



flowNPC 1

1200 V / 80 A

Topology features

- Integrated DC capacitor
- Kelvin Emitter for improved switching performance
- Neutral Point Clamped Topology (I-Type)
- Temperature sensor

Component features

- High efficiency in hard switching and resonant topologies
- High speed switching
- Low gate charge

Housing features

- Base isolation: Al₂O₃
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Extra features

- 4 quadrant operation
- integrated capacitor

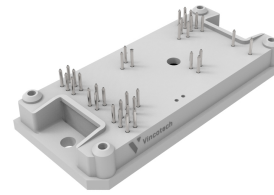
Target applications

- Power Supply
- Solar Inverters
- UPS

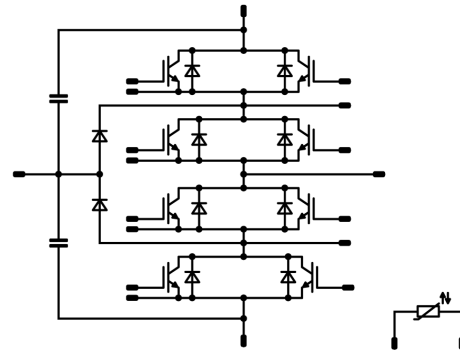
Types

- 10-FY07NIB080SM03-L095F03

flow 1 12 mm housing



Schematic





Vincotech

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
-----------	--------	------------	-------	------

Buck Switch

Collector-emitter voltage	V_{CES}		650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	60	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	109	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C

Buck Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	75	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	103	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Switch

Collector-emitter voltage	V_{CES}		650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	60	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	109	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	107	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	360	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	140	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Sw. Inv. Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	63	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	98	W
Maximum junction temperature	T_{jmax}		175	°C

Capacitor (DC)

Maximum DC voltage	V_{MAX}		630	V
Operation Temperature	T_{op}		-55 ... 125	°C

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{jop}		-40...+($T_{jmax} - 25$)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
Creepage distance			>12,7	mm
Clearance			8,24	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

Buck Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0008	25	3,3	4	4,7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		80	25 125 150		1,65 1,89 1,95	2,22 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	650		25			80	μA
Gate-emitter leakage current	I_{GES}		20	0		25			240	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							5000		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25		25		80		pF
Reverse transfer capacitance	C_{res}							18		pF
Gate charge	Q_g	$V_{CC} = 520$ V	15		80	25		190		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,87		K/W
--	---------------	------------------------------------	--	--	--	--	--	------	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		46 47 47,8		ns
Rise time	t_r	$R_{gon} = 8$ Ω $R_{goff} = 8$ Ω				25 125 150		6,8 8 8,6		ns
Turn-off delay time	$t_{d(off)}$		-5/15	350	40	25 125 150		125,2 146,6 151,2		ns
Fall time	t_f					25 125 150		6,43 6,87 7,23		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 1,69$ μC $Q_{tFWD} = 3,31$ μC $Q_{tFWD} = 3,82$ μC				25 125 150		0,461 0,686 0,735		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,25 0,364 0,394		mWs



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			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				80	25 125 150		1,52 1,45 1,42	1,92 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 650$ V				25			4,2	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,92		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RM}					25 125 150		49,88 67,91 72,69		A
Reverse recovery time	t_{rr}					25 125 150		51,53 78,62 89,74		ns
Recovered charge	Q_r	$di/dt=3712$ A/μs $di/dt=3734$ A/μs $di/dt=3515$ A/μs	-5/15	350	40	25 125 150		1,69 3,31 3,82		μC
Reverse recovered energy	E_{rec}					25 125 150		0,36 0,765 0,884		mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$					25 125 150		1317 1064 1003		A/μs



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	

Boost Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$				0,0008	25	3,3	4	4,7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15			80	25 125 150		1,65 1,89 1,95	2,22 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	650			25			80	μA
Gate-emitter leakage current	I_{GES}		20	0			25			240	nA
Internal gate resistance	r_g								None		Ω
Input capacitance	C_{ies}								5000		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25			25		80		pF
Reverse transfer capacitance	C_{res}								18		pF
Gate charge	Q_g	$V_{CC} = 520$ V	15			80	25		190		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)							0,87		K/W
--	---------------	---------------------------------------	--	--	--	--	--	--	------	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$						25 125		25,2 24,2		ns
Rise time	t_r	$R_{gon} = 8$ Ω $R_{goff} = 8$ Ω					25 125		7,8 9,2		ns
Turn-off delay time	$t_{d(off)}$		0/15	350	40		25 125		173,4 203,2		ns
Fall time	t_f						25 125		3,59 5,46		ns
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD} = 1,8$ μC $Q_{rFWD} = 3,81$ μC					25 125		0,593 0,857		mWs
Turn-off energy (per pulse)	E_{off}						25 125		0,232 0,379		mWs



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_{CE} [V]	T_j [°C]	Min	Typ	Max	

Boost Diode

Static

Forward voltage	V_F				120	25 125 150		1,48 1,4 1,37	1,92 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 650$ V				25			6,4	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,68		K/W
--	---------------	------------------------------------	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RM}	$di/dt=5704$ A/μs $di/dt=4474$ A/μs	0/15	350	40	25		43,76		A
	t_{rr}					125		53,52		
Reverse recovery time						25		65,21		
	Q_r					125		86,01		
Recovered charge						25		1,8		
Reverse recovered energy	E_{rec}					25		0,351		mWs
						125		0,824		
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25		412,76		A/μs
						125		3324		



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_{CE} [V]	T_j [°C]	Min	Typ	Max	

Boost Sw. Inv. Diode

Static

Forward voltage	V_F				60	25 125	1,23	1,7 1,59	1,87 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 650$ V				25			0,72	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,96		K/W
--	---------------	------------------------------------	--	--	--	--	--	------	--	-----

Capacitor (DC)

Static

Capacitance	C	DC bias voltage = 0 V				25		47		nF
Tolerance							-10		10	%
Dissipation factor		$f = 1$ kHz				25		2,5		%

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R25	$\Delta_{R/R}$	$R_{25} = 22$ kΩ				25	-5		5	%
Deviation of R100		$R_{100} = 1486$ Ω				100	-12		14	
Power dissipation	P							200		mW
Power dissipation constant	d					25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3 %						3950		K
B-value	$B_{(25/100)}$	Tol. ±3 %						3998		K
Vincotech Thermistor Reference									B	

⁽¹⁾ Value at chip level

⁽²⁾ Only valid with pre-applied Vincotech thermal interface material.

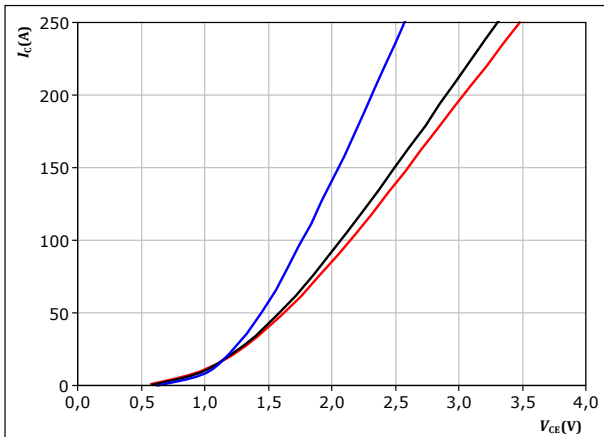


Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$



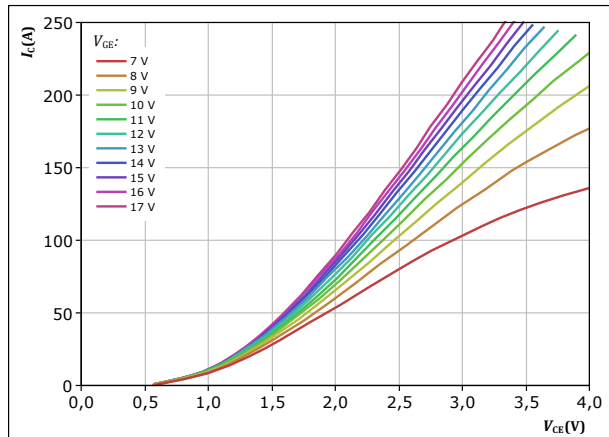
$t_p = 250 \mu\text{s}$
 $V_{GE} = 15 \text{ V}$

