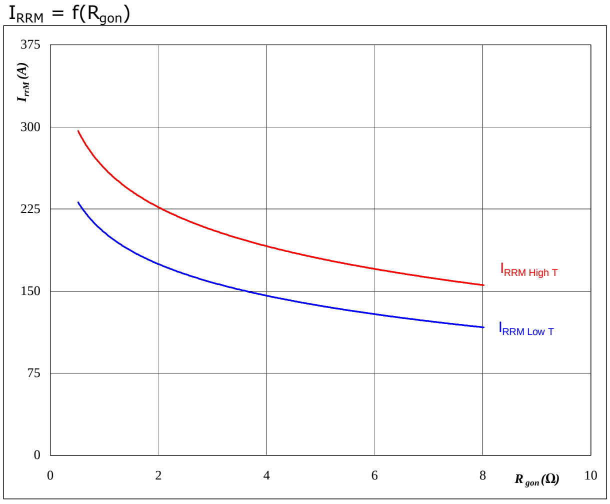
At

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

Figure 16 FWD

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

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



At

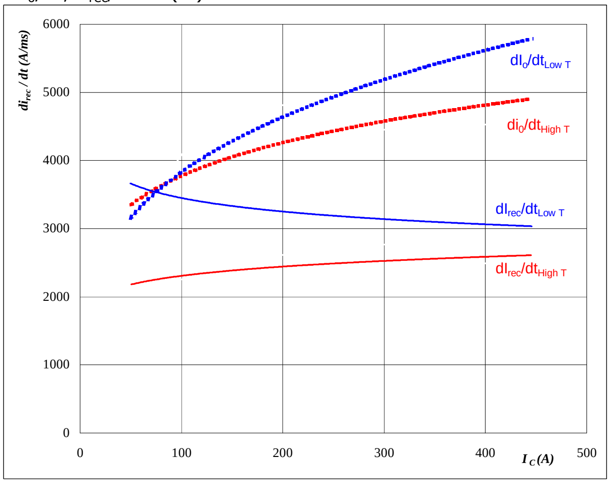
T_j =	25/125	°C
V_R =	350	V
I_F =	249	A
V_{GE} =	±15	V

Buck

Figure 17 FWD

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

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



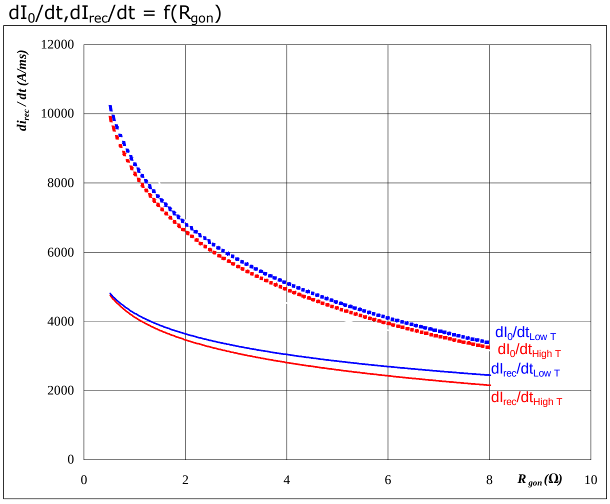
At

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

Figure 18 FWD

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

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



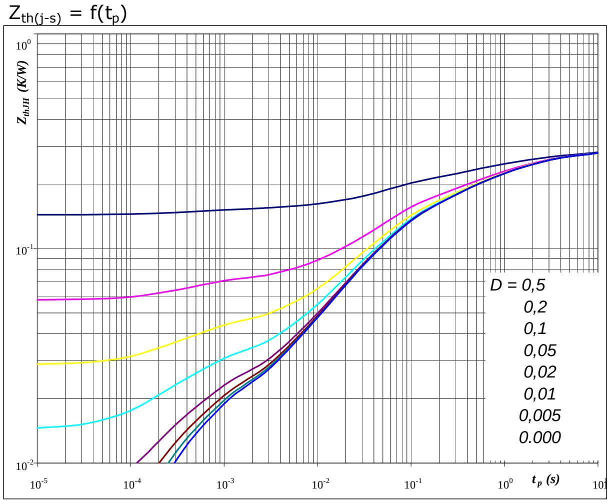
At

T_j =	25/125	°C
V_R =	350	V
I_F =	249	A
V_{GE} =	±15	V

Figure 19 IGBT

IGBT transient thermal impedance as a function of pulse width

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



At

D =	t_p / T	
$R_{th(j-s)}$ =	0,29	K/W

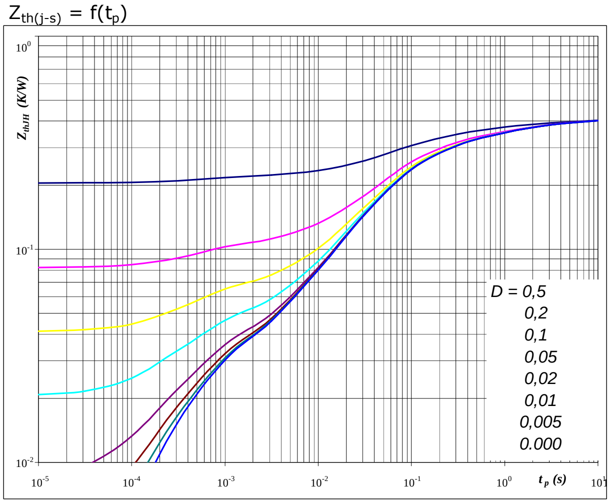
IGBT thermal model values

R (K/W)	Tau (s)
0,02	9,6E+00
0,07	1,7E+00
0,07	2,9E-01
0,09	4,4E-02
0,02	7,6E-03
0,02	3,6E-04

Figure 20 FWD

Diode transient thermal impedance as a function of pulse width

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



At

D =	t_p / T	
$R_{th(j-s)}$ =	0,41	K/W

FWD thermal model values

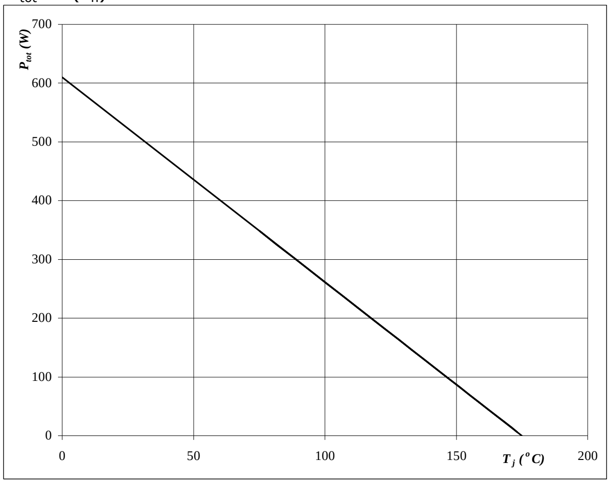
R (K/W)	Tau (s)
0,02	8,8E+00
0,06	1,6E+00
0,10	2,4E-01
0,16	5,4E-02
0,04	1,1E-02
0,03	4,5E-04

