Vincotech

30-PT07NIA320RV-LE06F68Y / 30-FT07NIA320RV-LE06F68

datasheet

***flow*NPC 2** **1200 V / 320 A**

Features

- Fast swtching IGBTs for fast switching frequencies
- Low inductive package

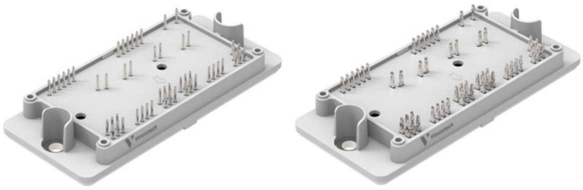
Target applications

- Solar Inverters

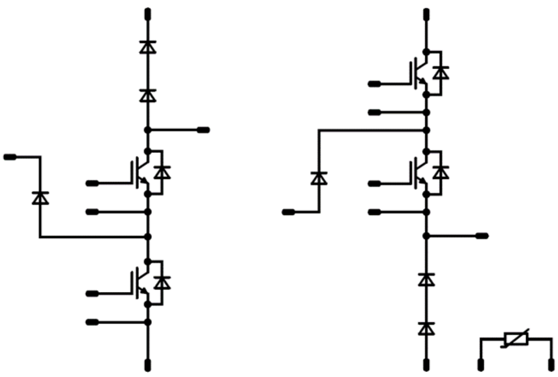
Types

- 30-PT07NIA320RV-LE06F68Y
- 30-FT07NIA320RV-LE06F68

flow 2 (2 DCB) 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	195	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	1280	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	288	W
Gate-emitter voltage	V_{GES}		±30	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V Vcc = 360 V T_j = 25 °C	2	μs
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	166	A
Repetitive peak forward current	I_{FRM}			1280	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	206	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	195	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		1280	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	288	W
Gate-emitter voltage	V_{GES}			±30	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V Vcc = 360 V	T_j = 25 °C	2	μs
Maximum junction temperature	T_{jmax}			175	°C
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1300	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	168	A
Repetitive peak forward current	I_{FRM}			1280	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	419	W
Maximum junction temperature	T_{jmax}			175	°C
Buck Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			30	A
Repetitive peak forward current	I_{FRM}			120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	58	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			30	A
Repetitive peak forward current	I_{FRM}			120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	58	W
Maximum junction temperature	T_{jmax}			175	°C

Module Properties

Thermal Properties

Parameter	Symbol	Condition	Value	Unit
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…(T_{jmax} - 25)	°C

Isolation Properties

Parameter	Symbol	Condition		Value	Unit
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	4000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance				min. 12,7	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			5	0,2284	25	5	6	7	V
Collector-emitter saturation voltage	V_{CEsat}		15		320	25 125 150		1,65 1,69 1,75	1,9	V
Collector-emitter cut-off current	I_{CES}		0	650		25			40	µA
Gate-emitter leakage current	I_{GES}		30	0		25			800	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	30		25		19240		pF
Output capacitance	C_{oes}							736		
Reverse transfer capacitance	C_{res}							316		
Gate charge	Q_g		15	400	320	25		684		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	320	25 125 150		115 107 109		ns
Rise time	t_r					25 125 150		12 14 13		
Turn-off delay time	$t_{d(off)}$					25 125 150		113 122 125		
Fall time	t_f					25 125 150		34 42 43		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 10,5 µC Q_{rFWD} = 16,5 µC Q_{rFWD} = 19 µC				25 125 150		1,099 2,351 2,418		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,483 5,425 5,902		

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				320	25 125 150		1,55 1,62 1,62	1,9	V
Reverse leakage current	I_R			650		25			40	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,46		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 20376 A/µs di/dt = 18018 A/µs di/dt = 17862 A/µs	±15	350	320	25 125 150		400 431 444		A
Reverse recovery time	t_{rr}					25 125 150		55 69 90		ns
Recovered charge	Q_r					25 125 150		10,548 16,458 18,955		µC
Reverse recovered energy	E_{rec}					25 125 150		2,849 3,688 4,392		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		22078 14420 13032		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			5	0,2284	25	5	6	7	V
Collector-emitter saturation voltage	V_{CEsat}		15		320	25 125 150		1,65 1,69 1,75	1,9	V
Collector-emitter cut-off current	I_{CES}		0	650		25			40	µA
Gate-emitter leakage current	I_{GES}		30	0		25			800	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	30		25		19240		pF
Output capacitance	C_{oes}							736		
Reverse transfer capacitance	C_{res}							316		
Gate charge	Q_g		15	400	320	25		684		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	320	25 125 150		112 111 111		ns
Rise time	t_r					25 125 150		14 14 15		
Turn-off delay time	$t_{d(off)}$					25 125 150		116 124 127		
Fall time	t_f					25 125 150		31 43 47		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 10,5 µC Q_{rFWD} = 16,9 µC Q_{rFWD} = 19,3 µC				25 125 150		0,970 2,030 2,438		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,562 5,445 6,064		

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				320	25 125 150		3,08 3,30 3,26	3,8	V
Reverse leakage current	I_R			1300		25			40	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,23		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 18496 A/µs di/dt = 14673 A/µs di/dt = 15353 A/µs	±15	350	320	25 125 150		340 368 380		A
Reverse recovery time	t_{rr}					25 125 150		42 131 137		ns
Recovered charge	Q_r					25 125 150		10,512 16,942 19,349		µC
Reverse recovered energy	E_{rec}					25 125 150		2,913 3,944 4,643		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		28026 19719 17394		A/µs
Buck Sw. Protection Diode										
Static										
Forward voltage	V_F				30	25 125 150		1,58 1,75 1,70	1,9	V
Reverse leakage current	I_R			650		25			10	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,63		K/W

Characteristic Values

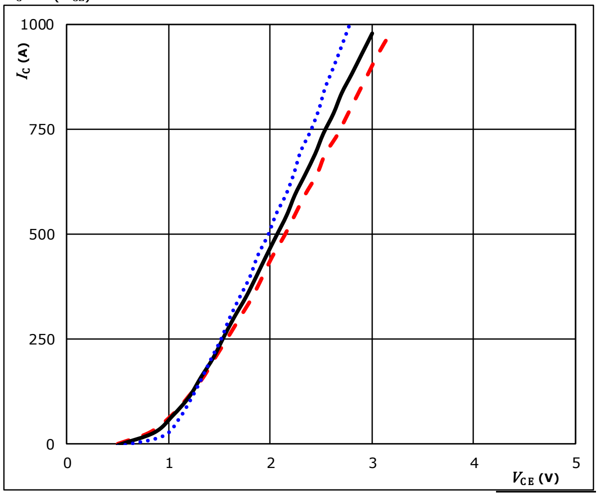
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				30	25 125 150		1,58 1,75 1,70	1,9	V
Reverse leakage current	I_R			650		25			10	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,63		K/W
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

$I_C = f(V_{CE})$

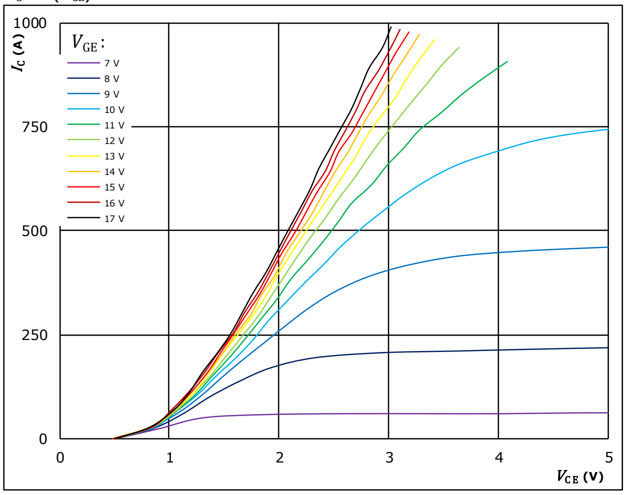


t_p =	250	μs		25 °C	···········
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

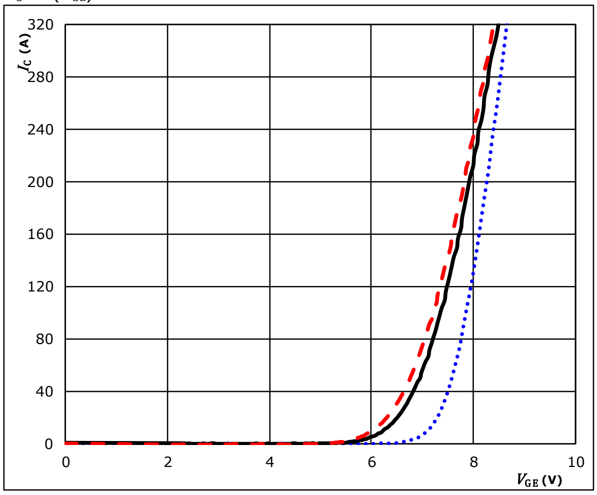


t_p =	250	μs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

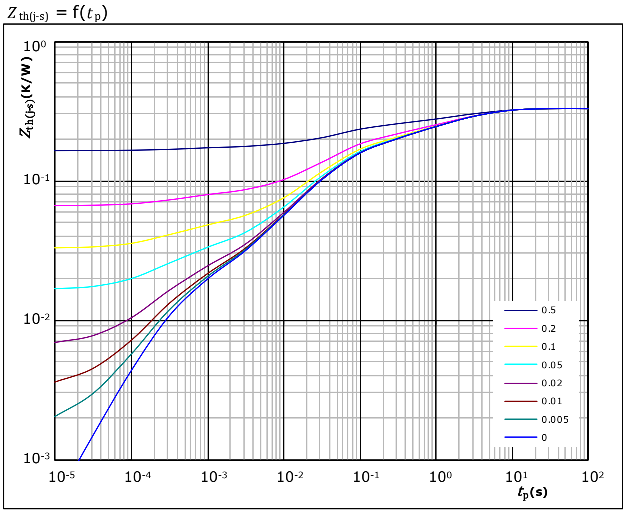


t_p =	100	μs		25 °C	···········
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,33	K/W