T_j : — 25 °C
— 125 °C
— 150 °C

figure 2. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

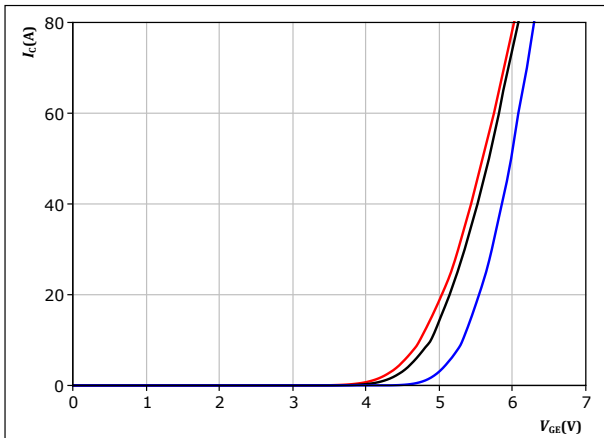


$t_p = 250 \mu\text{s}$
 $T_j = 150 \text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$



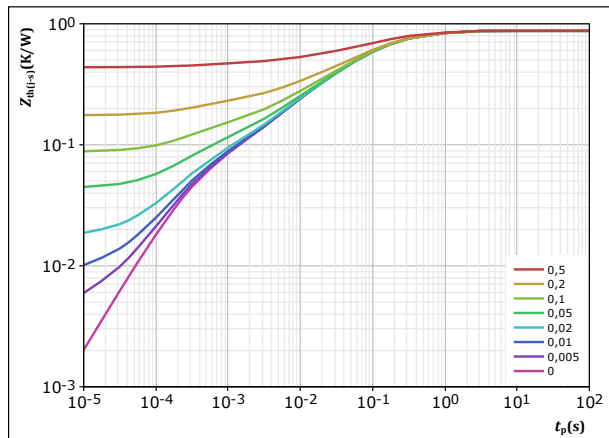
$t_p = 250 \mu\text{s}$
 $V_{CE} = 10 \text{ V}$

T_j : — 25 °C
— 125 °C
— 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,874 \text{ K/W}$

IGBT thermal model values

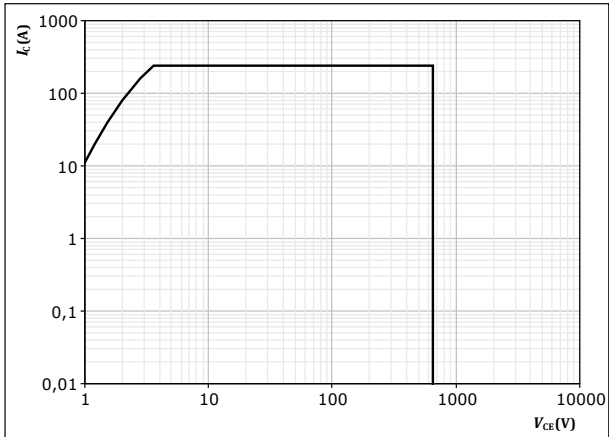
R (K/W)	τ (s)
1,42E-01	7,24E-01
3,44E-01	1,23E-01
1,79E-01	3,69E-02
1,18E-01	9,05E-03
3,80E-02	2,24E-03
5,36E-02	3,22E-04



Buck Switch Characteristics

figure 5. IGBT

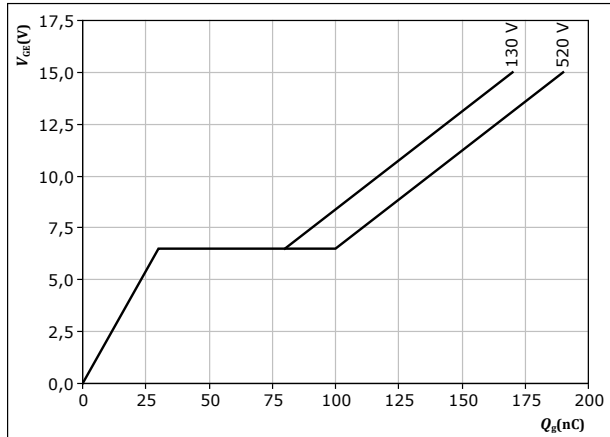
Safe operating area
 $I_C = f(V_{CE})$



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

figure 6. IGBT

Gate voltage vs gate charge
 $V_{GE} = f(Q_g)$



$I_C = 80$ A
 $T_j = 25$ °C



Buck Diode Characteristics

figure 7. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

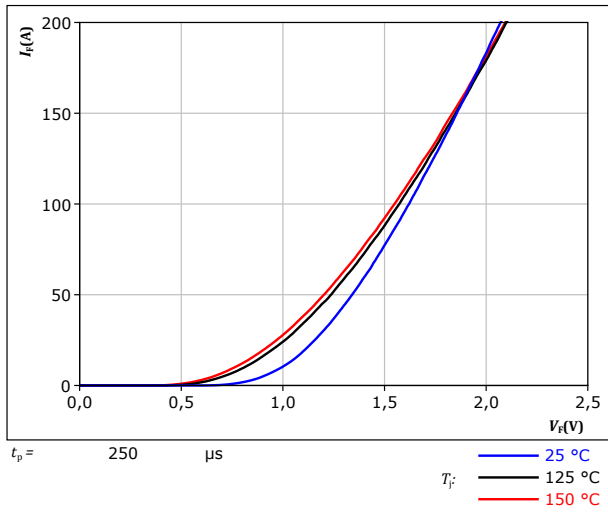
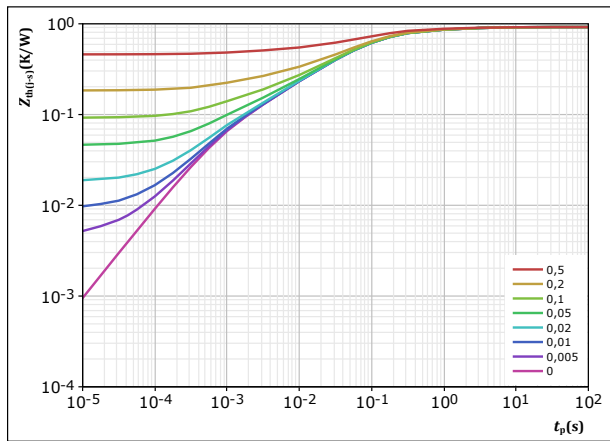