Buck

Figure 21 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



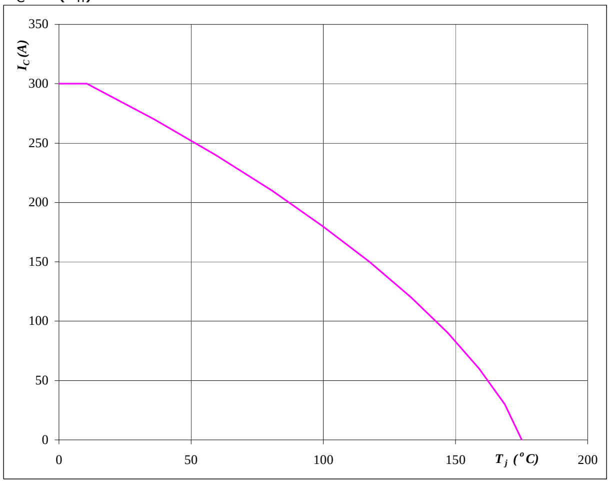
At

T_j = 175 °C

Figure 22 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

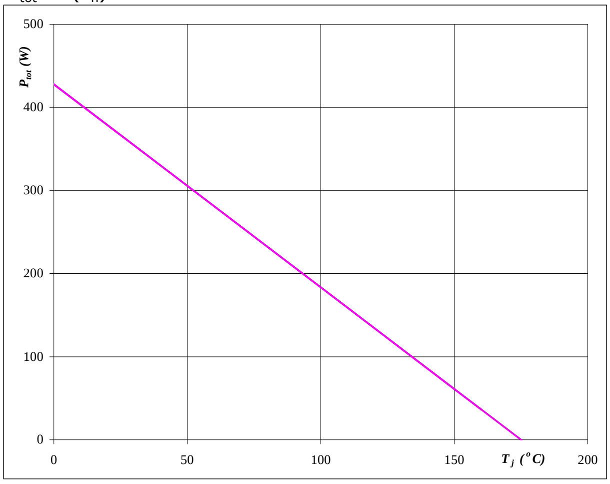
T_j = 175 °C

V_{GE} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



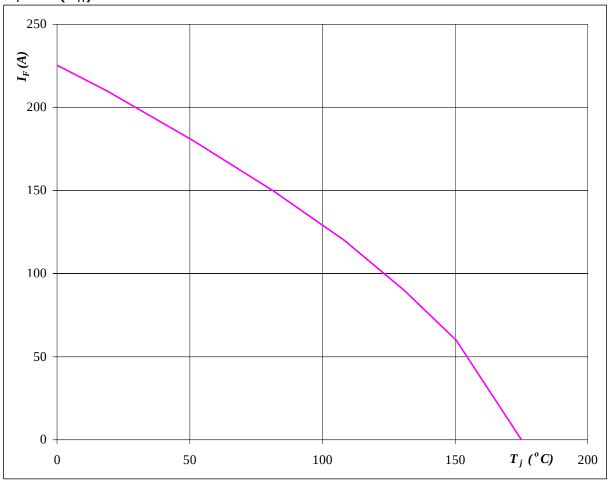
At

T_j = 175 °C

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

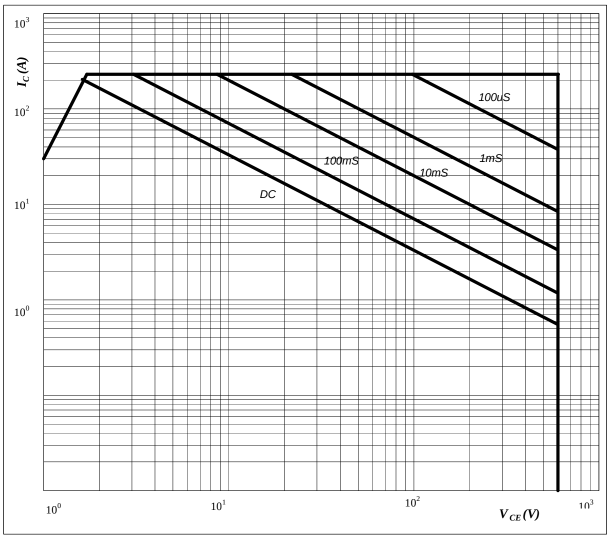
T_j = 175 °C

Buck

Figure 25 IGBT

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



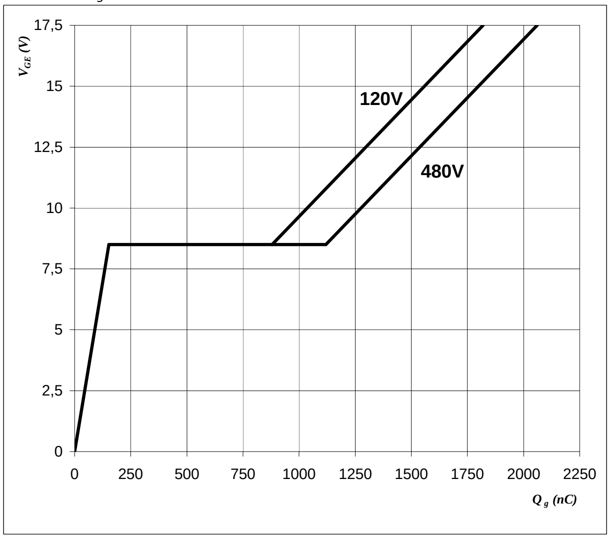
At

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

Figure 26 IGBT

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



At

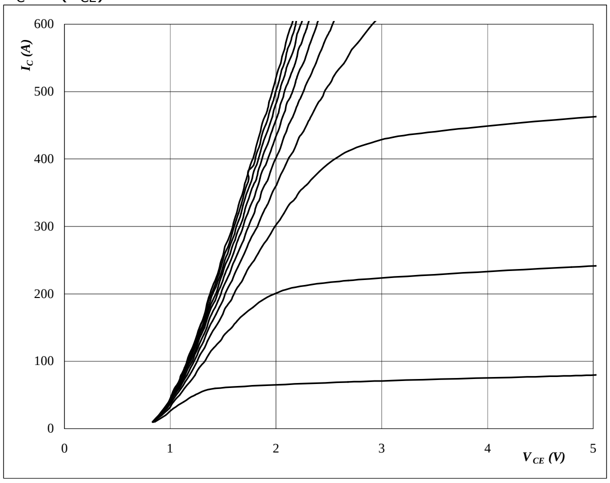
I_C =	300	A

Boost

Figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



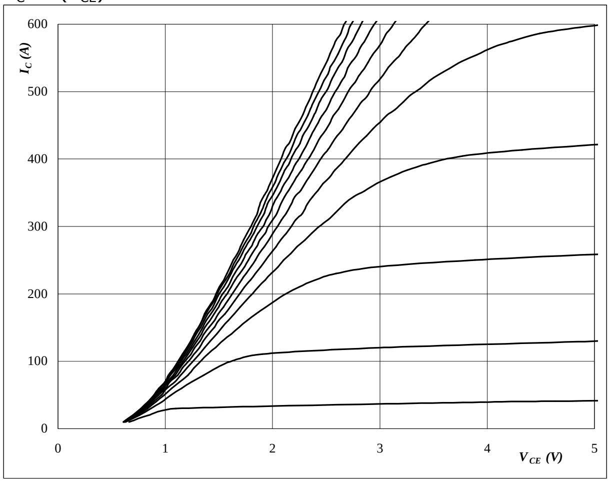
At

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

$I_C = f(V_{CE})$



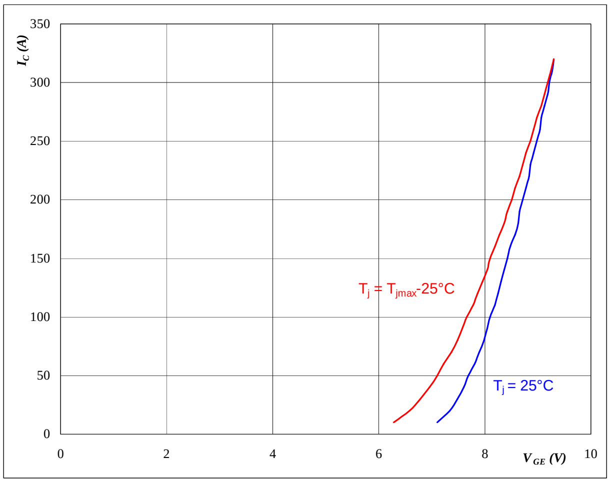
At

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

Figure 3 FWD

Typical transfer characteristics

$I_C = f(V_{GE})$



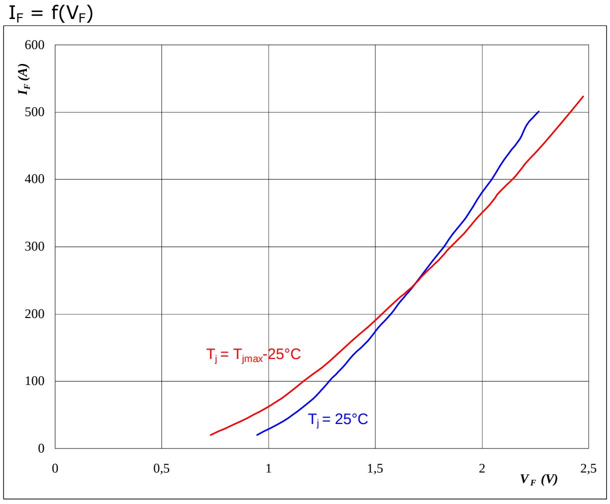
At

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