IGBT thermal model values

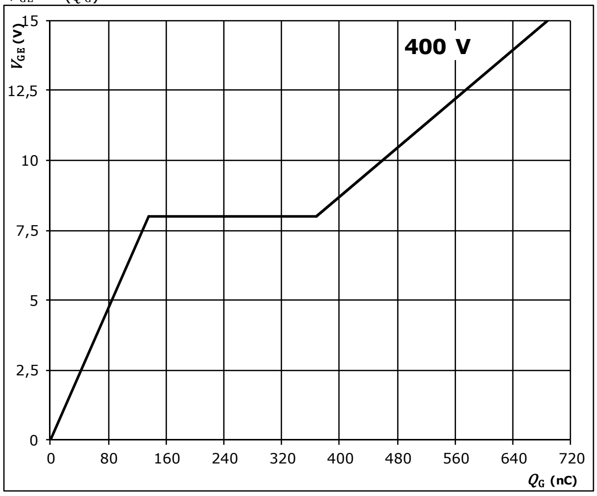
R (K/W)	τ (s)
7,40E-02	4,51E+00
7,65E-02	9,09E-01
5,04E-02	1,46E-01
1,01E-01	3,45E-02
1,34E-02	4,36E-03
1,43E-02	3,37E-04

Buck Switch Characteristics

figure 5.	IGBT

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$



I_C = 320 A

figure 6.	IGBT

Safe operating area

$I_C = f(V_{CE})$

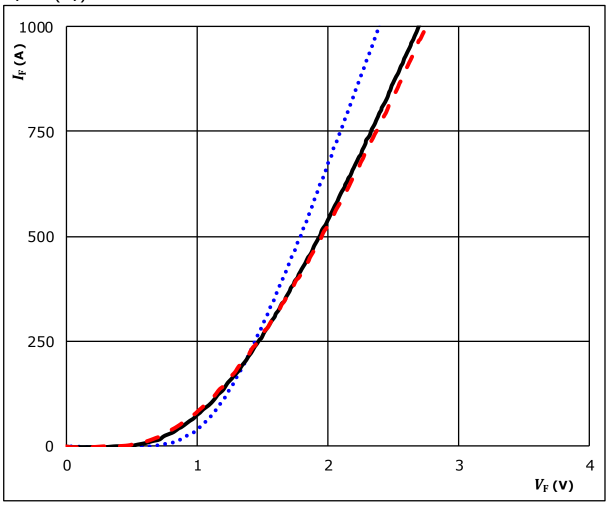
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



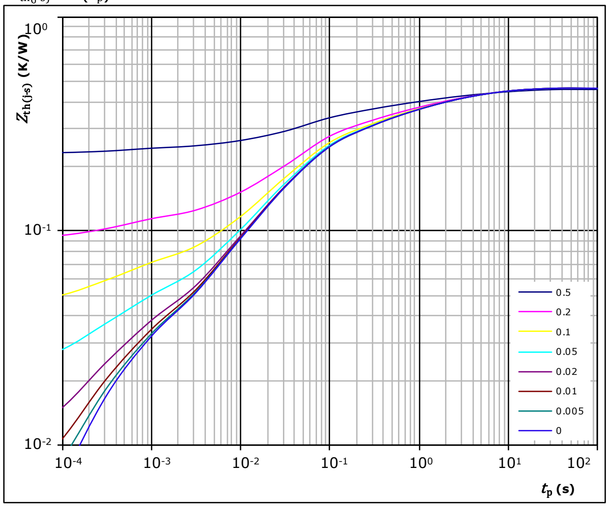
t_p = 250 µs

T_j: 25 °C ········ / 125 °C ——— / 150 °C – – –

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,46 K/W

FWD thermal model values

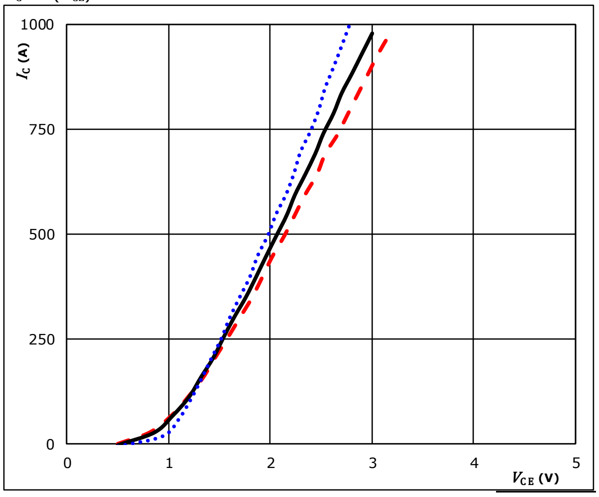
R (K/W)	τ (s)
6,31E-02	6,50E+00
8,04E-02	1,31E+00
8,87E-02	2,64E-01
1,65E-01	4,43E-02
3,87E-02	6,98E-03
2,43E-02	3,73E-04

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

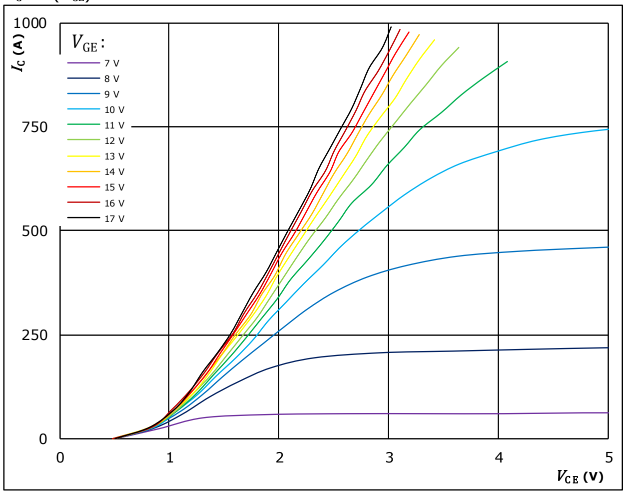


t_p =	250	µs		25 °C	············
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

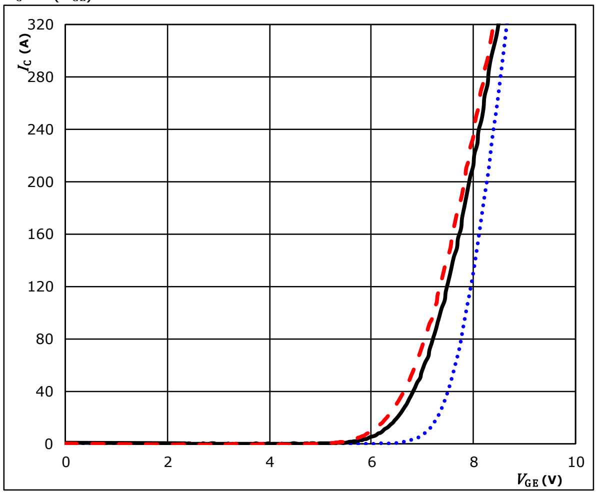


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

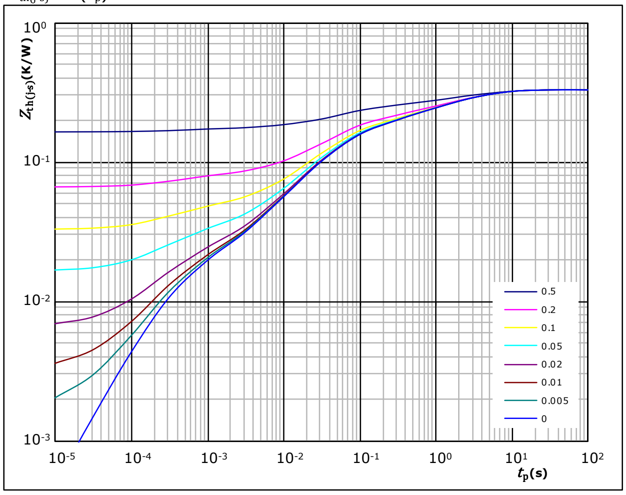


t_p =	100	µs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j\text{-}s)}$ =	0,33	K/W

IGBT thermal model values

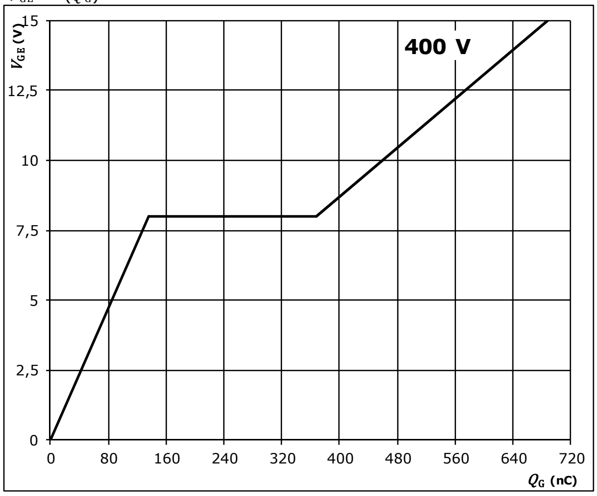
R (K/W)	τ (s)
7,40E-02	4,51E+00
7,65E-02	9,09E-01
5,04E-02	1,46E-01
1,01E-01	3,45E-02
1,34E-02	4,36E-03
1,43E-02	3,37E-04