figure 8. FWD

Transient thermal impedance as a function of pulse width

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





Boost Switch Characteristics

figure 9. IGBT

Typical output characteristics
 $I_C = f(V_{CE})$

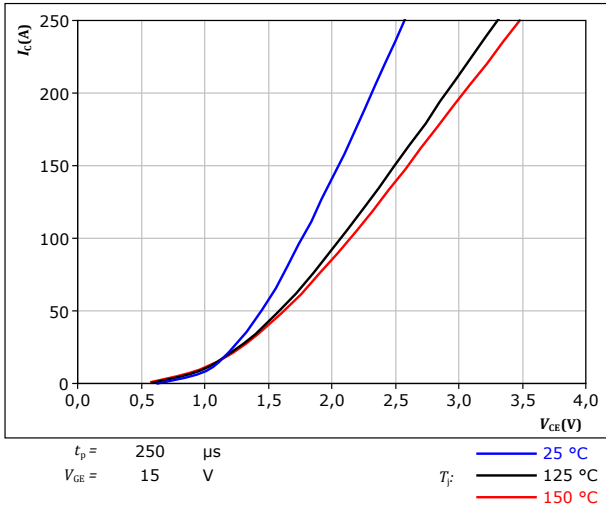


figure 10. IGBT

Typical output characteristics
 $I_C = f(V_{CE})$

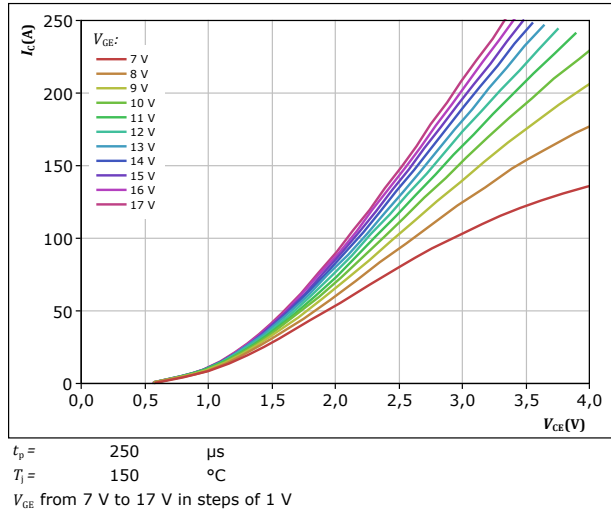


figure 11. IGBT

Typical transfer characteristics
 $I_C = f(V_{GE})$

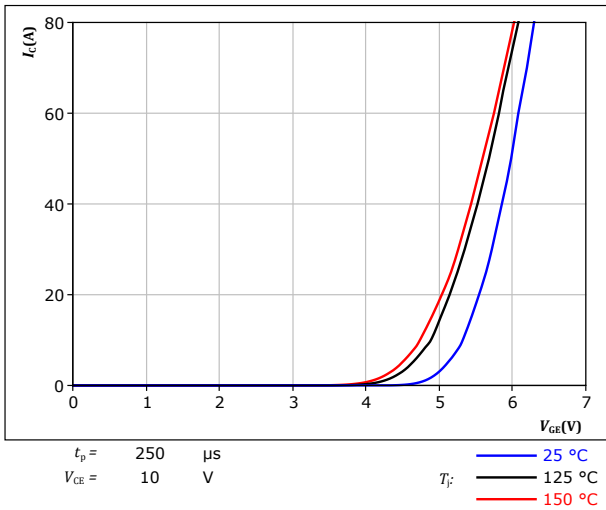
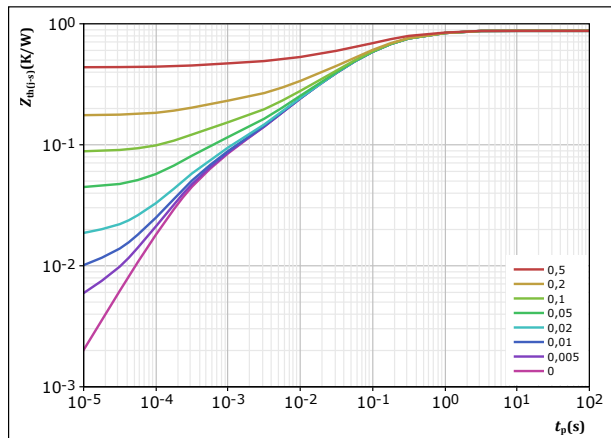


figure 12. IGBT

Transient thermal impedance as a function of pulse width
 $Z_{th(j-s)} = f(t_p)$



IGBT thermal model values

R (K/W)	τ (s)
1,42E-01	7,24E-01
3,44E-01	1,23E-01
1,79E-01	3,69E-02
1,18E-01	9,05E-03
3,80E-02	2,24E-03
5,36E-02	3,22E-04

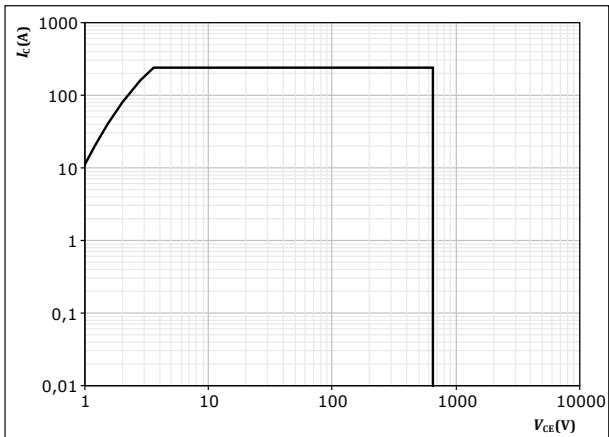


Boost Switch Characteristics

figure 13. IGBT

Safe operating area

$$I_C = f(V_{CE})$$

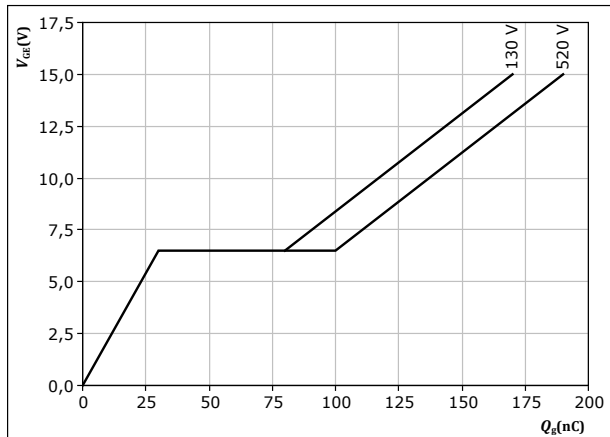


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 14. IGBT

Gate voltage vs gate charge

$$V_{GE} = f(Q_g)$$



I_C = 80 A
T_j = 25 °C



Boost Diode Characteristics

figure 15. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

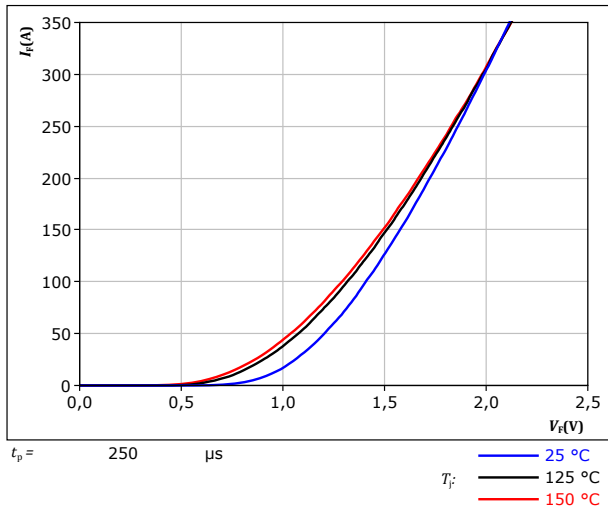
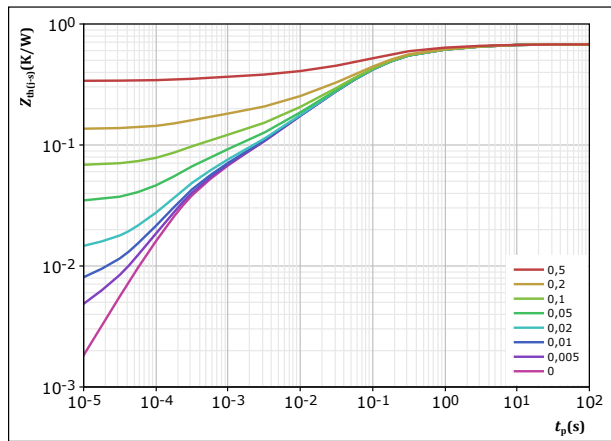


figure 16. FWD

Transient thermal impedance as a function of pulse width

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



$D = \frac{t_p}{T}$
 $R_{th(j-s)} = 0,678 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
3,92E-02	5,75E+00
8,22E-02	9,83E-01
2,55E-01	1,51E-01
1,58E-01	4,02E-02
7,12E-02	8,23E-03
2,99E-02	1,81E-03
4,25E-02	2,74E-04

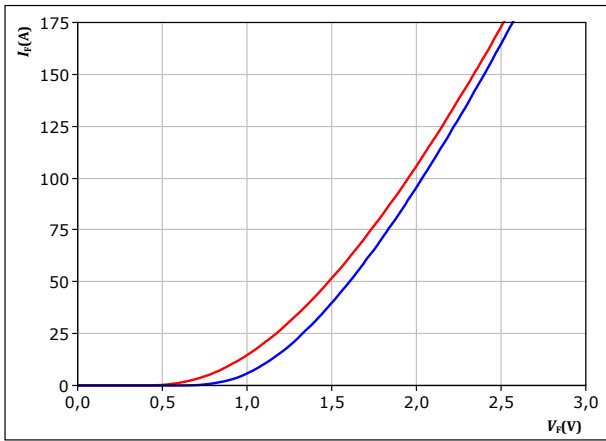


Boost Sw. Inv. Diode Characteristics

figure 17. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

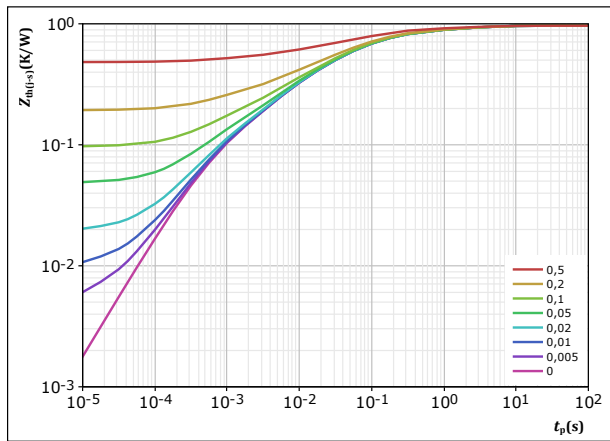


$t_p = 250 \mu s$
 T_j : — 25 °C
 — 125 °C

figure 18. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,965 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
7,25E-02	3,37E+00
1,28E-01	5,13E-01
3,41E-01	8,29E-02
2,28E-01	1,76E-02
1,27E-01	3,85E-03
6,83E-02	5,32E-04