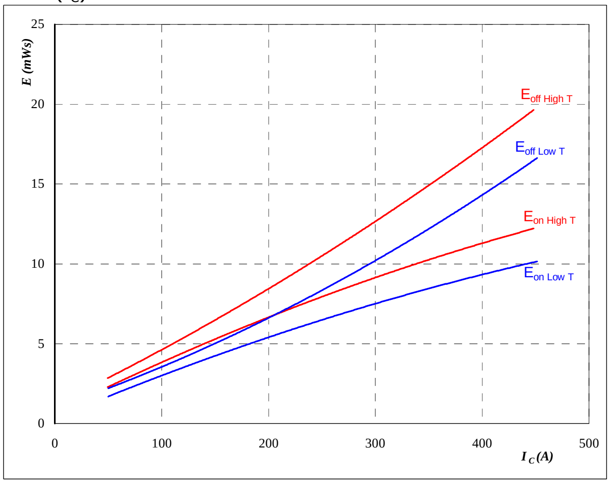
t_p =	250	μs

Boost

Figure 5 IGBT

Typical switching energy losses as a function of collector current

E = f(I_C)



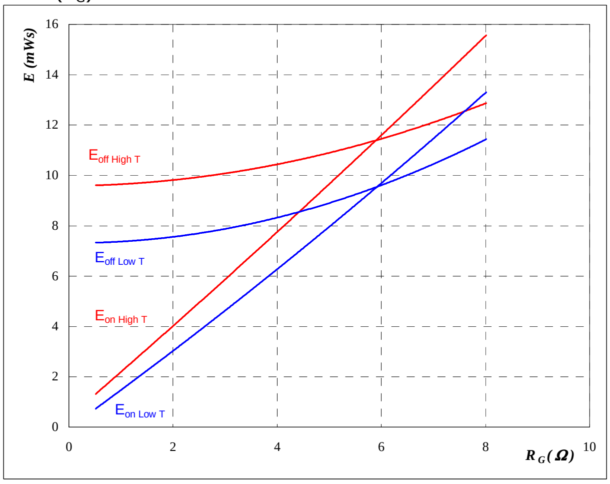
With an inductive load at

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

Figure 6 IGBT

Typical switching energy losses as a function of gate resistor

E = f(R_G)



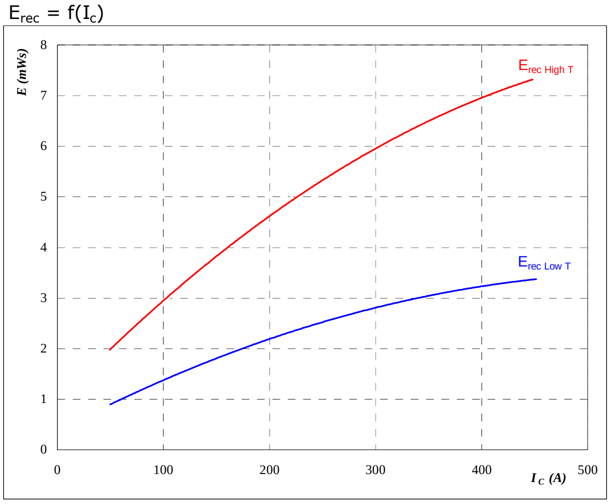
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	251	A

Figure 7 IGBT

Typical reverse recovery energy loss as a function of collector current

E_{rec} = f(I_c)



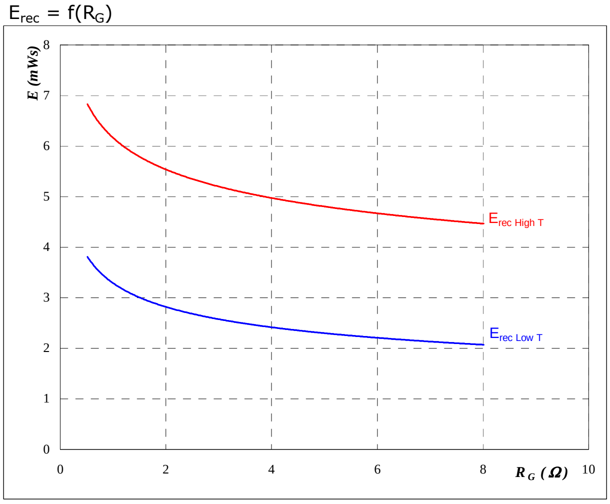
With an inductive load at

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

Figure 8 IGBT

Typical reverse recovery energy loss as a function of gate resistor

E_{rec} = f(R_G)



With an inductive load at

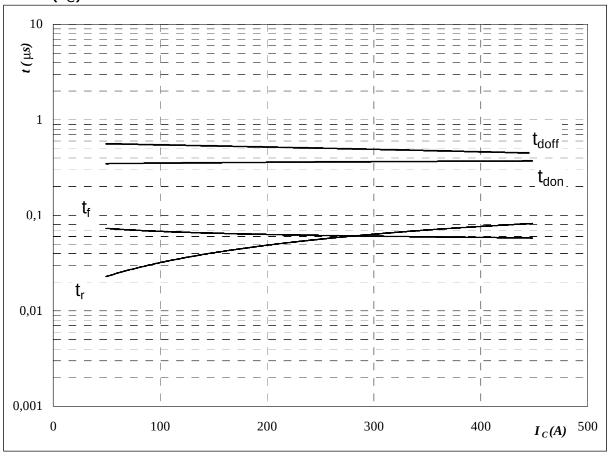
T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	251	A

Boost

Figure 9 IGBT

Typical switching times as a function of collector current

t = f(I_C)



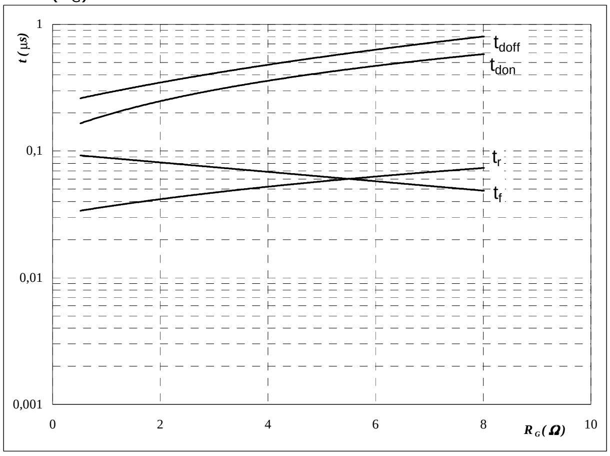
With an inductive load at

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

Figure 10 IGBT

Typical switching times as a function of gate resistor

t = f(R_G)