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$



I_C = 320 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$

D = single pulse

T_s = 80 ºC

V_{GE} = ±15 V

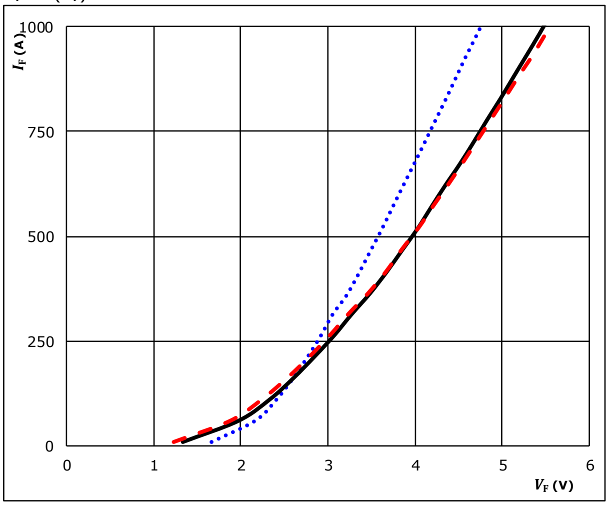
T_j = T_{jmax}

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



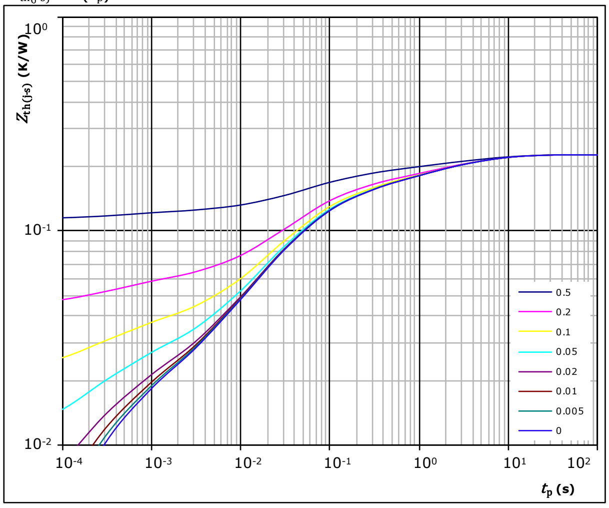
t_p = 250 μs

T_j:
25 °C
125 °C
150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,23 K/W

FWD thermal model values

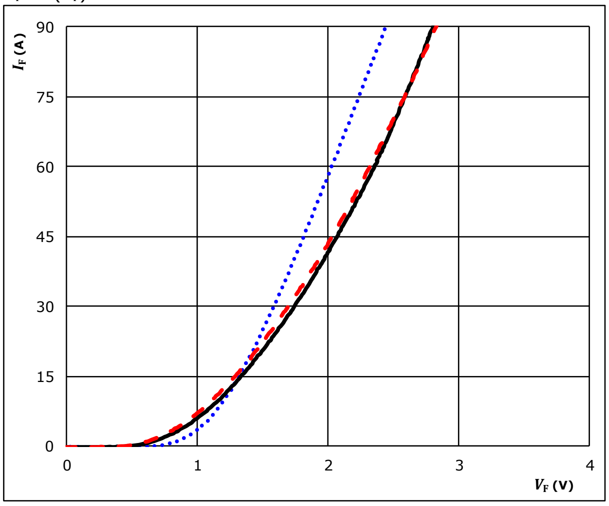
R (K/W)	τ (s)
2,98E-02	6,07E+00
3,97E-02	1,43E+00
4,45E-02	2,09E-01
7,10E-02	4,64E-02
2,25E-02	1,22E-02
6,79E-03	1,76E-03
1,22E-02	2,85E-04

Buck Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



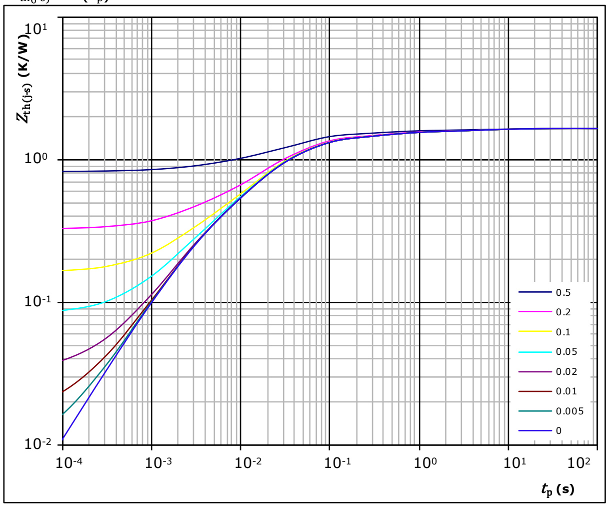
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,63 K/W

FWD thermal model values

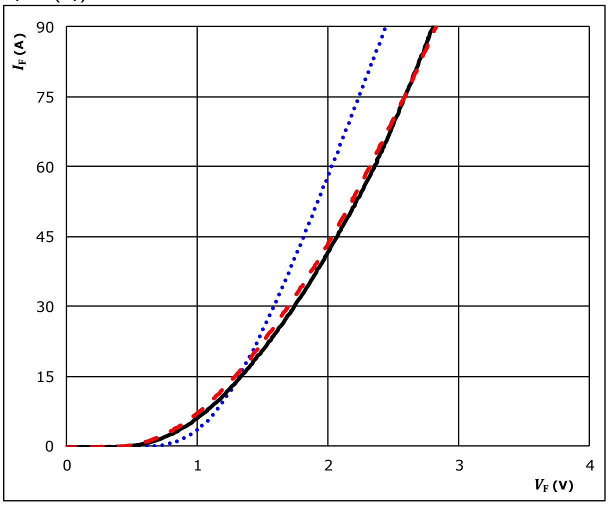
R (K/W)	τ (s)
9,92E-02	5,24E+00
2,09E-01	3,38E-01
2,18E-01	6,29E-02
9,00E-01	2,20E-02
2,06E-01	2,64E-03

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



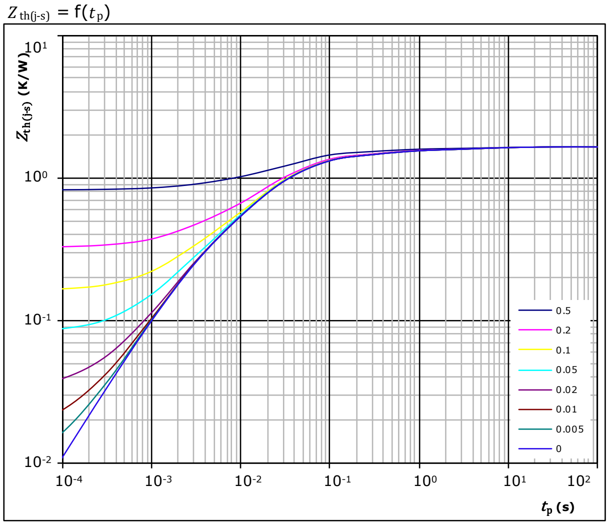
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,63 K/W

FWD thermal model values

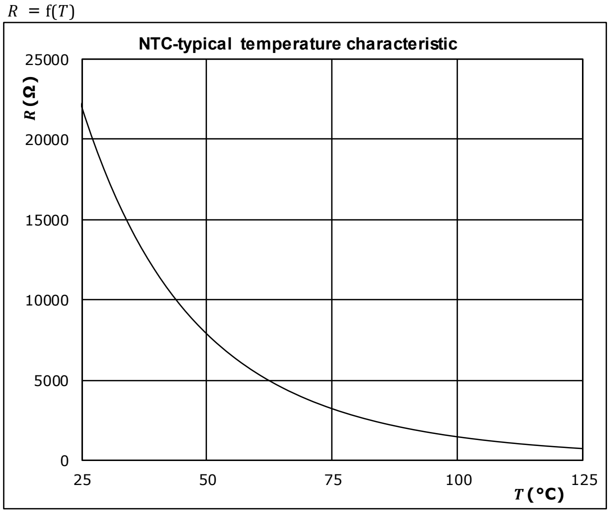
R (K/W)	τ (s)
9,92E-02	5,24E+00
2,09E-01	3,38E-01
2,18E-01	6,29E-02
9,00E-01	2,20E-02
2,06E-01	2,64E-03

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

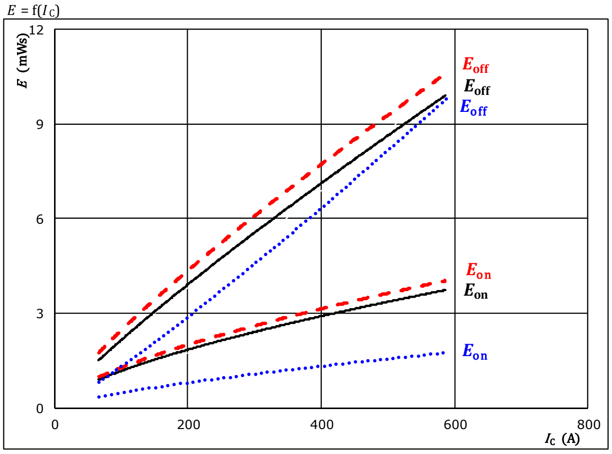


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



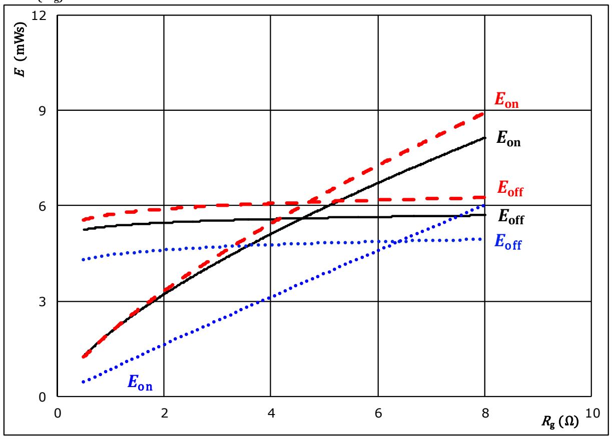
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	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