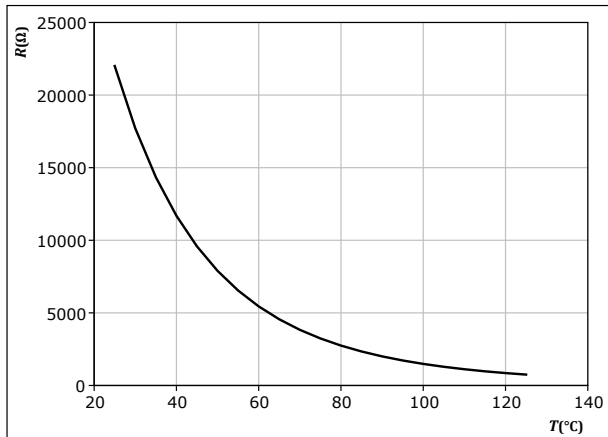


Thermistor Characteristics

figure 19. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

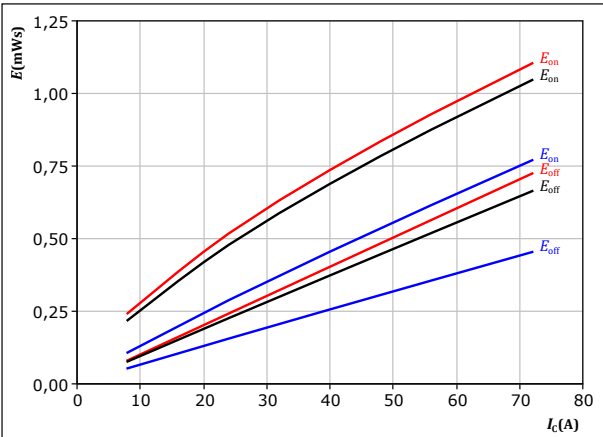




Buck Switching Characteristics

figure 20. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$

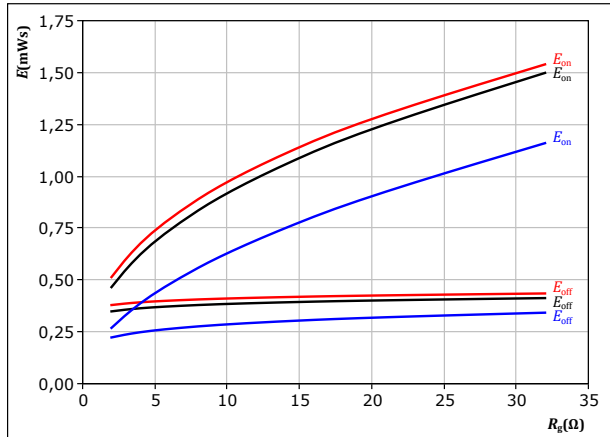


With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 21. IGBT

Typical switching energy losses as a function of IGBT turn on gate resistor
 $E = f(R_g)$

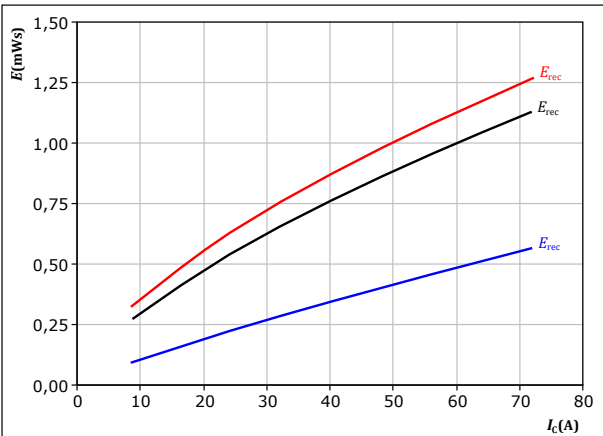


With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $I_c = 40$ A

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 22. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$

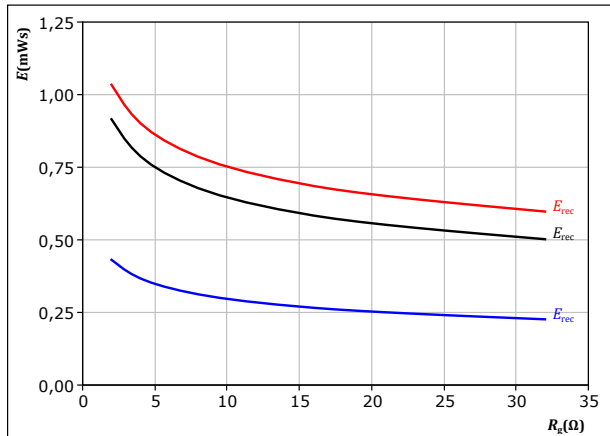


With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 8$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 23. FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $I_c = 40$ A

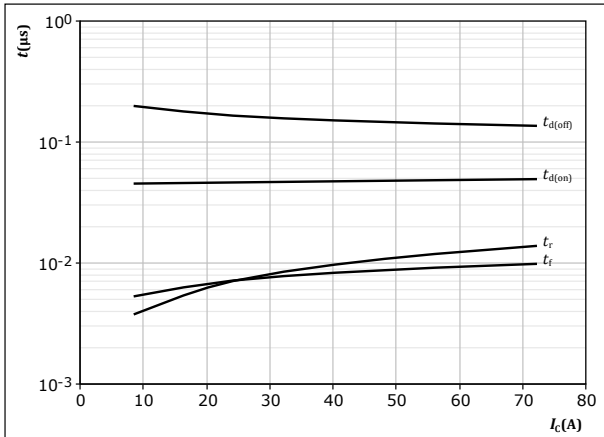
T_j : — 25 °C
 — 125 °C
 — 150 °C



Buck Switching Characteristics

figure 24. IGBT

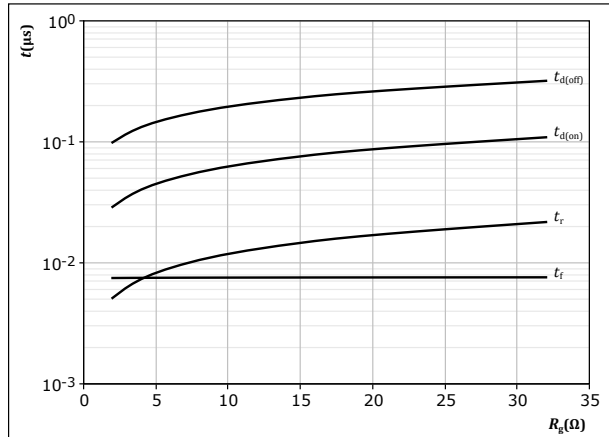
Typical switching times as a function of collector current
 $t = f(I_C)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$
 $R_{goff} = 8 \text{ } \Omega$

figure 25. IGBT

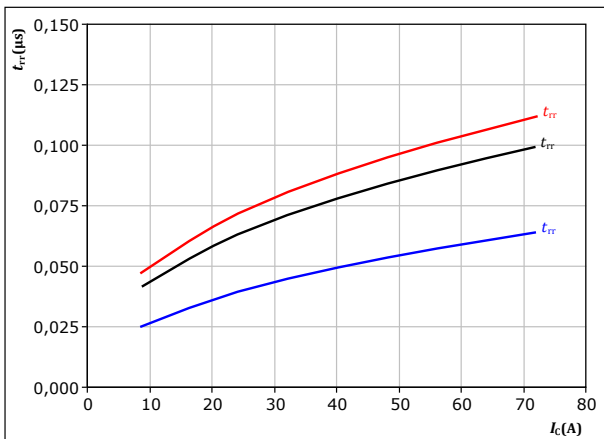
Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_C = 40 \text{ A}$

figure 26. FWD

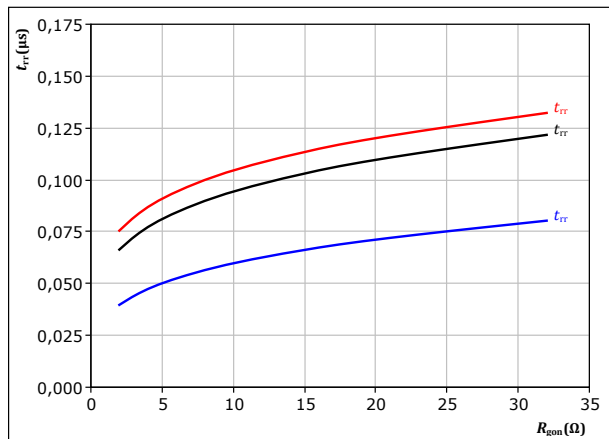
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_C)$



With an inductive load at
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 27. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_C = 40 \text{ A}$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

