Vincotech

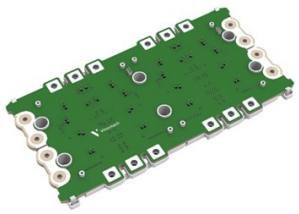
70-W424NIA800M7-M800F70
datasheet

VINcoNPC X8 **2400 V / 800 A**

Features

- $T_h$ree-level topology for 1500Vdc applications
- High power screw interface
- Low inductive package
- Integrated snubber diode for optional asymmetrical inductance
- Temperature sensor

*flow*screw 4w 12 mm housing



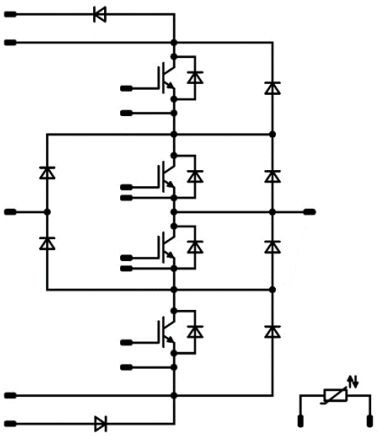
Target applications

- Solar inverter
- Wind Power
- Motor Drive

Types

- 70-W424NIA800M7-M800F70

Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Buck Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	829	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	1600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	1536	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V Vcc = 800 V T_j = 150 °C	9,5	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}		1200	V
Continuous (direct) forward current	I_F	T_j = T_{jmax} T_s = 80 °C	542	A
Repetitive peak forward current	I_{FRM}		1600	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	884	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	T_j = T_{jmax} T_s = 80 °C	829	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	1600	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	1536	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V Vcc = 800 V T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	T_j = T_{jmax} T_s = 80 °C	542	A
Repetitive peak forward current	I_{FRM}		1600	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	884	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Sw.Inv.Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	T_j = T_{jmax} T_s = 80 °C	542	A
Repetitive peak forward current	I_{FRM}		1600	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	884	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}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	68	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 8,3 ms	260	A
Surge current capability	I^2t		336	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	181	W
Maximum junction temperature	T_{jmax}		175	°C
Snubber Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	283	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 8,3 ms T_j = 150 °C	1080	A
Surge current capability	I^2t			A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	749	W
Maximum junction temperature	T_{jmax}		175	°C

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…(T_{jmax} - 25)	°C
Maximum allowed PCB temperature	T_{PCB}		125	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* t_p = 2 s	6000	V
		AC Voltage t_p = 1 min	2500	V
Creepage distance			min. 12,7	mm
Clearance			min. 12,7	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,08	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		800	25 125 150		1,53 1,70 1,75	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			800	µA
Gate-emitter leakage current	I_{GES}		20	0		25			4000	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}		0	10		25		168000		pF
Output capacitance	C_{oes}							5600		
Reverse transfer capacitance	C_{res}							2240		
Gate charge	Q_g		15	600	800	25		5600		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,06		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 1 Ω R_{goff} = 1 Ω	-8 / 16	600	1440	25 125 150		183 167 165		ns
Rise time	t_r					25 125 150		68 67 70		
Turn-off delay time	$t_{d(off)}$					25 125 150		416 397 390		
Fall time	t_f					25 125 150		63 68 74		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 107 µC Q_{rFWD} = 161 µC Q_{rFWD} = 173 µC				25 125 150		130,000 153,000 160,000		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		79,500 100,000 107,000		

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				800	25 125		1,82 1,96	2,1	V
Reverse leakage current	I_R			1200		25 150			320	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,11		K/W
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		800 872 899		A
Reverse recovery time	t_{rr}					25 125 150		361 499 528		ns
Recovered charge	Q_r	di/dt = 16300 A/ di/dt = 19100 A/ di/dt = 18800 A/	-8 / 16	600	1440	25 125 150		107,000 161,000 173,000		µC
Reverse recovered energy	E_{rec}					25 125 150		37,000 59,200 63,900		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		9460 8200 7870		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	$V_{GE(th)}$			10	0,08	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		800	25 125 150		1,53 1,70 1,75	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			800	µA
Gate-emitter leakage current	I_{GES}		20	0		25			4000	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}		0	10		25		168000		pF
Output capacitance	C_{oes}							5600		
Reverse transfer capacitance	C_{res}							2240		
Gate charge	Q_g		15	600	800	25		5600		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,06		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 1 Ω R_{goff} = 1 Ω	-8 / 16	600	800	25 125 150		161 158 153		ns
Rise time	t_r					25 125 150		37 40 41		
Turn-off delay time	$t_{d(off)}$					25 125 150		483 487 485		
Fall time	t_f					25 125 150		69 96 101		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 74,3 µC Q_{rFWD} = 119 µC Q_{rFWD} = 135 µC				25 125 150		48,100 58,300 64,200		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		56,500 71,700 78,300		