$E = f(R_g)$



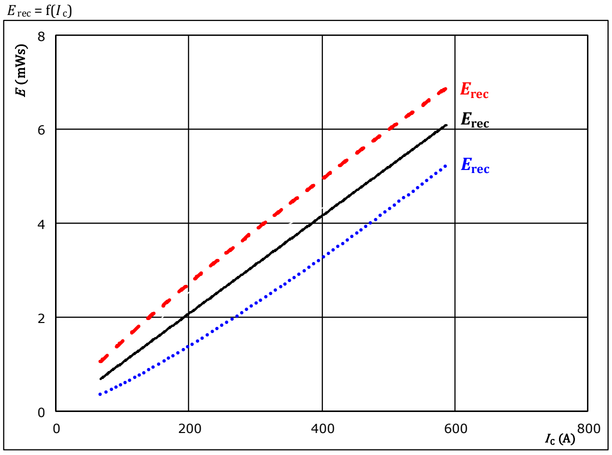
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	320	A		150 °C	– – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



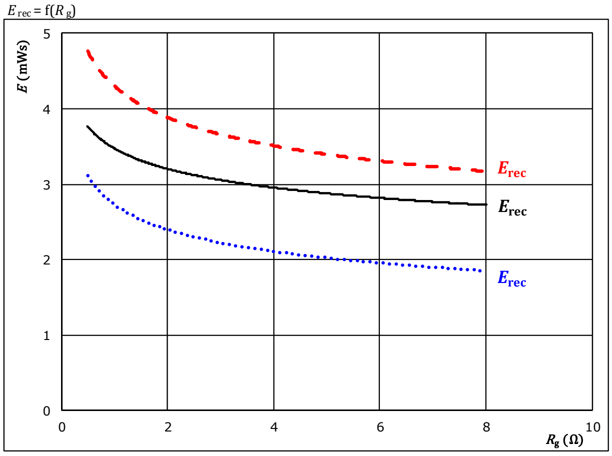
With an inductive load at

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

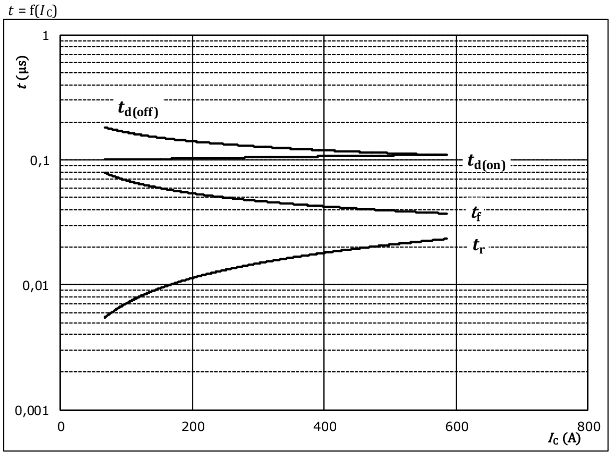
V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	320	A		150 °C	– – –

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



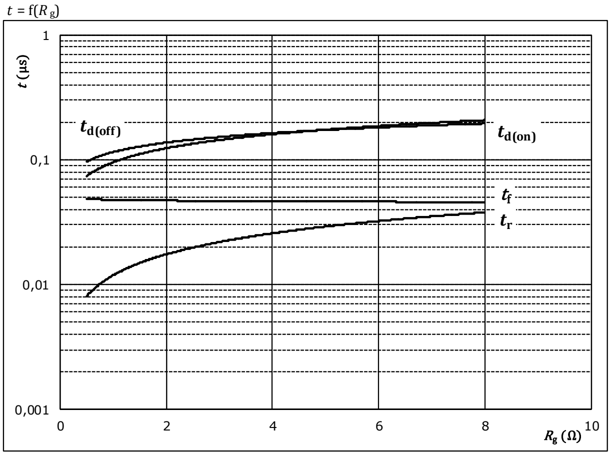
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



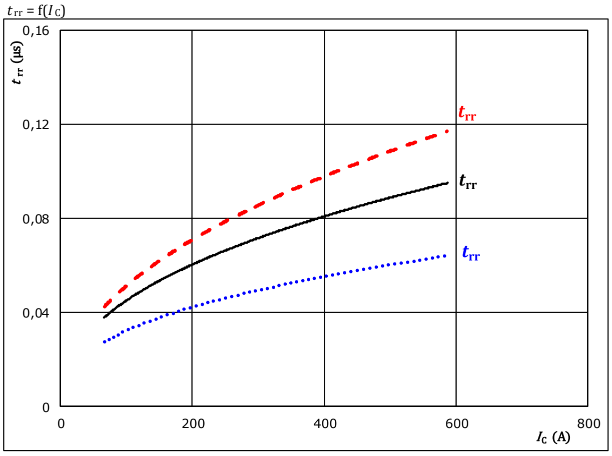
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	320	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



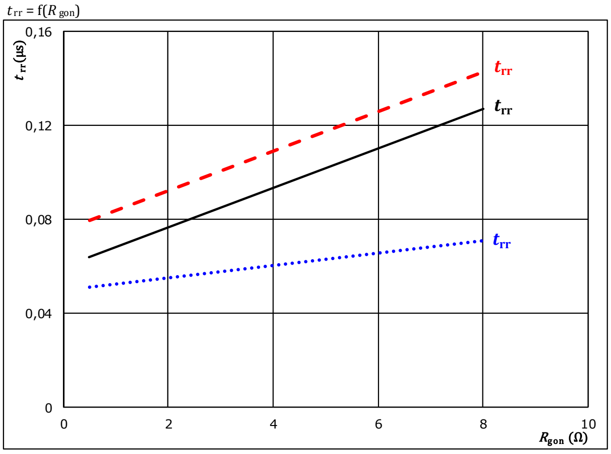
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C	dotted blue
V_{GE} =	±15	V		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

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



With an inductive load at

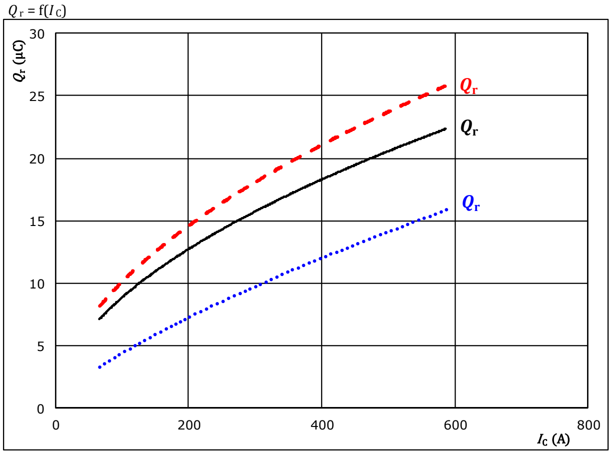
V_{CE} =	350	V	T_j:	25 °C	dotted blue
V_{GE} =	±15	V		125 °C	solid black
I_C =	320	A		150 °C	dashed red

Buck Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



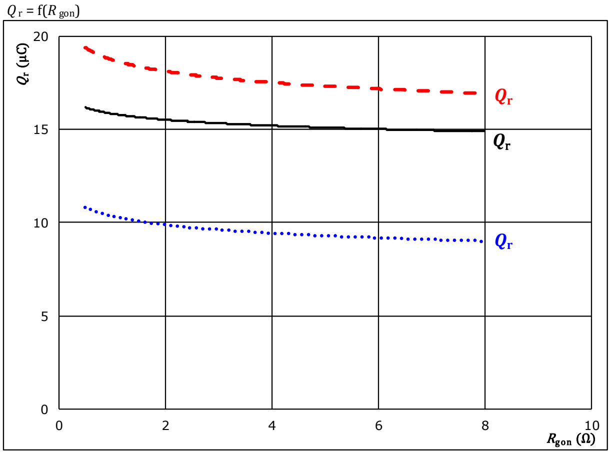
With an inductive load at

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

figure 10. FWD

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

$Q_r = f(R_{gon})$



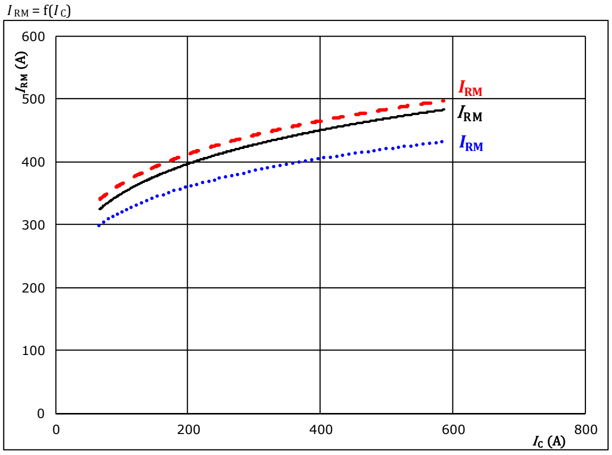
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C=	320	A		150 °C	dashed