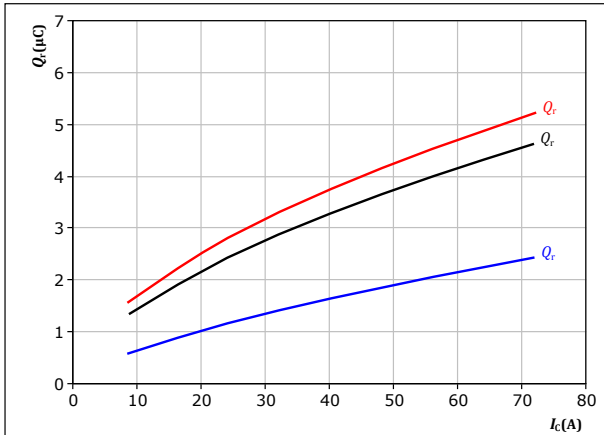


Buck Switching Characteristics

figure 28. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

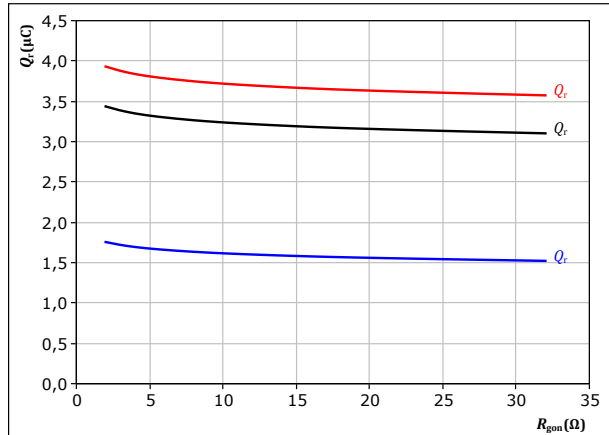
$V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 8 \ \Omega$

T_j : 25 °C
125 °C
150 °C

figure 29. FWD

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

$$Q_r = f(R_{gon})$$



With an inductive load at

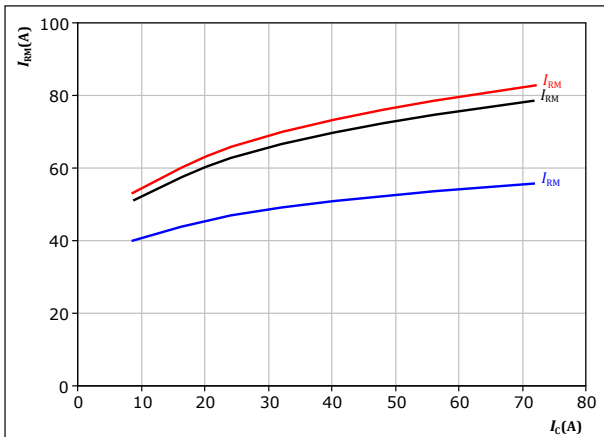
$V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 40 \text{ A}$

T_j : 25 °C
125 °C
150 °C

figure 30. FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

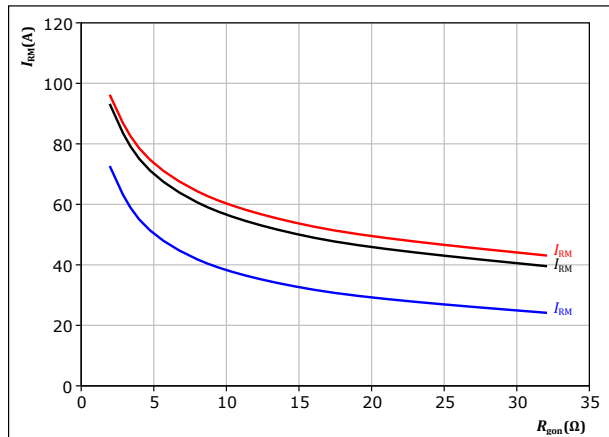
$V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $R_{gon} = 8 \ \Omega$

T_j : 25 °C
125 °C
150 °C

figure 31. 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

$V_{CE} = 350 \text{ V}$
 $V_{GE} = -5/15 \text{ V}$
 $I_c = 40 \text{ A}$

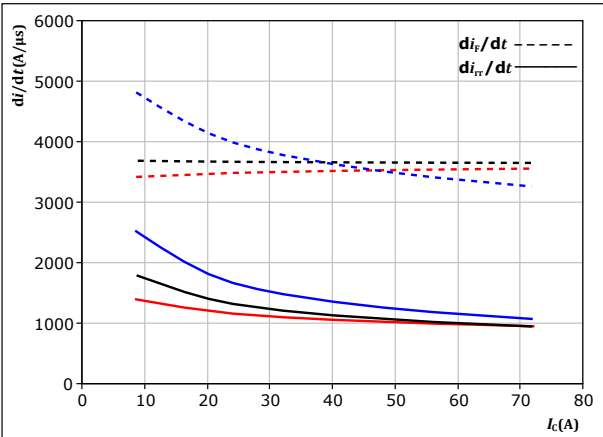
T_j : 25 °C
125 °C
150 °C



Buck Switching Characteristics

figure 32. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_r/dt = f(I_c)$



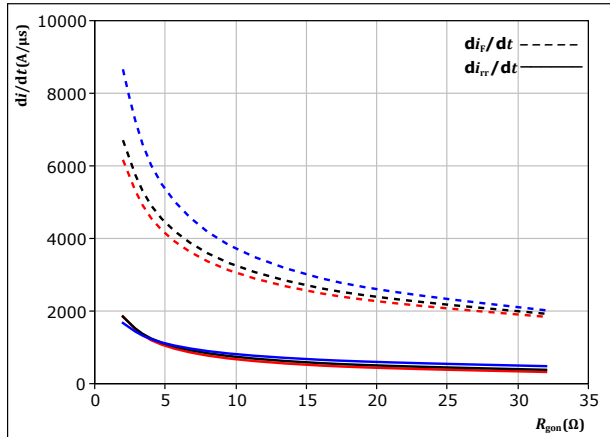
With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 8$ Ω

T_j : 25 °C
 125 °C
 150 °C

figure 33. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



With an inductive load at

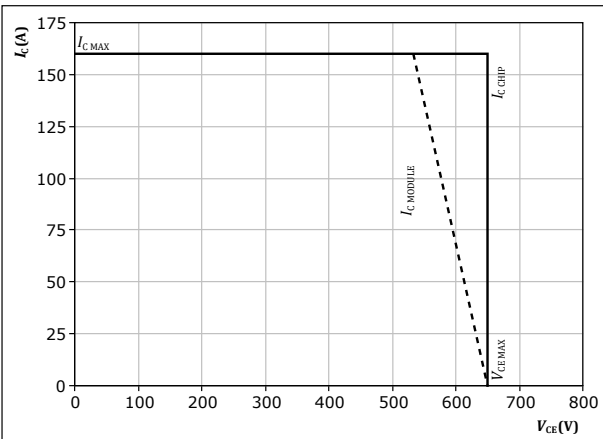
$V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $I_c = 40$ A

T_j : 25 °C
 125 °C
 150 °C

figure 34. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



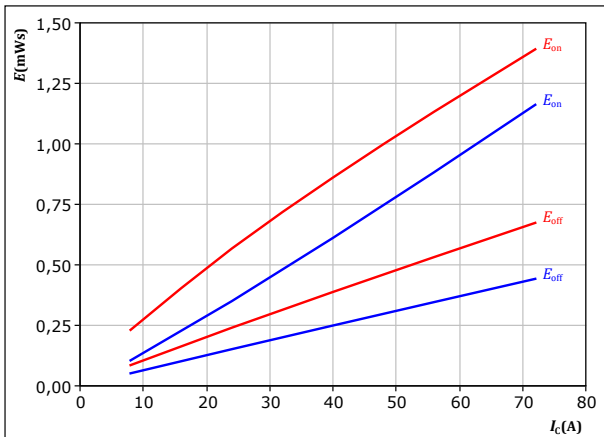
At $T_j = 150$ °C
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω



Boost Switching Characteristics

figure 35. IGBT

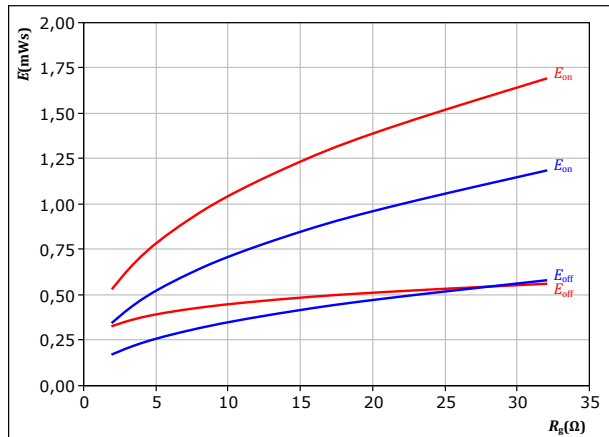
Typical switching energy losses as a function of collector current
 $E = f(I_c)$