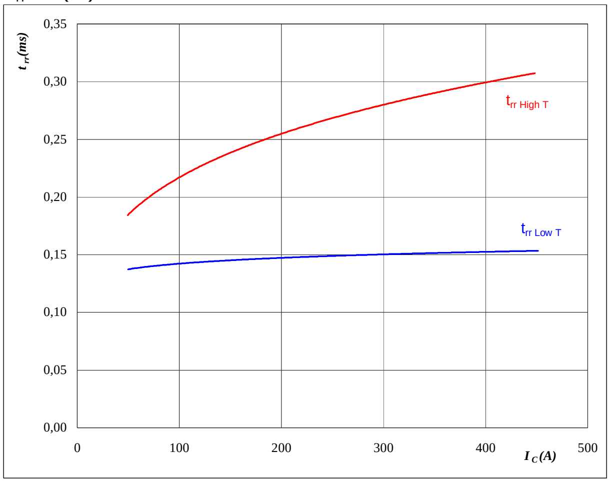
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	251	A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(Ic)



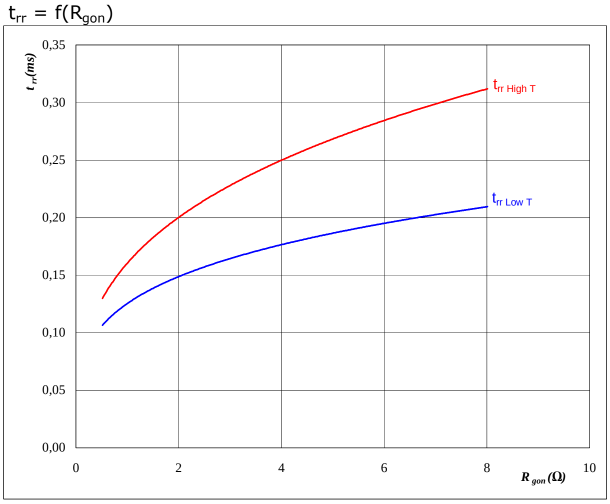
At

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

Figure 12 FWD

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

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



At

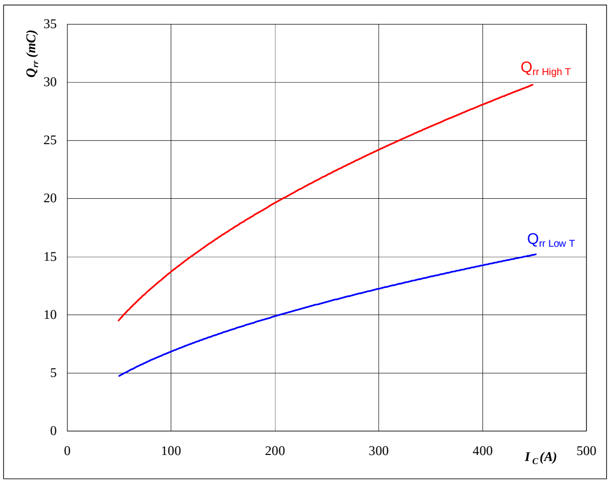
T_j =	25/125	°C
V_R =	350	V
I_F =	251	A
V_{GE} =	±15	V

Boost

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



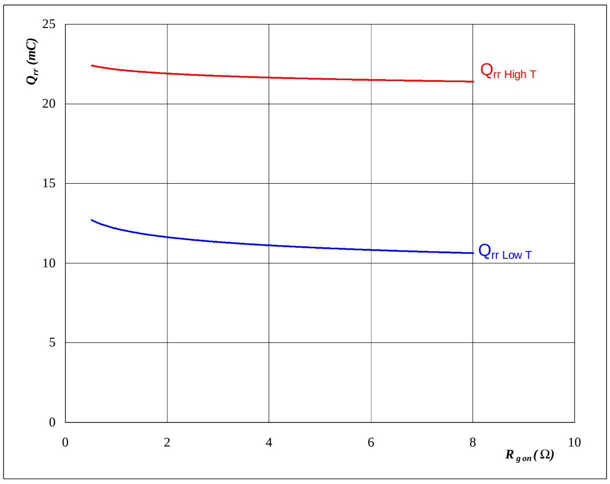
At

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

Figure 14 FWD

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

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



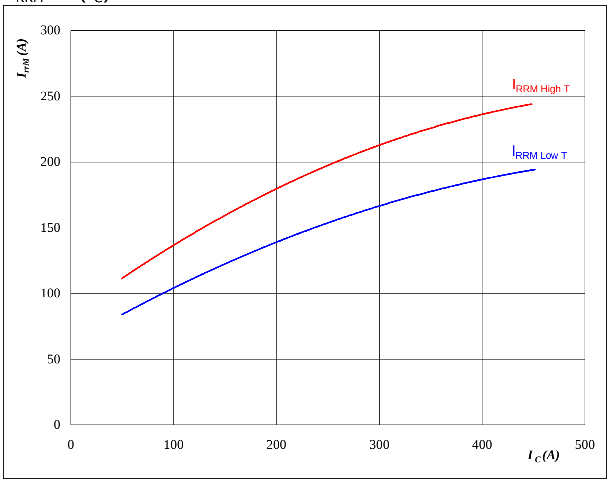
At

T_j =	25/125	°C
V_R =	350	V
I_F =	251	A
V_{GE} =	±15	V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



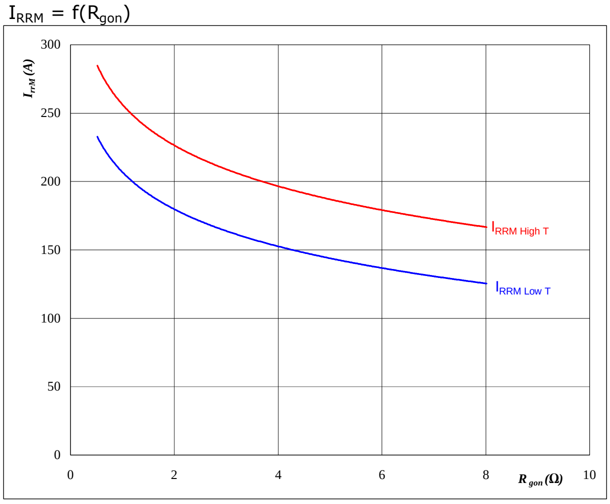
At

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

Figure 16 FWD

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

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



At

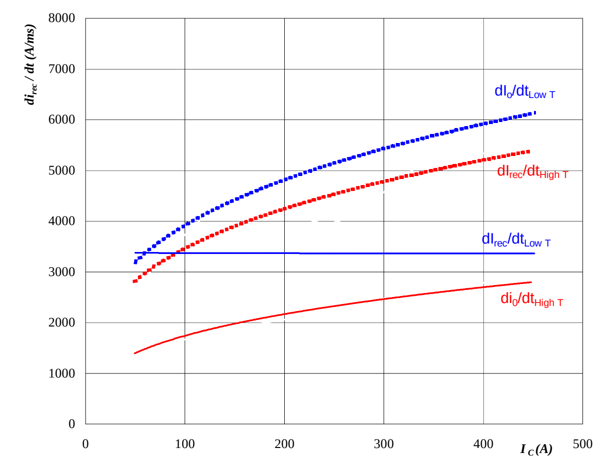
T_j =	25/125	°C
V_R =	350	V
I_F =	251	A
V_{GE} =	±15	V