figure 11. FWD

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

$I_{RM} = f(I_C)$



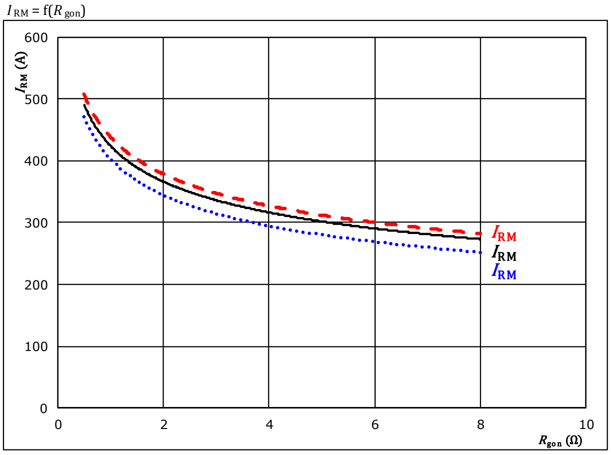
With an inductive load at

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

figure 12. FWD

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

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



With an inductive load at

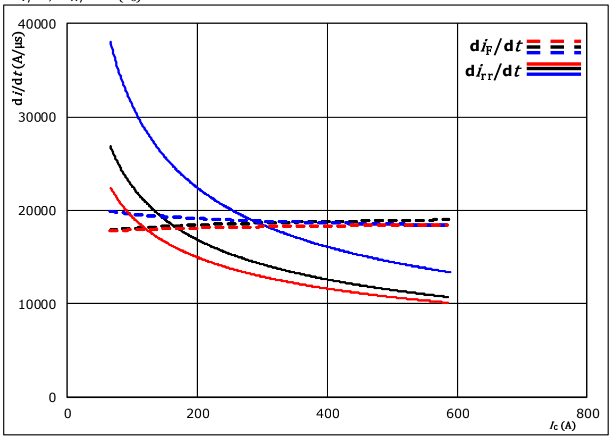
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	320	A		150 °C	dashed

Buck Switching Characteristics

figure 13. **FWD**

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

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



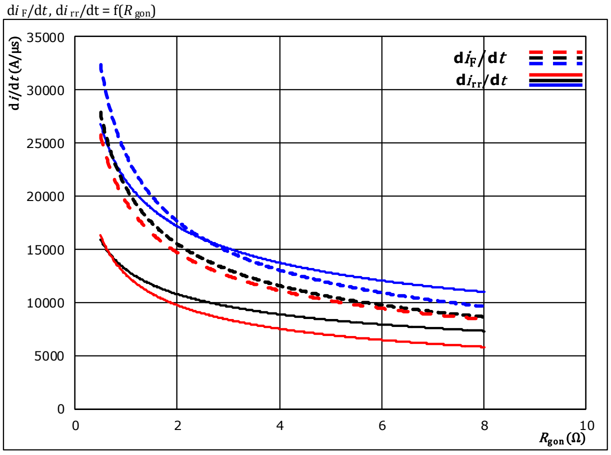
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	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, $di_{rr}/dt = f(R_{gon})$



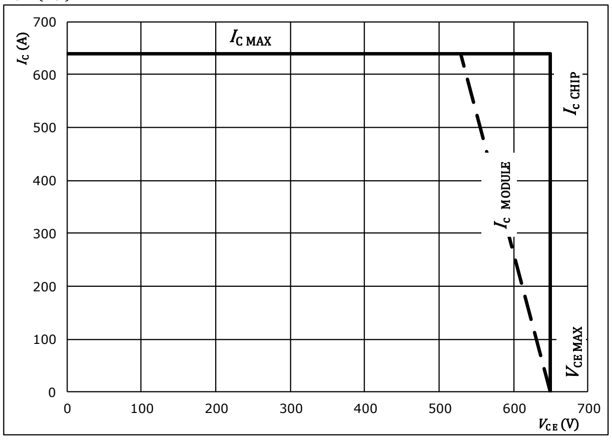
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	320	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

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

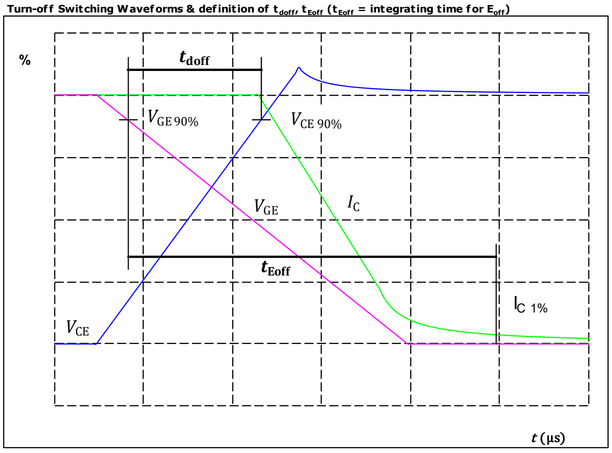
Buck Switching Definitions

General conditions

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

figure 1. IGBT

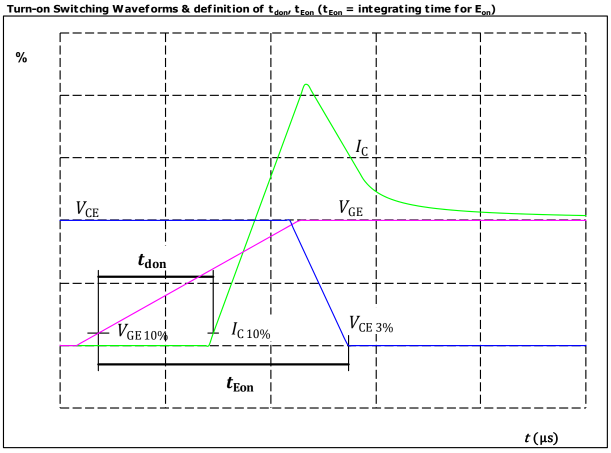
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_{doff} =	122	ns

figure 2. IGBT

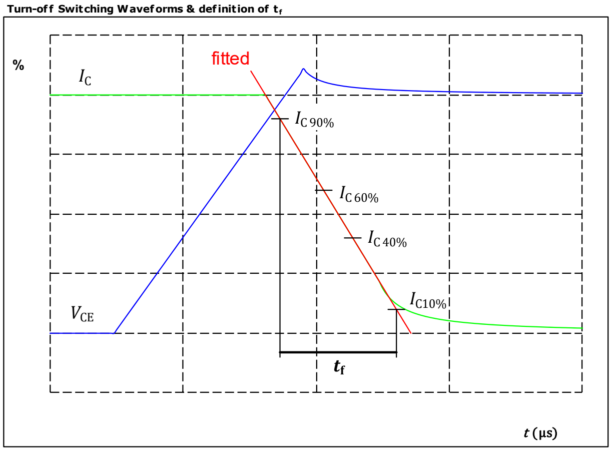
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_{don} =	107	ns

figure 3. IGBT

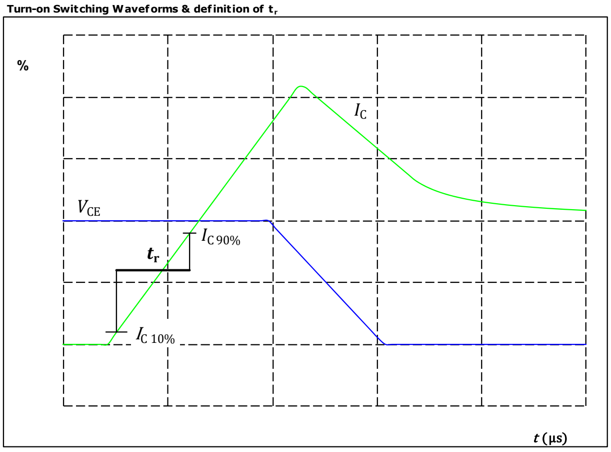
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_f =	42	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

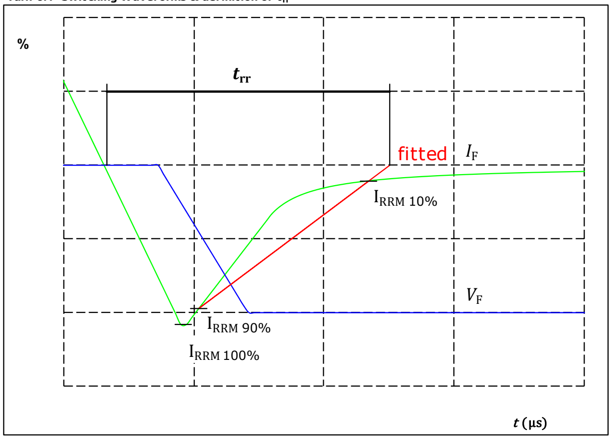


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_r =	14	ns

Buck Switching Characteristics

figure 5. **FWD**

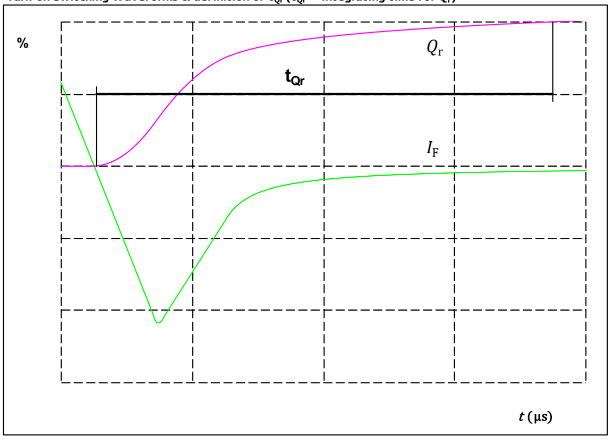
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	320	A
I_{RRM} (100%) =	431	A
t_{rr} =	69	ns