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 Diode										
Static										
Forward voltage	V_F				800	25 125		1,82 1,96	2,1	V
Reverse leakage current	I_R			1200		25 150			320	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,11		K/W
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		734 846 879		A
Reverse recovery time	t_{rr}					25 125 150		256 363 402		ns
Recovered charge	Q_r	di/dt = 15900 A/ di/dt = 21900 A/ di/dt = 17800 A/	-8 / 16	600	800	25 125 150		74,300 119,000 135,000		µC
Reverse recovered energy	E_{rec}					25 125 150		25,800 45,300 51,700		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		9340 7650 6600		A/µs
Boost Sw.Inv.Diode										
Static										
Forward voltage	V_F				800	25 125		1,82 1,96	2,1	V
Reverse leakage current	I_R			1200		25 150			320	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,11		K/W

Characteristic Values

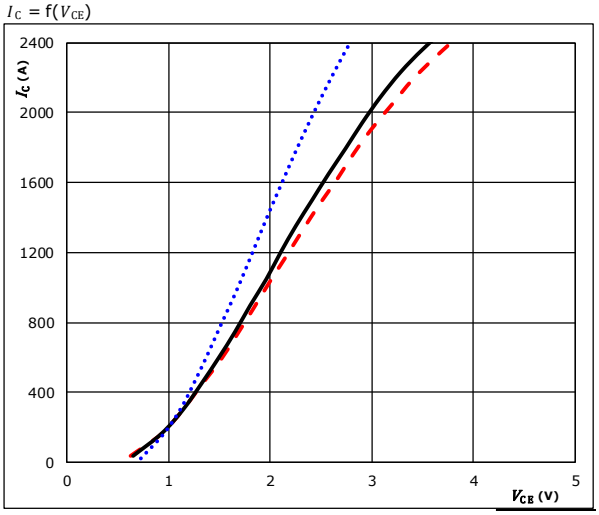
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				60	25 125		2,37 2,47	2,71	V
Reverse leakage current	I_R			1200		25 150			240 7200	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,53		K/W
Snubber Diode										
Static										
Forward voltage	V_F				200	25 125		2,21 2,31	2,54	V
Reverse leakage current	I_R			1200		25 150			240 35200	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,13		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