Boost

Figure 17 FWD

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

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



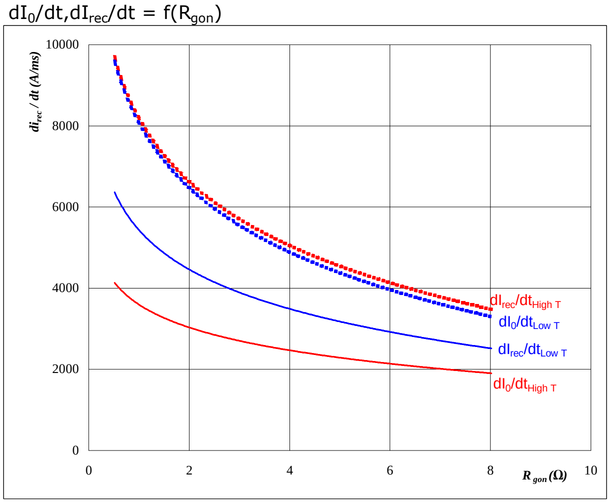
At

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

Figure 18 FWD

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

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



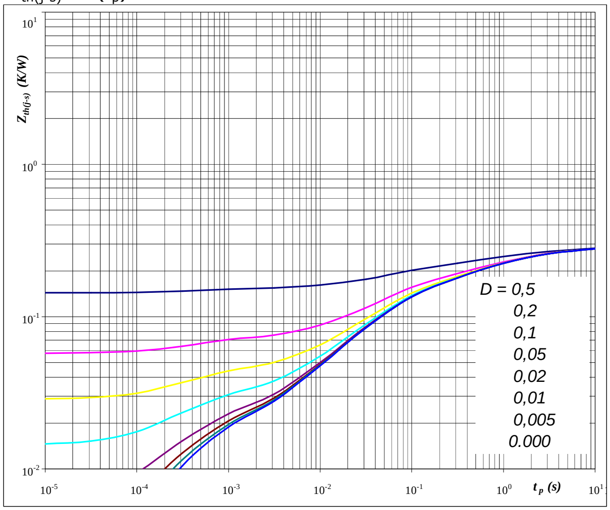
At

T_j =	25/125	°C
V_R =	350	V
I_F =	251	A
V_{GE} =	±15	V

Figure 19 IGBT

IGBT transient thermal impedance as a function of pulse width

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



At

D =	tp / T	
$R_{th(j-s)}$ =	0,29	K/W

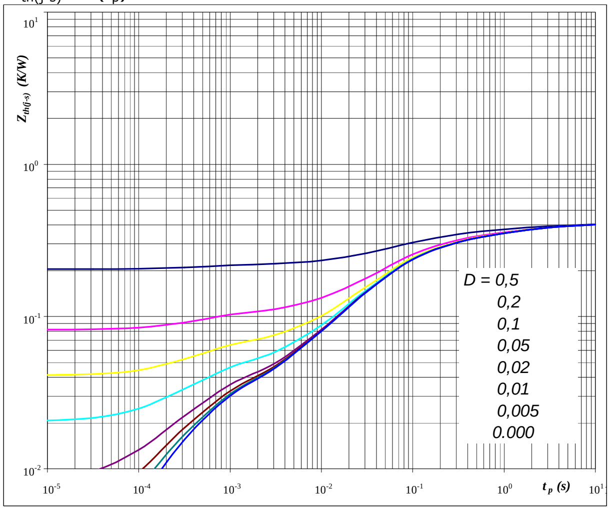
IGBT thermal model values

R (K/W)	Tau (s)
0,02	9,6E+00
0,07	1,7E+00
0,07	2,9E-01
0,09	4,4E-02
0,02	7,6E-03
0,02	3,6E-04

Figure 20 FWD

Diode transient thermal impedance as a function of pulse width

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



At

D =	tp / T	
$R_{th(j-s)}$ =	0,41	K/W

FWD thermal model values

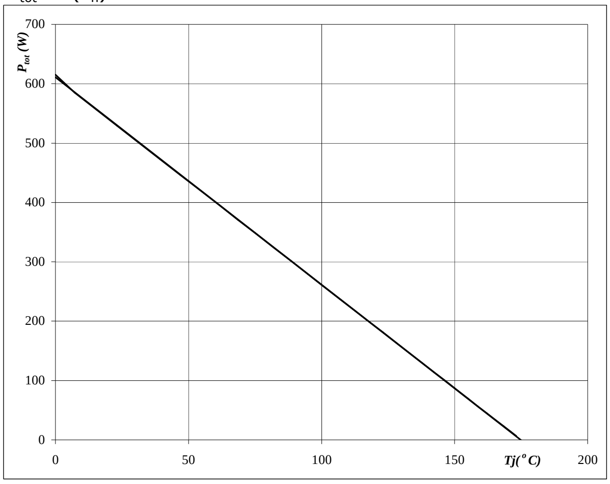
R (K/W)	Tau (s)
0,02	8,8E+00
0,06	1,6E+00
0,10	2,4E-01
0,16	5,4E-02
0,04	1,1E-02
0,03	4,5E-04