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω
 T_j : — 25 °C
— 125 °C

figure 36. IGBT

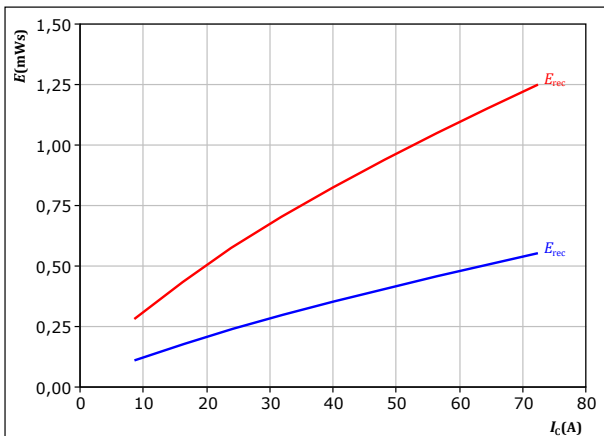
Typical switching energy losses as a function of IGBT turn on gate resistor
 $E = f(R_g)$



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $I_c = 40$ A
 T_j : — 25 °C
— 125 °C

figure 37. FWD

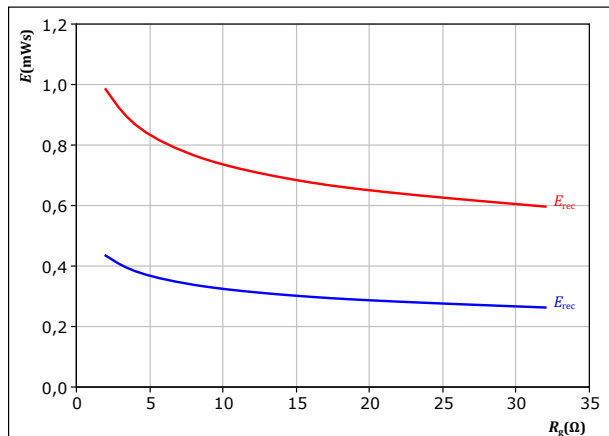
Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 8$ Ω
 T_j : — 25 °C
— 125 °C

figure 38. FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor
 $E_{rec} = f(R_g)$



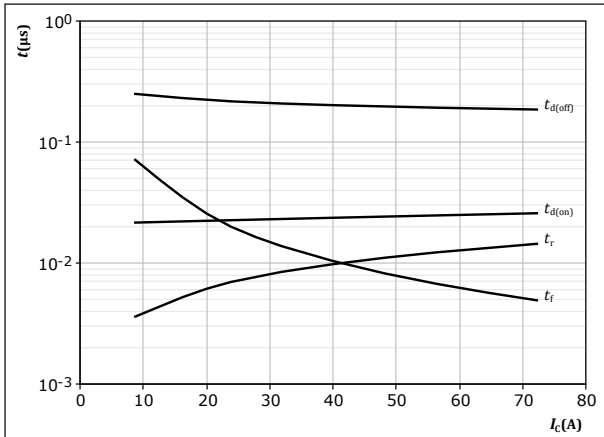
With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $I_c = 40$ A
 T_j : — 25 °C
— 125 °C



Boost Switching Characteristics

figure 39. IGBT

Typical switching times as a function of collector current
 $t = f(I_c)$

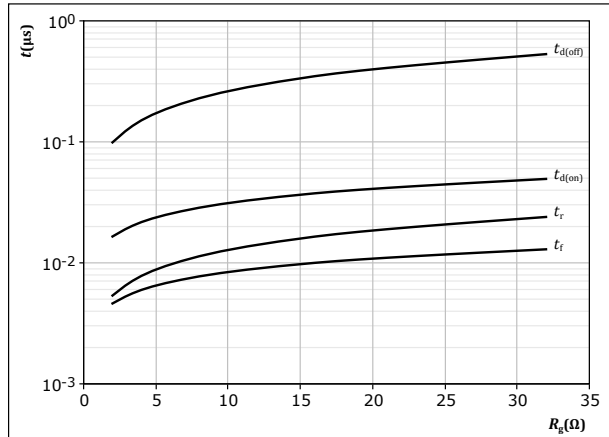


With an inductive load at

$T_j = 125$ °C
 $V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

figure 40. IGBT

Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$

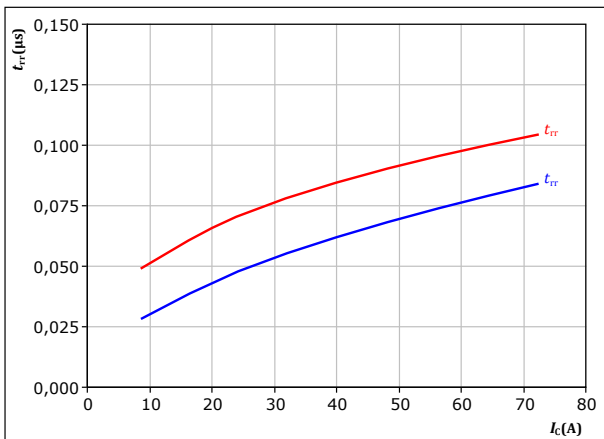


With an inductive load at

$T_j = 125$ °C
 $V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $I_c = 40$ A

figure 41. FWD

Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



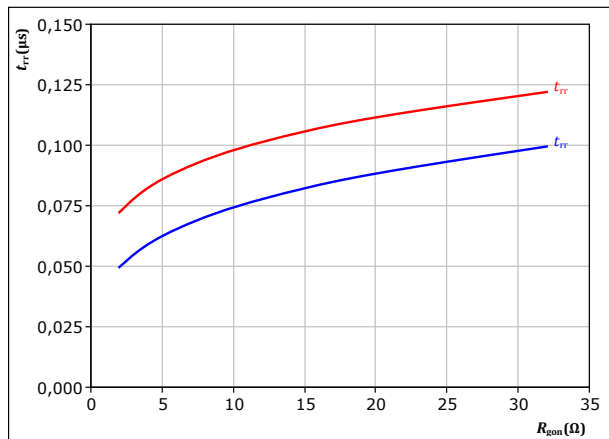
With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 8$ Ω

T_j : — 25 °C
— 125 °C

figure 42. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $I_c = 40$ A

T_j : — 25 °C
— 125 °C

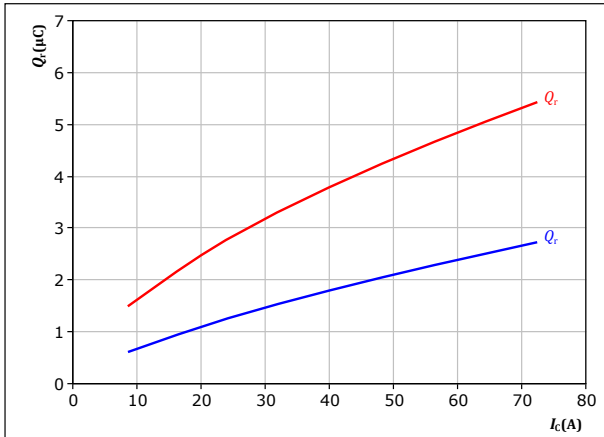


Boost Switching Characteristics

figure 43. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

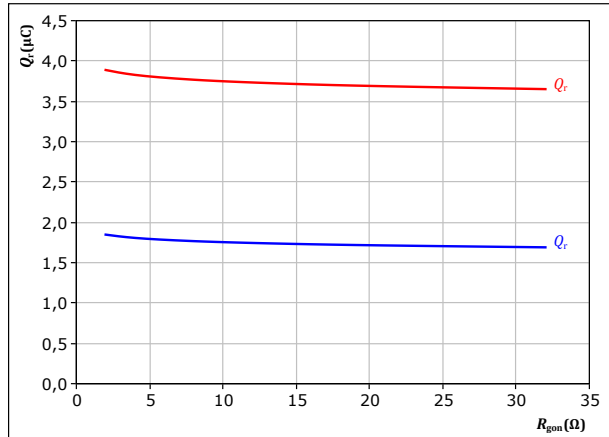
$V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 8$ Ω