$I_C = f(V_{CE})$

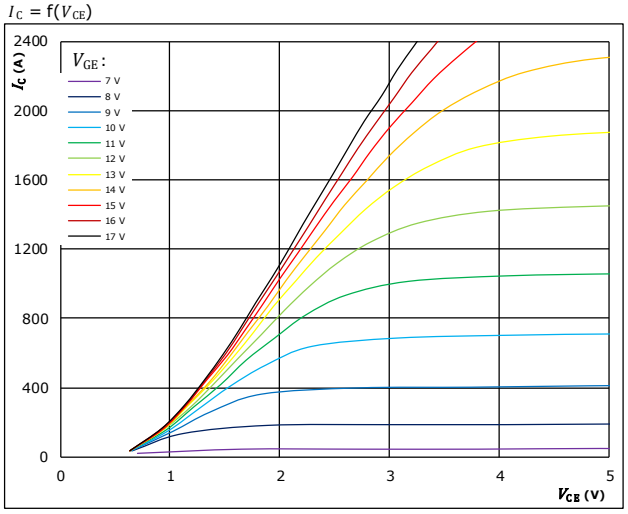


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

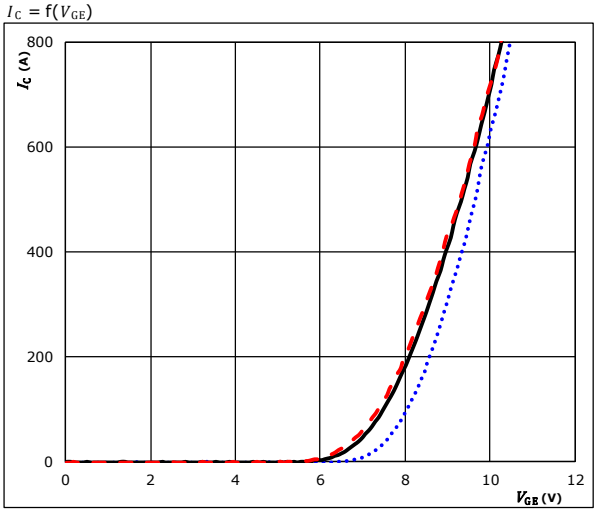


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

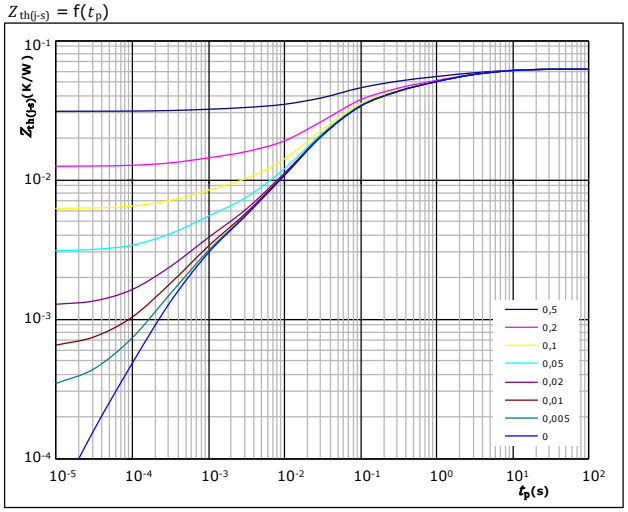


t_p =	250	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,06	K/W

IGBT thermal model values

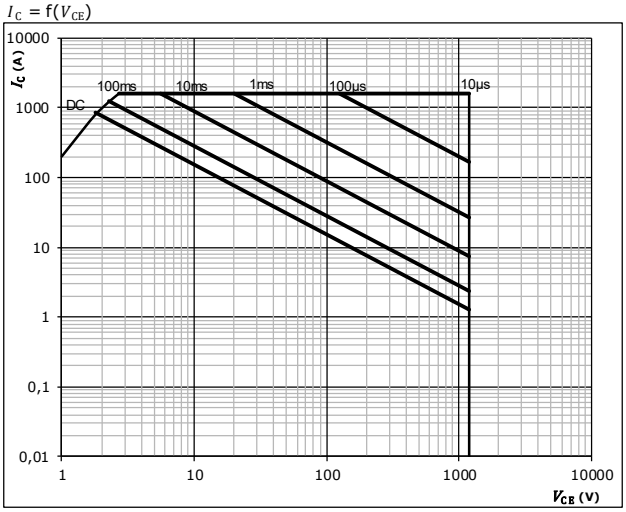
R (K/W)	τ (s)
7,38E-03	5,64E+00
1,16E-02	1,21E+00
1,14E-02	2,33E-01
2,25E-02	4,98E-02
5,89E-03	1,55E-02
1,30E-03	2,19E-03
1,87E-03	5,19E-04

Buck Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



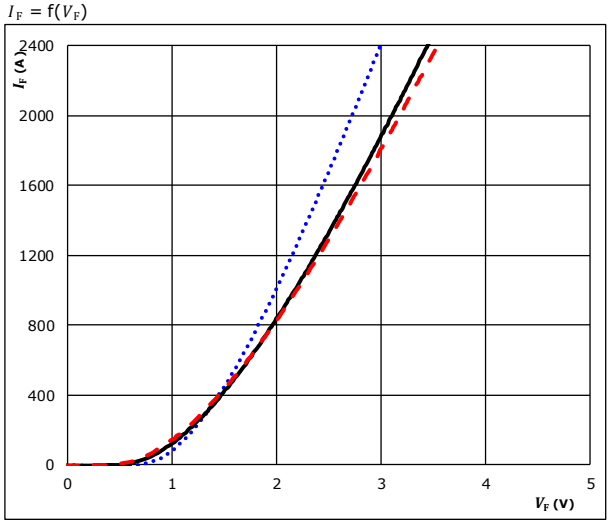
D =	single pulse	
T_s =	80	°C
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