Boost

Figure 21 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



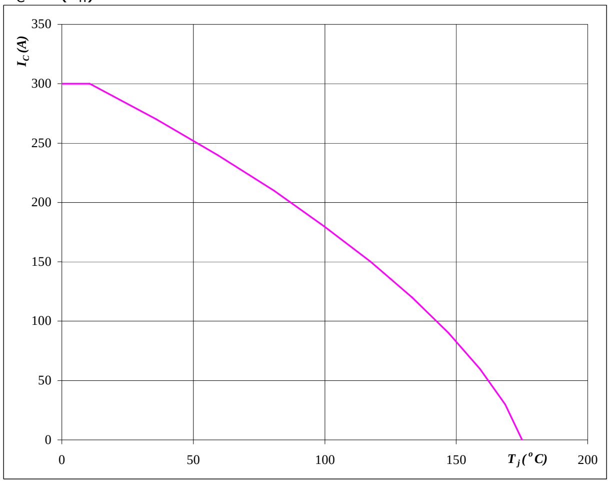
At

T_j = 175 ºC

Figure 22 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

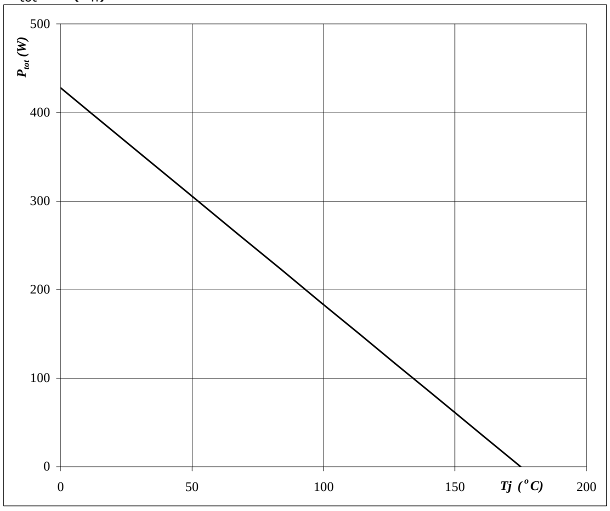
T_j = 175 ºC

V_{GE} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



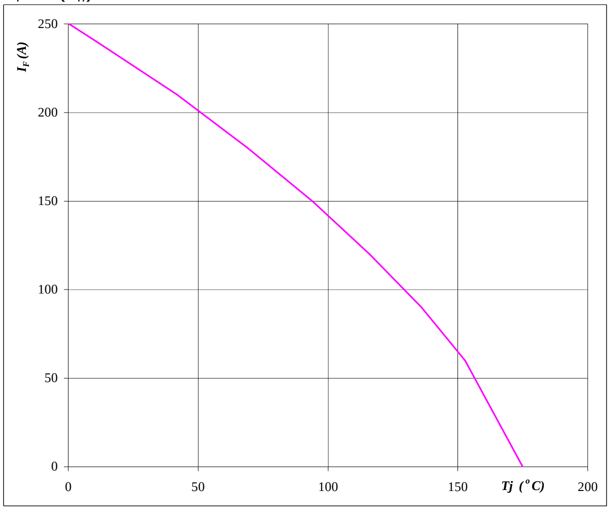
At

T_j = 175 ºC

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

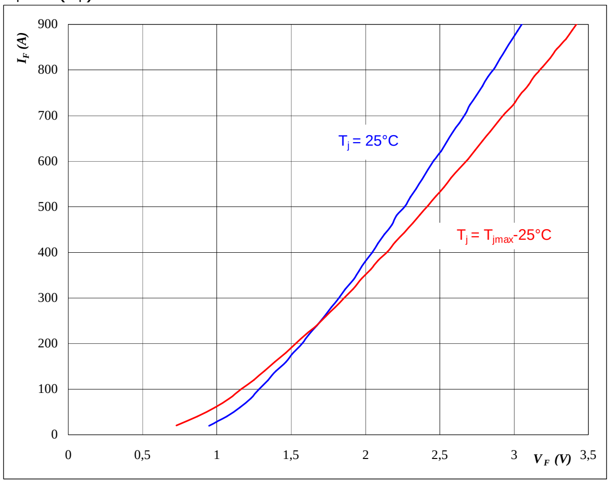
T_j = 175 ºC

Boost

Figure 25 Boost Inverse Diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



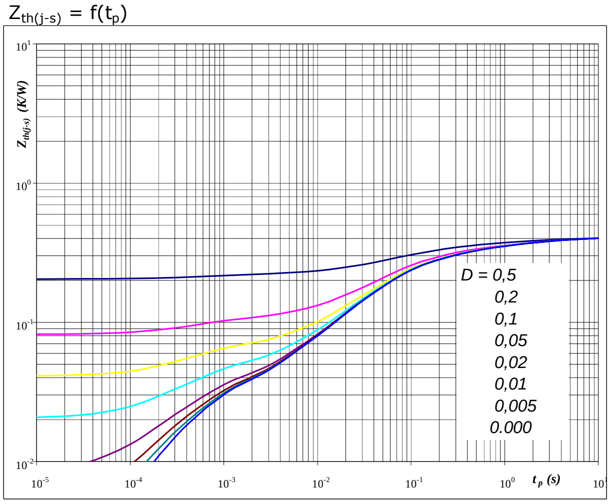
At

t_p = 250 µs

Figure 26 Boost Inverse Diode

Diode transient thermal impedance as a function of pulse width

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



At

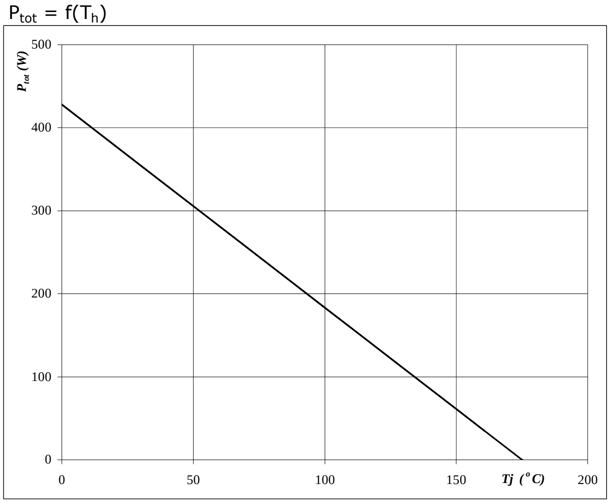
D = tp / T

$R_{th(j-s)}$ = 0,41 K/W

Figure 27 Boost Inverse Diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



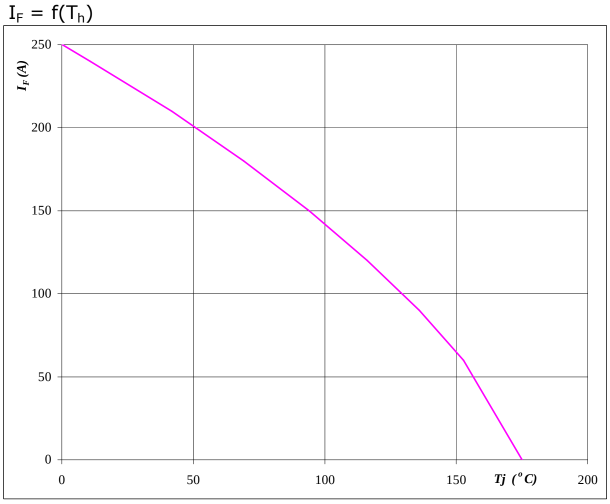
At

T_j = 175 ºC

Figure 28 Boost Inverse Diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



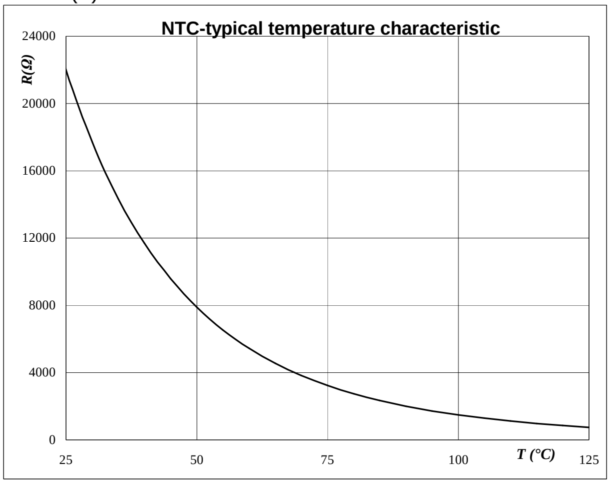
At

T_j = 175 ºC

Thermistor

Figure 1	Thermistor

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



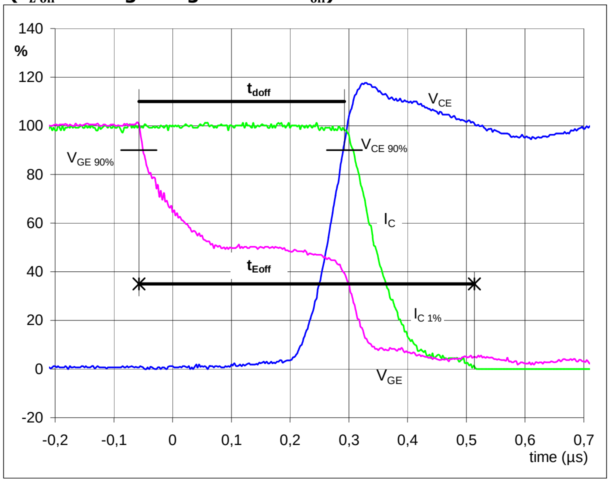
Switching Definitions BUCK

General conditions

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

Figure 1 Buck IGBT

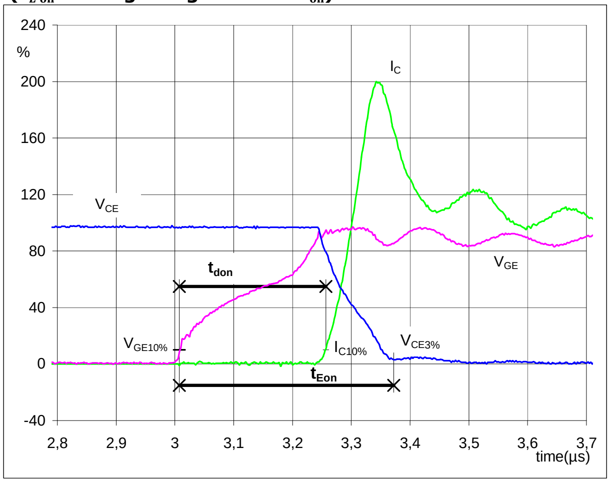
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	249	A
t_{doff} =	0,34	µs
$t_{E\,off}$ =	0,57	µs

Figure 2 Buck IGBT

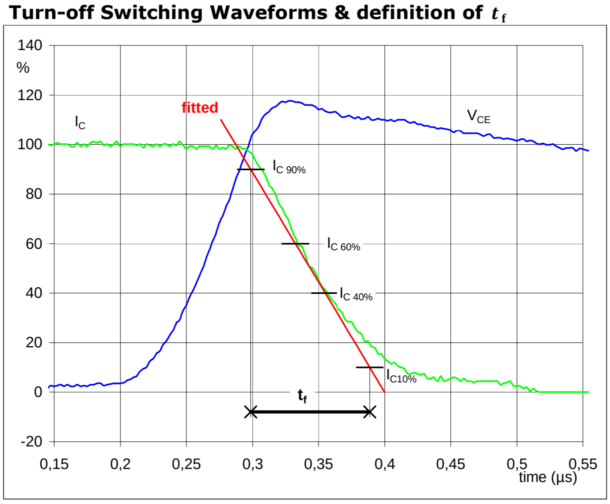
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	249	A
t_{don} =	0,25	µs
$t_{E\,on}$ =	0,36	µs