figure 6. **FWD**

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



I_F (100%) =	320	A
Q_r (100%) =	0	µC

30-PT07NIA320RV-LE06F68Y / 30-FT07NIA320RV-LE06F68

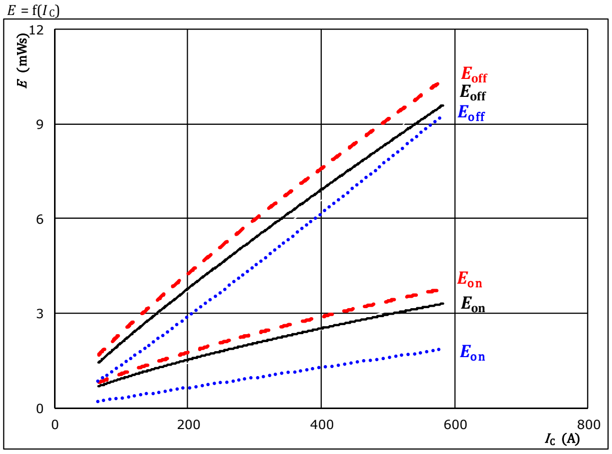
datasheet

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



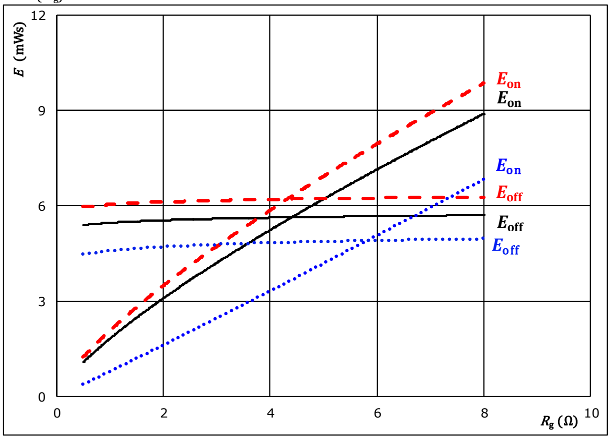
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



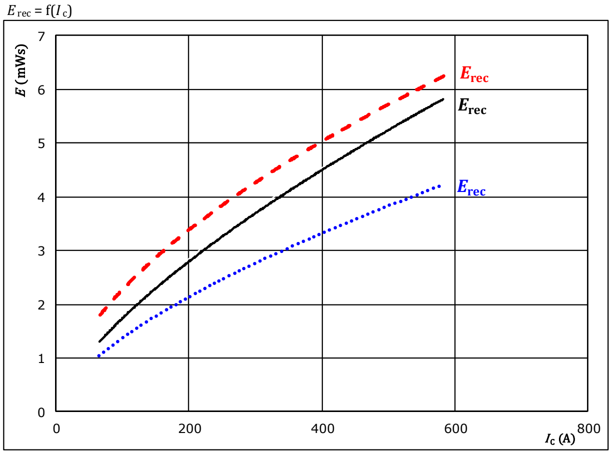
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	320	A		150 °C	– – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



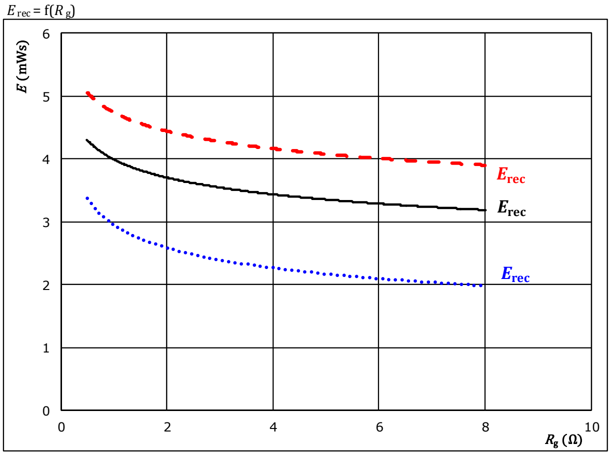
With an inductive load at

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

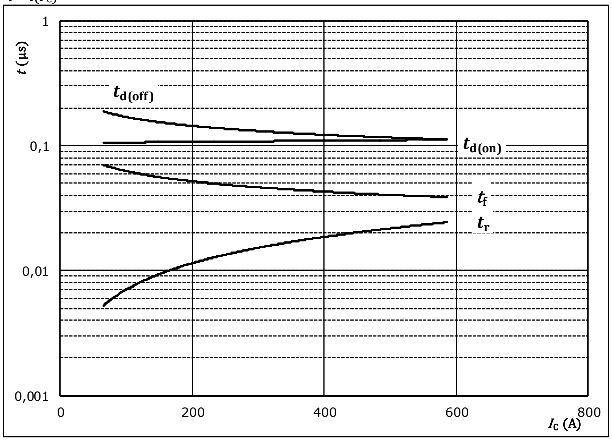
V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	320	A		150 °C	– – –

Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



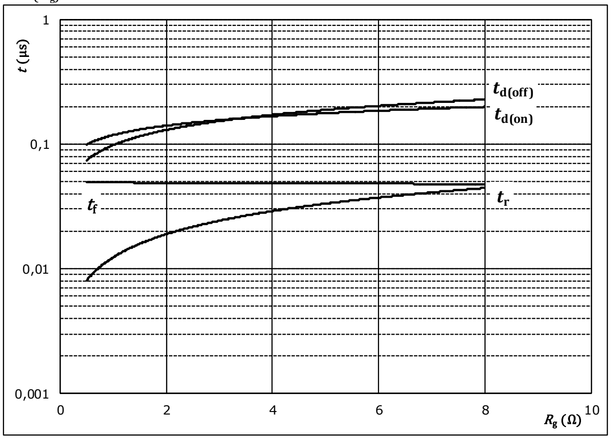
With an inductive load at

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

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



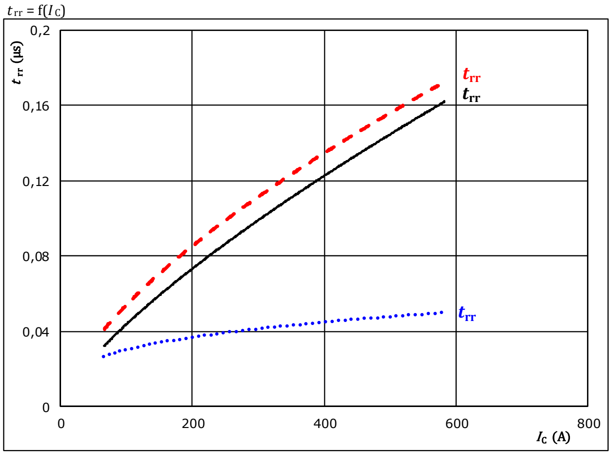
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	320	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



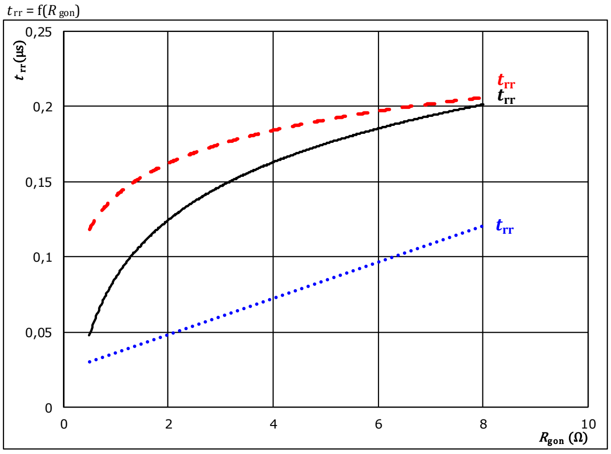
With an inductive load at

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

figure 8. FWD

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

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



With an inductive load at

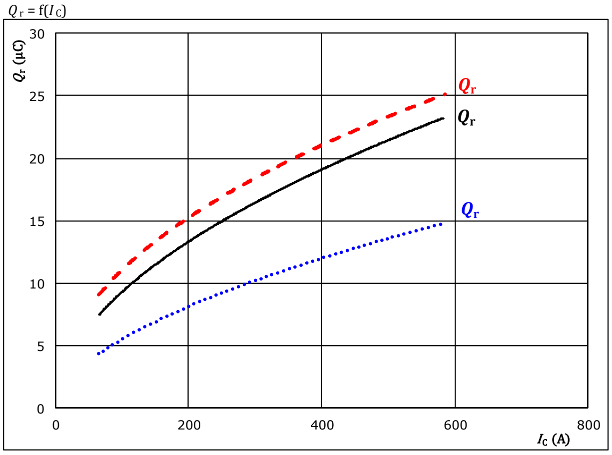
V_{CE} =	350	V	T_j:	25 °C / 125 °C / 150 °C
V_{GE} =	±15	V		
I_C =	320	A		