T_j : — 25 °C
— 125 °C

figure 44. FWD

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

$$Q_r = f(R_{gon})$$



With an inductive load at

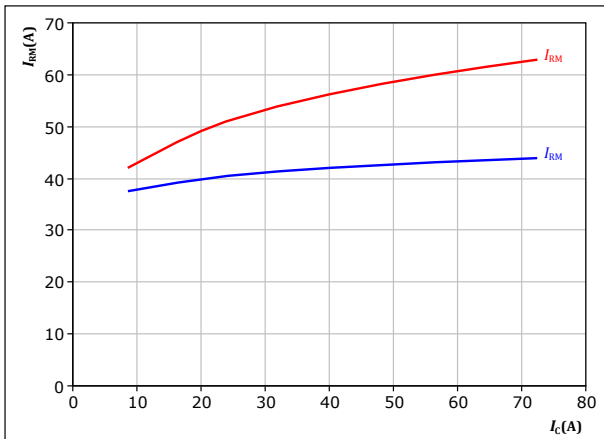
$V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $I_c = 40$ A

T_j : — 25 °C
— 125 °C

figure 45. FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

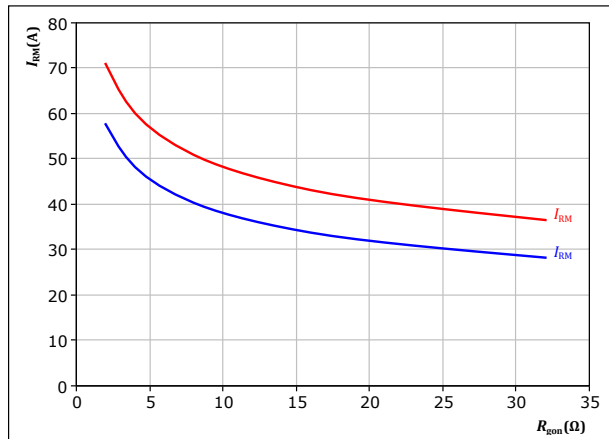
$V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 8$ Ω

T_j : — 25 °C
— 125 °C

figure 46. 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
 $V_{GE} = 0/15$ V
 $I_c = 40$ A

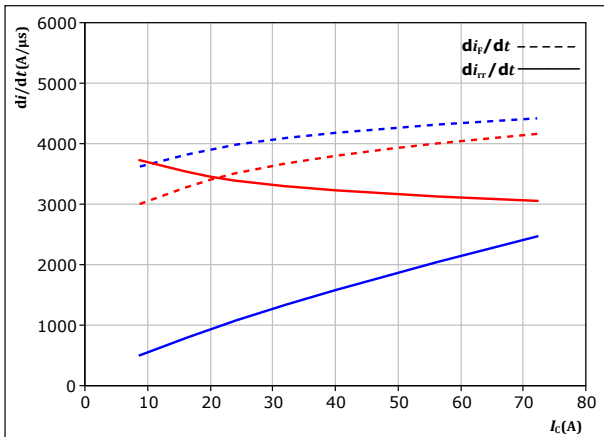
T_j : — 25 °C
— 125 °C



Boost Switching Characteristics

figure 47. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_i/dt, di_r/dt = f(I_C)$



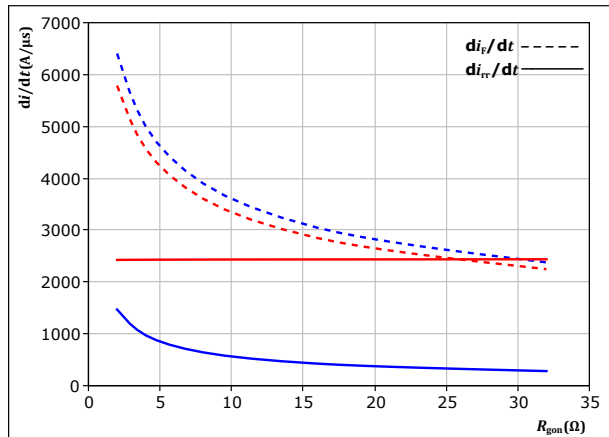
With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $R_{gon} = 8$ Ω

T_j : — 25 °C
 — 125 °C

figure 48. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_i/dt, di_r/dt = f(R_{gon})$



With an inductive load at

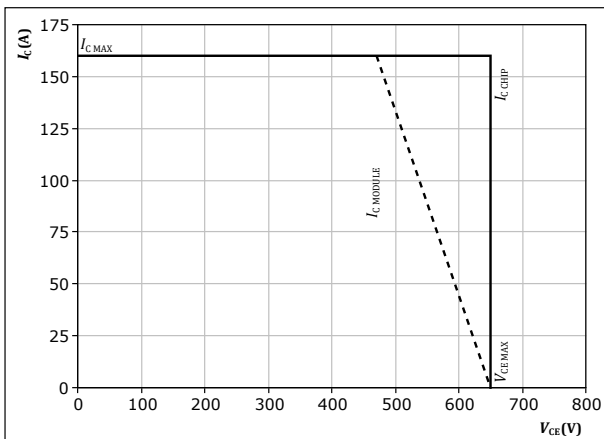
$V_{CE} = 350$ V
 $V_{GE} = 0/15$ V
 $I_C = 40$ A

T_j : — 25 °C
 — 125 °C

figure 49. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



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



Switching Definitions

figure 50. IGBT
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})

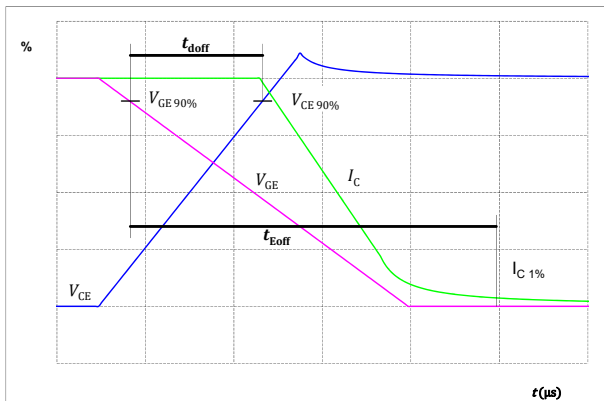


figure 51. IGBT
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})

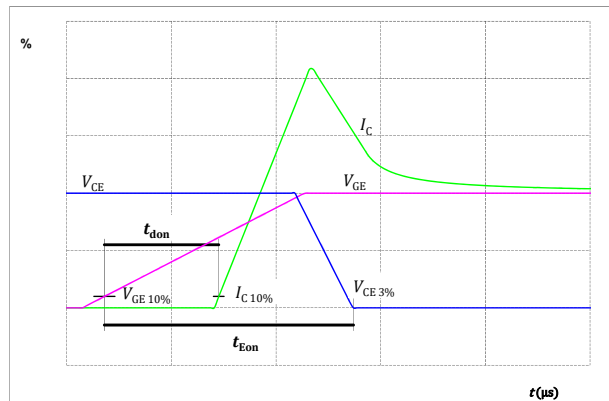


figure 52. IGBT
Turn-off Switching Waveforms & definition of t_f

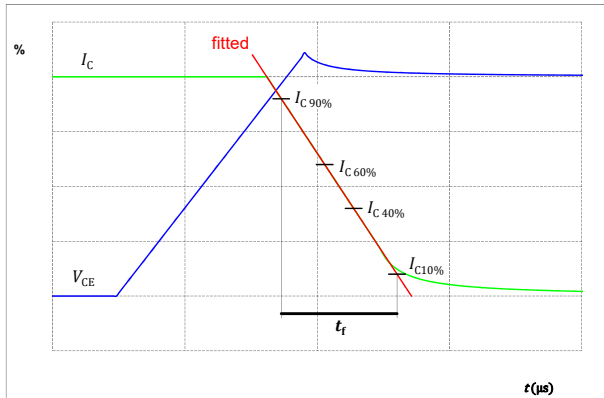
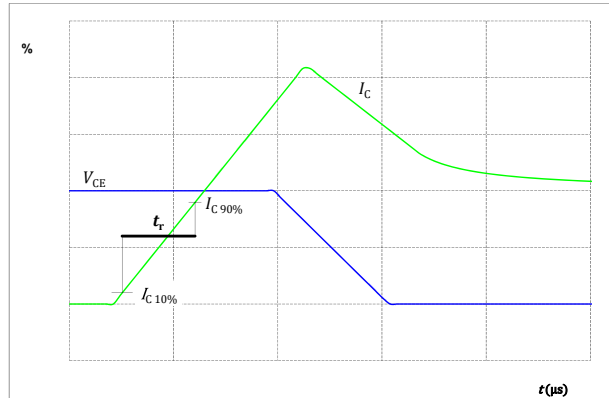