Figure 3 Buck IGBT

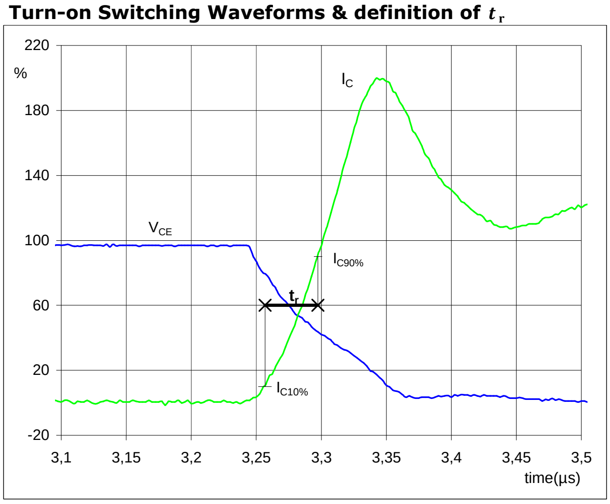
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	350	V
I_C (100%) =	249	A
t_f =	0,09	µs

Figure 4 Buck IGBT

Turn-on Switching Waveforms & definition of t_r

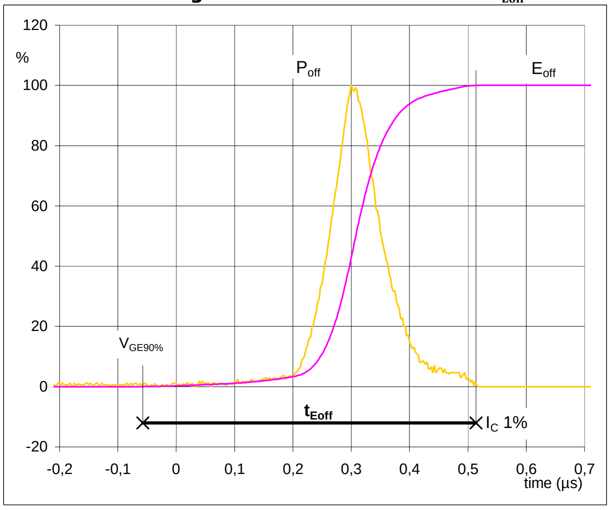


V_C (100%) =	350	V
I_C (100%) =	249	A
t_r =	0,04	µs

Switching Definitions BUCK

Figure 5 Buck IGBT

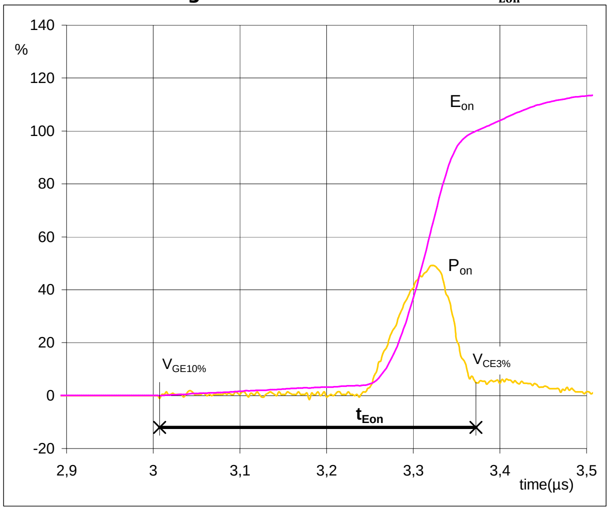
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	87,06	kW
E_{off} (100%) =	9,37	mJ
$t_{E\,off}$ =	0,57	µs

Figure 6 Buck IGBT

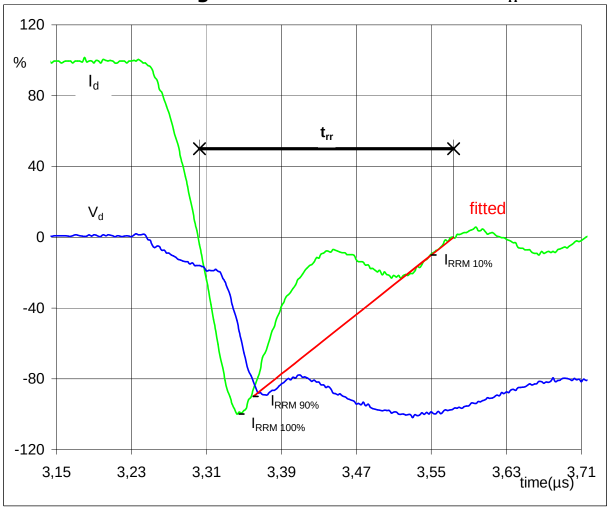
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	87,06	kW
E_{on} (100%) =	3,62	mJ
$t_{E\,on}$ =	0,36	µs

Figure 7 BUCK FWD

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

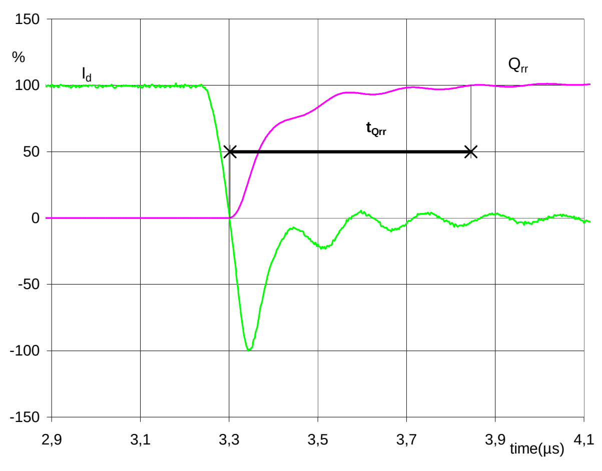


V_d (100%) =	350	V
I_d (100%) =	249	A
I_{RRM} (100%) =	-250	A
t_{rr} =	0,14	µs

Switching Definitions BUCK

Figure 8 BUCK FWD

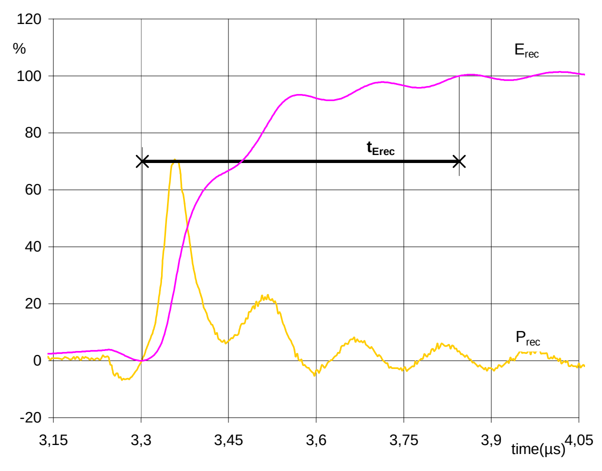
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_d (100%) =	249	A
Q_{rr} (100%) =	21,68	μC
$t_{Q\,rr}$ =	0,54	μs