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



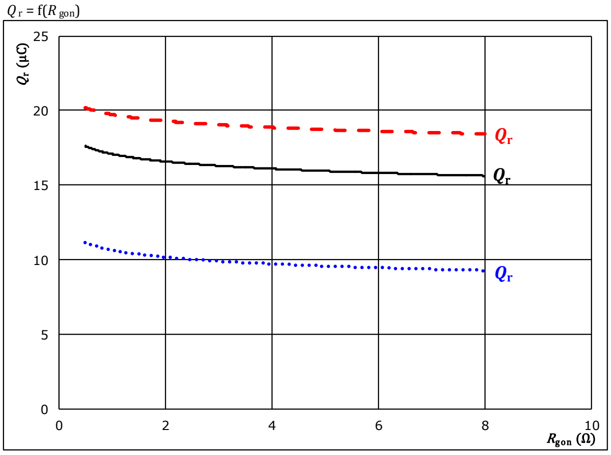
With an inductive load at

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

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



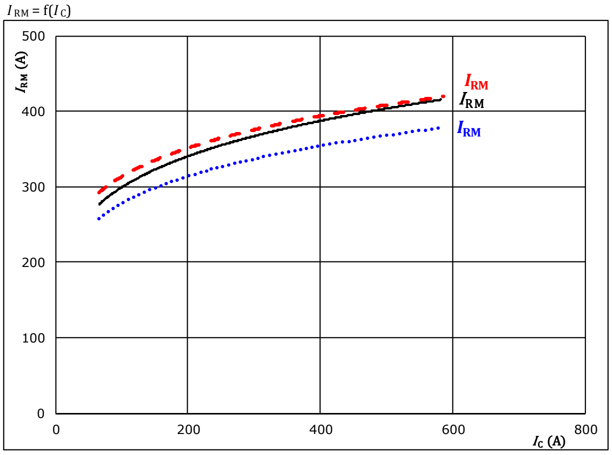
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	320	A		150 °C

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



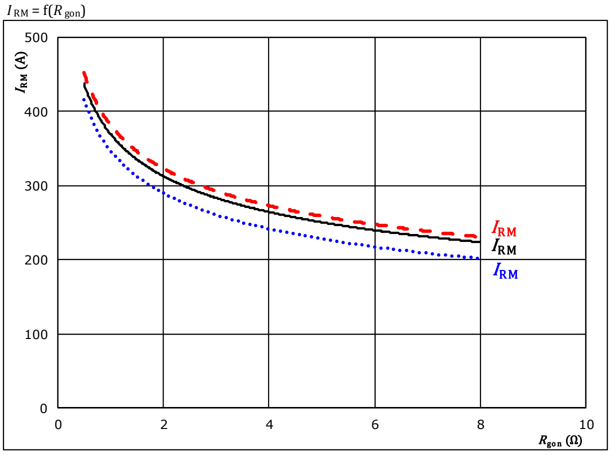
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		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

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



With an inductive load at

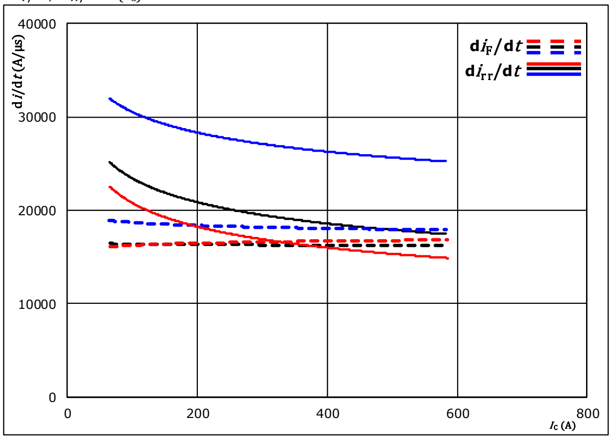
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	320	A		150 °C

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



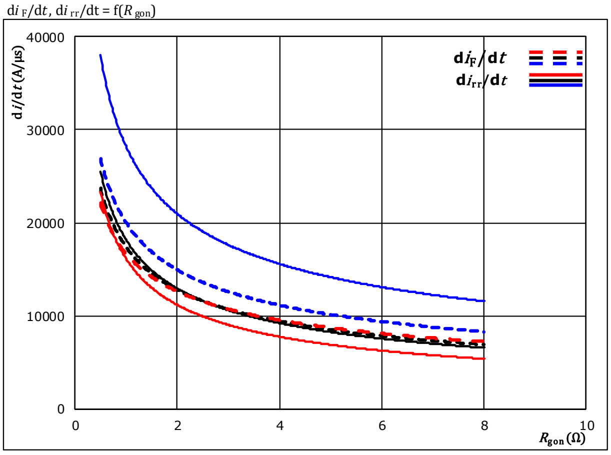
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	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, $di_{rr}/dt = f(R_{gon})$



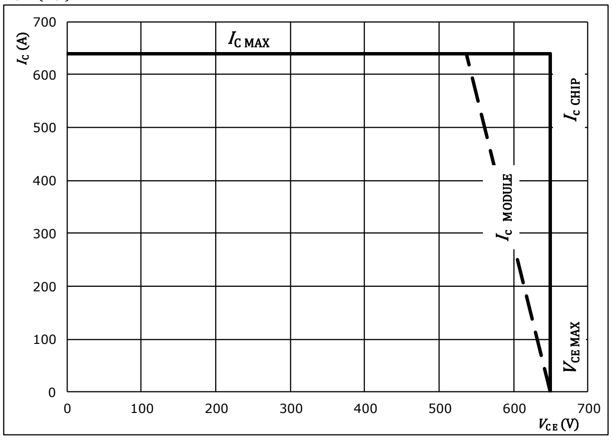
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	320	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

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

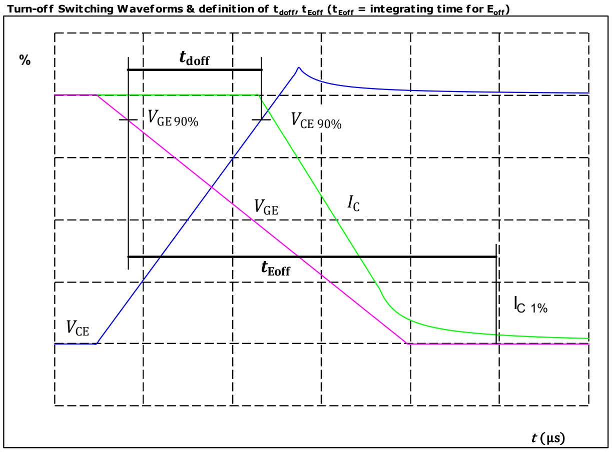
Boost Switching Definitions

General conditions

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

figure 1. **IGBT**

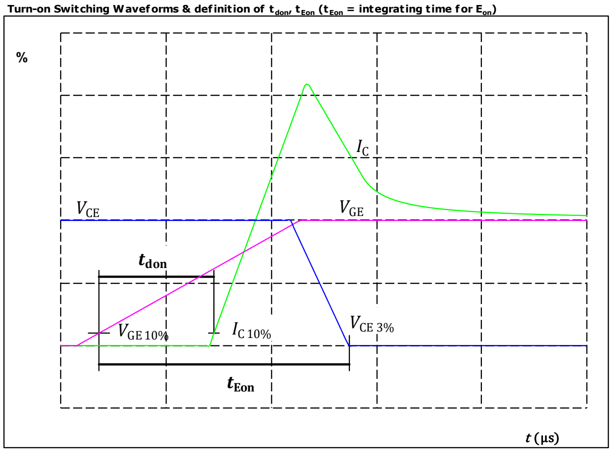
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_{doff} =	124	ns

figure 2. **IGBT**

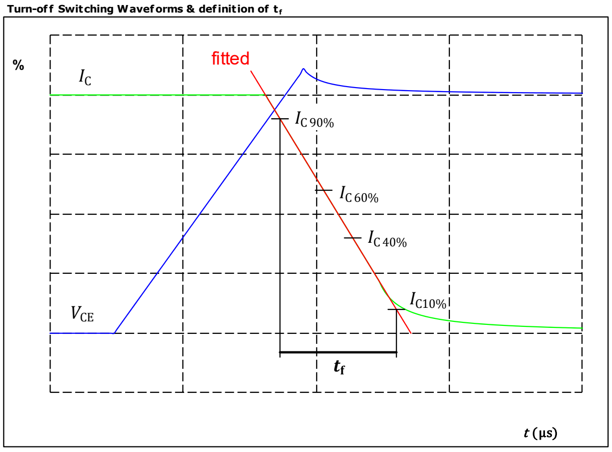
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_{don} =	111	ns

figure 3. **IGBT**

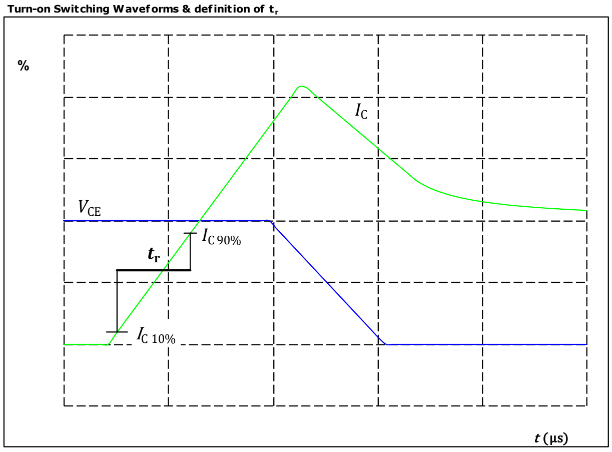
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_f =	43	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