figure 53. IGBT
Turn-on Switching Waveforms & definition of t_r





Switching Definitions

figure 54. FWD

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

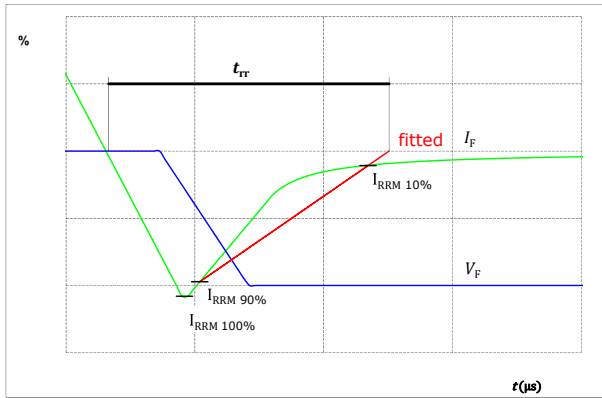
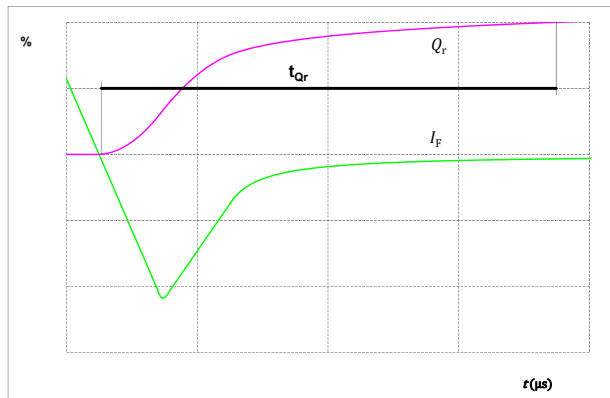


figure 55. FWD


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



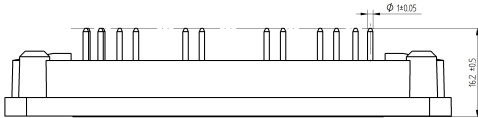
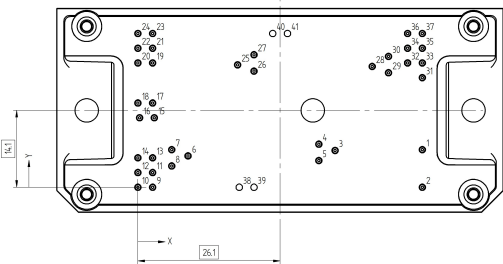


Vincotech

Ordering Code	
Version	Ordering Code
Without thermal paste	10-FY07NIB080SM03-L095F03
With thermal paste (5,2 W/mK, PTM6000HV)	10-FY07NIB080SM03-L095F03-/7/

Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTTVV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTTTTV	Lot number LLLLL	Serial SSSS	Date code WWYY	

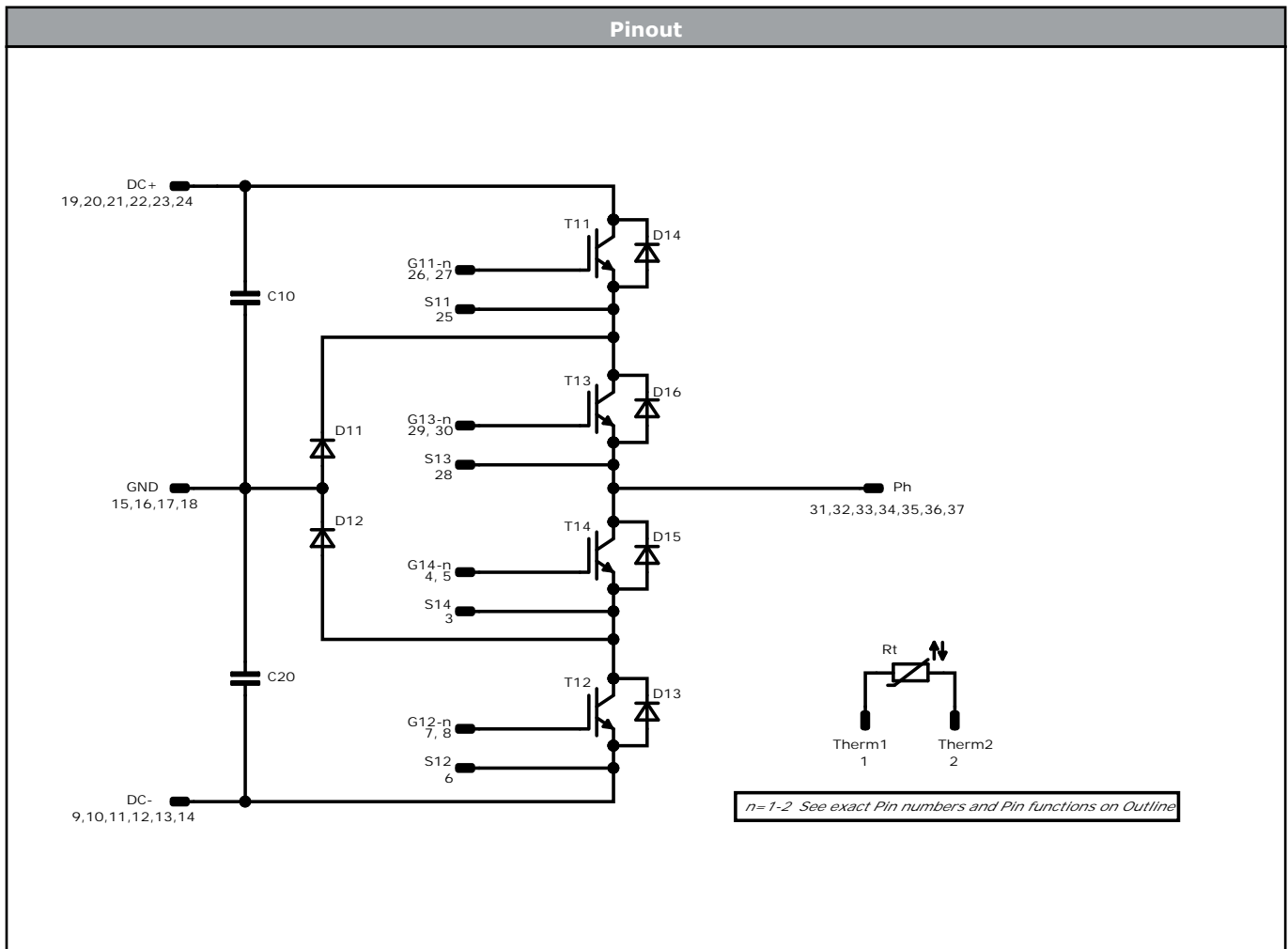
Outline			
Pin table [mm]			
Pin	X	Y	Function
1	52,2	6,9	Therm1
2	52,2	0	Therm2
3	36,2	6,75	S14
4	33,2	7,9	G14-1
5	33,2	4,9	G14-2
6	9,2	5,75	S12
7	6,2	6,9	G12-1
8	6,2	3,9	G12-2
9	2,7	0	DC-
10	0	0	DC-
11	2,7	2,7	DC-
12	0	2,7	DC-
13	2,7	5,4	DC-
14	0	5,4	DC-
15	3	12,75	GND
16	0,3	12,75	GND
17	2,7	15,45	GND
18	0	15,45	GND
19	2,7	22,8	DC+
20	0	22,8	DC+
21	2,7	25,5	DC+
22	0	25,5	DC+
23	2,7	28,2	DC+
24	0	28,2	DC+
25	18,3	22,45	S11
26	21,3	21,3	G11-2
27	21,3	24,3	G11-1
28	43	22,15	S13
29	46	21	G13-2
30	46	24	G13-1
31	52,2	20,1	Ph
32	49,5	22,8	Ph
33	52,2	22,8	Ph
34	49,5	25,5	Ph
35	52,2	25,5	Ph
36	49,5	28,2	Ph
37	52,2	28,2	Ph
38	not assembled		
39	not assembled		
40	not assembled		
41	not assembled		

Tolerance of pinposition: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	650 V	80 A	Buck Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12	FWD	650 V	80 A	Buck Diode	Parallel devices with separate control. Values apply to complete device.
T13, T14	IGBT	650 V	80 A	Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D14	FWD	650 V	120 A	Boost Diode	Parallel devices with separate control. Values apply to complete device.
D15, D16	FWD	650 V	60 A	Boost Sw. Inv. Diode	Parallel devices with separate control. Values apply to complete device.
C1, C2	Capacitor	630 V		Capacitor (DC)	
NTC	Thermistor			Thermistor	



Vincotech

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

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</i> packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}=175^{\circ}\text{C}$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-FY07NIB080SM03-L095F03-D8-14	25 Sep. 2024	PCN-2024-025	

DISCLAIMER

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

LIFE SUPPORT POLICY

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.