Figure 9 BUCK FWD

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



P_{rec} (100%) =	87,06	kW
E_{rec} (100%) =	5,22	mJ
$t_{E\,rec}$ =	0,54	μs

Measurement circuits

Figure 10

BUCK stage switching measurement circuit

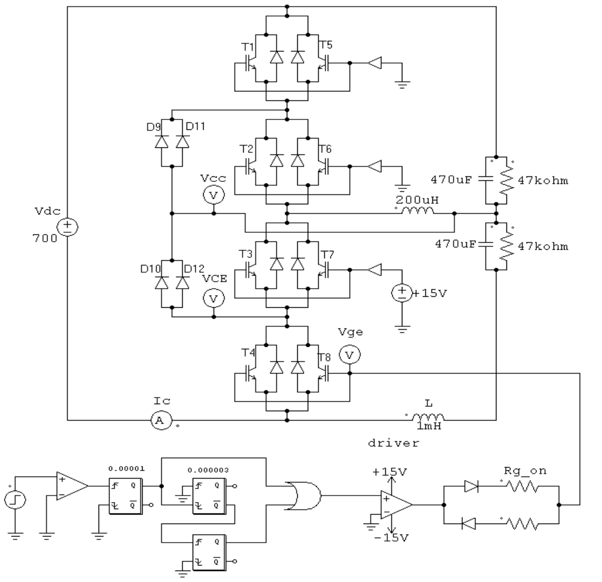
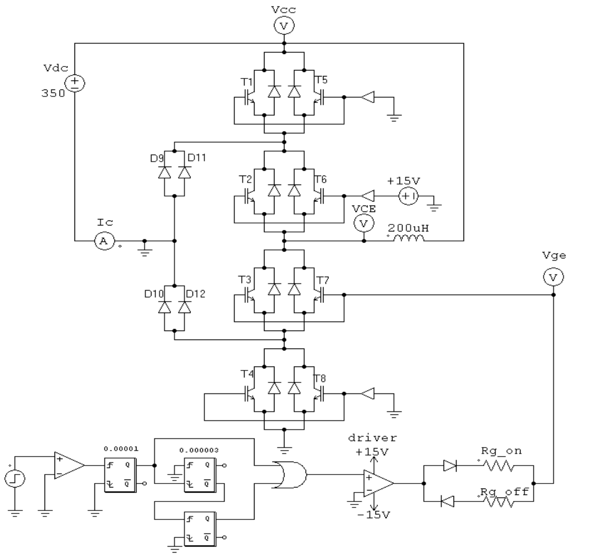


Figure 11

BOOST 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 *flow* 2 17mm housing	30-P206NIA300SA-M106FY	M106FY	M106FY
Standard in *flow* 2 17mm housing	30-F206NIA300SA-M106F	M106F	M106F

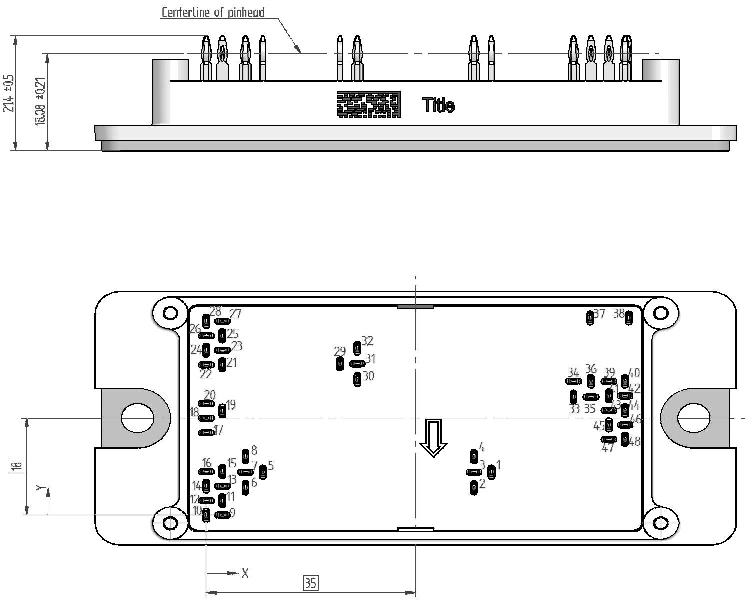
Outline

Pin table

Pin	X	Y	function
1	47,65	8	S3
2	44,75	5,1	G7
3	44,75	8	S7
4	44,75	10,9	G3
5	9,45	8	S4
6	6,55	5,1	G8
7	6,55	8	S8
8	6,55	10,9	G4
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	8,1	DC-
16	0	8,1	DC-
17	0	15,3	GND
18	0	18	GND
19	2,7	19,35	GND
20	0	20,7	GND
21	2,7	27,9	DC+
22	0	27,9	DC+
23	2,7	30,6	DC+
24	0	30,6	DC+
25	2,7	33,3	DC+
26	0	33,3	DC+
27	2,7	36	DC+
28	0	36	DC+
29	22,35	28,1	S1
30	25,25	25,2	G5
31	25,25	28,1	S5
32	25,25	31	G1

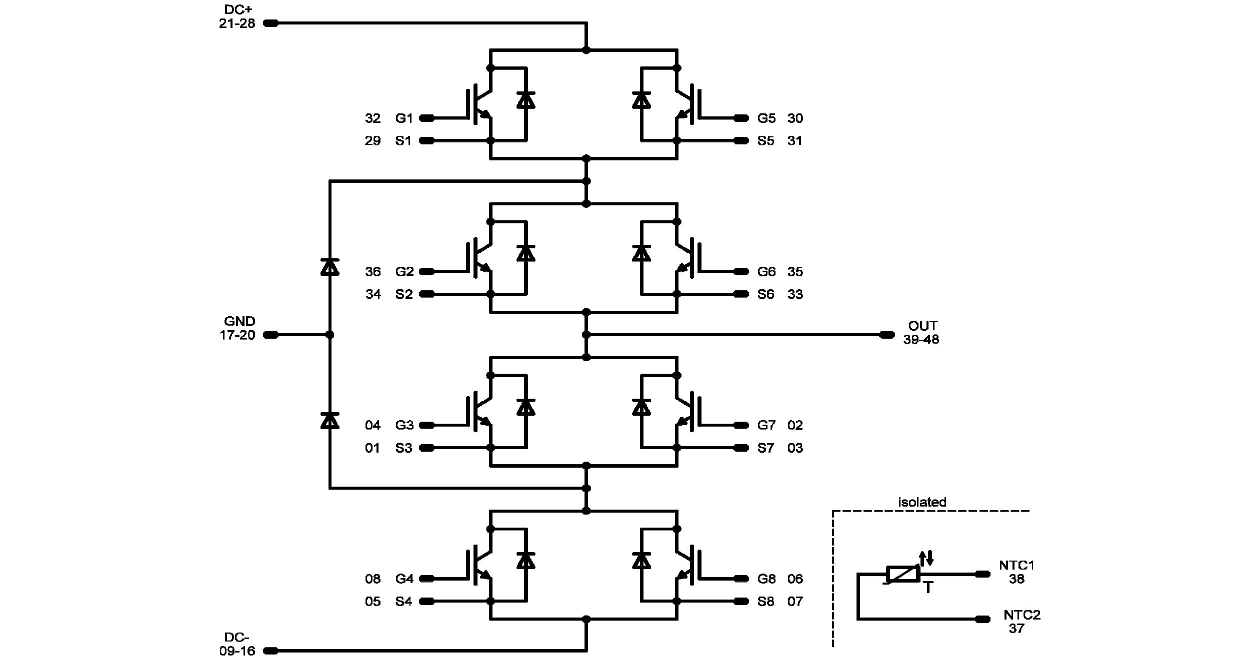
Pin table

Pin	X	Y	function
33	61,4	22	S6
34	61,4	25	S2
35	64,3	22	G6
36	64,3	25	G2
37	64,2	37	NTC2
38	70,6	37	NTC1
39	67,3	25	OUT
40	70	25	OUT
41	67,3	22	OUT
42	70	22	OUT
43	67,3	19	OUT
44	70	19	OUT
45	67,3	17	OUT
46	70	17	OUT
47	67,3	14	OUT
48	70	14	OUT



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

Pinout


DC+
21-28
32 G1
29 S1
G5 30
S5 31
36 G2
34 S2
G6 35
S6 33
GND
17-20
OUT
39-48
04 G3
01 S3
G7 02
S7 03
isolated
08 G4
05 S4
G8 06
S8 07
T
NTC1
38
NTC2
37
DC-
09-16

Packaging instruction					
Standard packaging quantity (SPQ)	36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 packages see vincotech.com website.