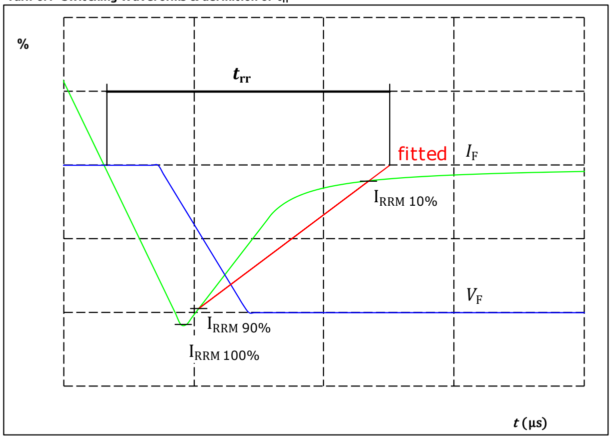


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	320	A
t_r =	14	ns

Boost Switching Characteristics

figure 5. **FWD**

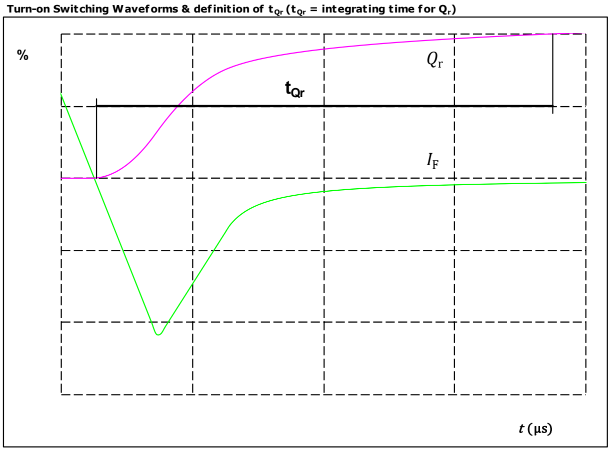
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	320	A
I_{RRM} (100%) =	368	A
t_{rr} =	131	ns

figure 6. **FWD**

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



I_F (100%) =	320	A
Q_r (100%) =	0	µC

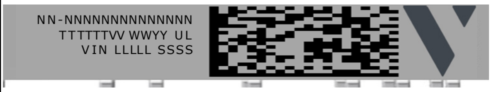
30-PT07NIA320RV-LE06F68Y / 30-FT07NIA320RV-LE06F68

datasheet

Vincotech

Ordering Code & Marking

Version	Ordering Code
without thermal paste 13 mm housing with pressfit pins	30-PT07NIA320RV-LE06F68Y
without thermal paste 13 mm housing with solder pins	30-FT07NIA320RV-LE06F68
with thermal paste 13 mm housing with pressfit pins	30-PT07NIA320RV-LE06F68Y-/3/
with thermal paste 13 mm housing with solder pins	30-FT07NIA320RV-LE06F68-/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		

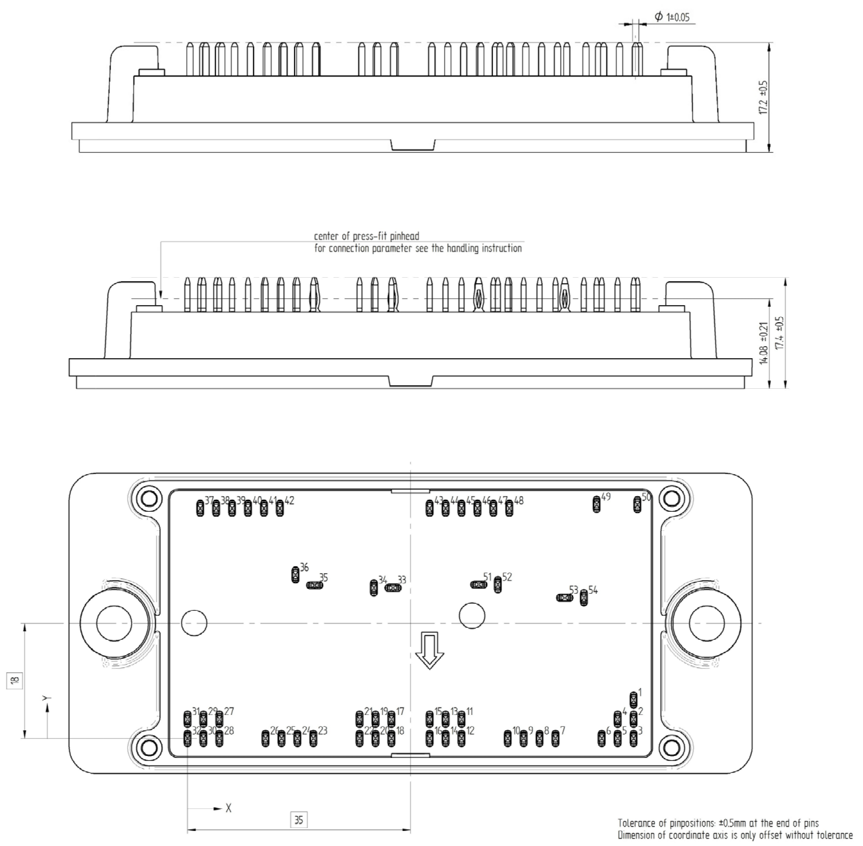
Outline

Pin table

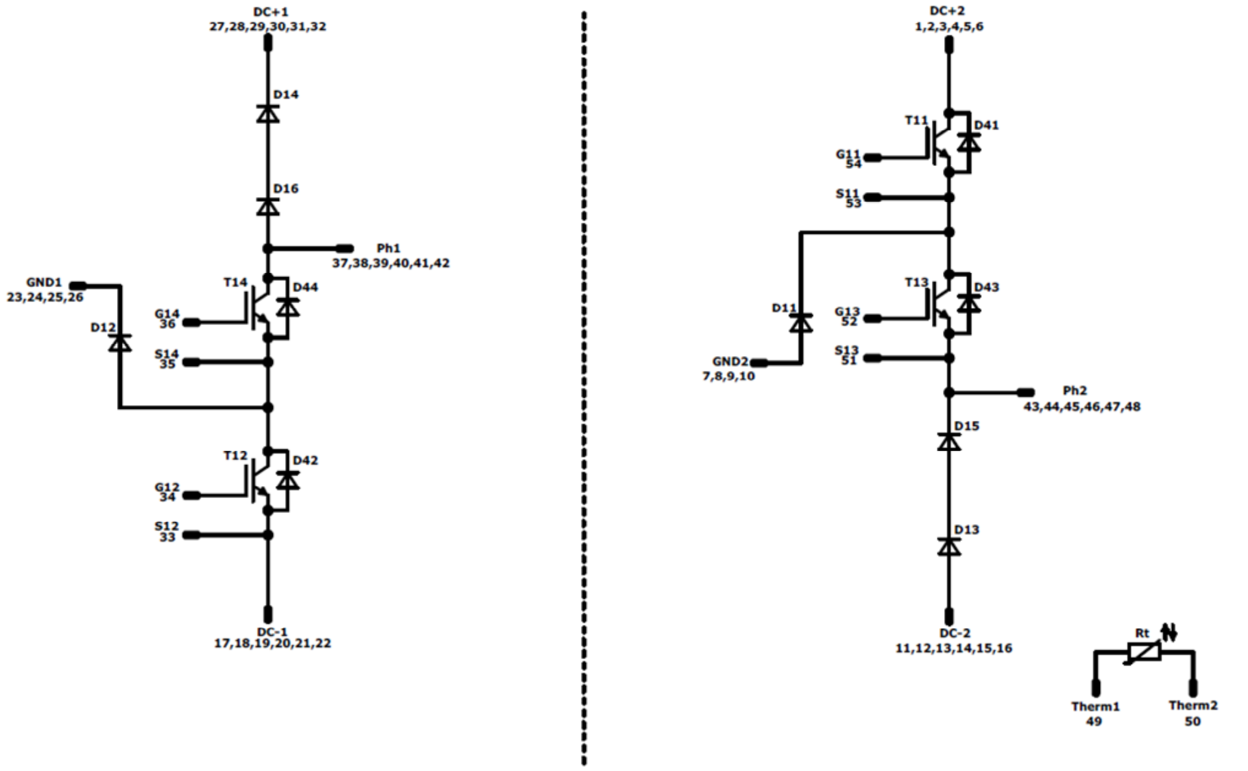
Pin	X	Y	Function
1	70	6	DC+2
2	70	3	DC+2
3	70	0	DC+2
4	67,5	3	DC+2
5	67,5	0	DC+2
6	65	0	DC+2
7	57,75	0	GND2
8	55,25	0	GND2
9	52,75	0	GND2
10	50,25	0	GND2
11	43	3	DC-2
12	43	0	DC-2
13	40,5	3	DC-2
14	40,5	0	DC-2
15	38	3	DC-2
16	38	0	DC-2
17	32	3	DC-1
18	32	0	DC-1
19	29,5	3	DC-1
20	29,5	0	DC-1
21	27	3	DC-1
22	27	0	DC-1
23	19,75	0	GND1
24	17,25	0	GND1
25	14,75	0	GND1
26	12,25	0	GND1
27	5	3	DC+1
28	5	0	DC+1
29	2,5	3	DC+1
30	2,5	0	DC+1
31	0	3	DC+1
32	0	0	DC+1
33	32,25	23,55	S12
34	29,25	23,55	G12
35	19,95	23,95	S14
36	16,95	25,55	G14
37	2	36	Ph1
38	4,5	36	Ph1
39	7	36	Ph1
40	9,5	36	Ph1
41	12	36	Ph1
42	14,5	36	Ph1
43	38	36	Ph2
44	40,5	36	Ph2
45	43	36	Ph2
46	45,5	36	Ph2
47	48	36	Ph2

Pin table

Pin	X	Y	Function
48	50,5	36	Ph2
49	64,2	36,6	Therm1
50	70,6	36,55	Therm2
51	45,7	24,05	S13
52	48,7	24,05	G13
53	59,2	22	S11
54	62,2	22	G11



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	650 V	320 A	Buck Switch	
D11, D12	FWD	650 V	320 A	Buck Diode	
T13, T14	IGBT	650 V	320 A	Boost Switch	
D13, D15; D14, D16	FWD	1300 V	320 A	Boost Diode	Serial devices. Values apply to complete device.
D41, D42	FWD	650 V	30 A	Buck Sw. Protection Diode	
D43, D44	FWD	650 V	30 A	Boost Sw. Protection Diode	
Rt	Thermistor			Thermistor	

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.

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
30-xT07NIA320RV-LE06F68x-D1-14	22 Jan. 2019		