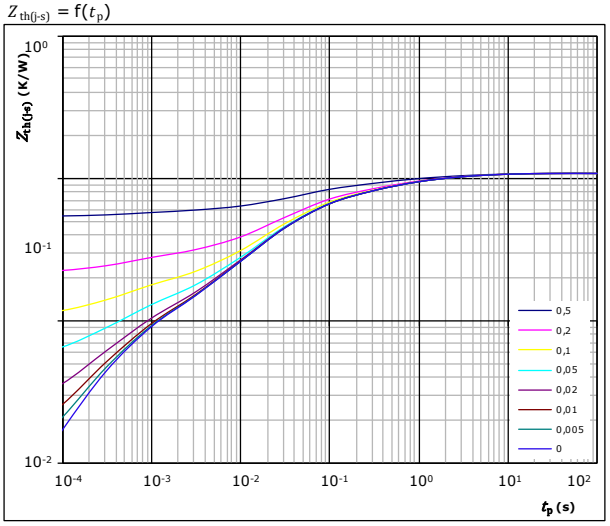
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,11 K/W

FWD thermal model values

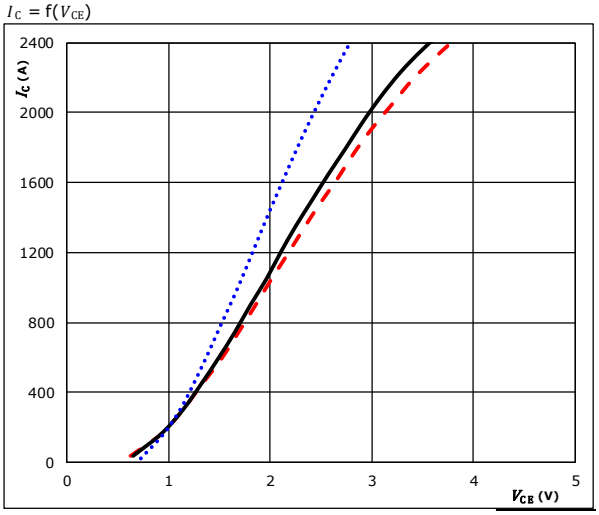
R (K/W)	τ (s)
7,54E-03	5,69E+00
1,57E-02	1,17E+00
2,42E-02	2,48E-01
3,71E-02	4,30E-02
1,34E-02	1,19E-02
3,30E-03	1,90E-03
6,17E-03	4,18E-04

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

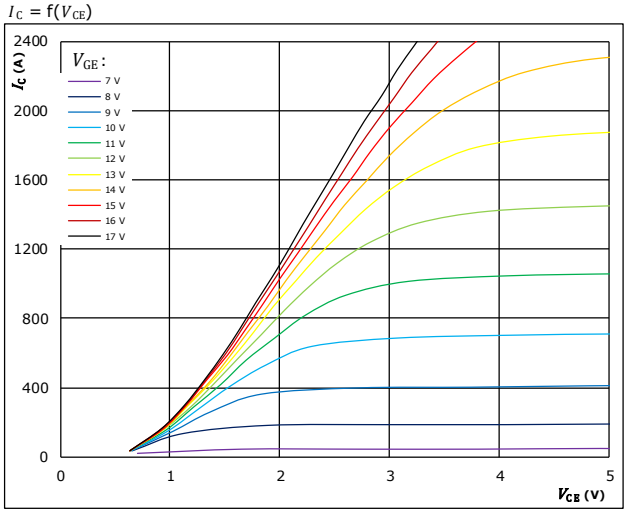


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

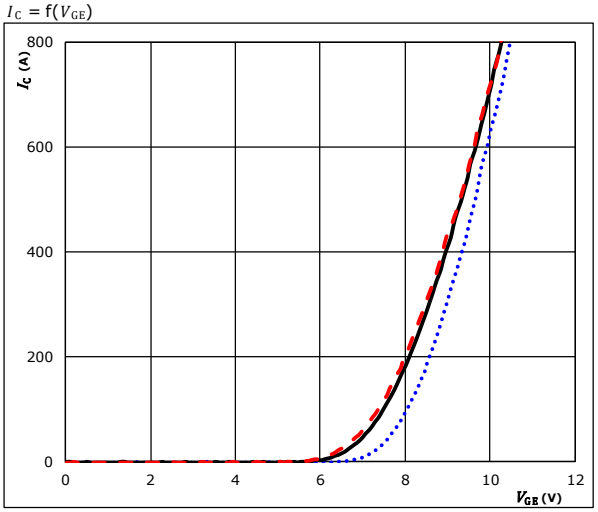


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

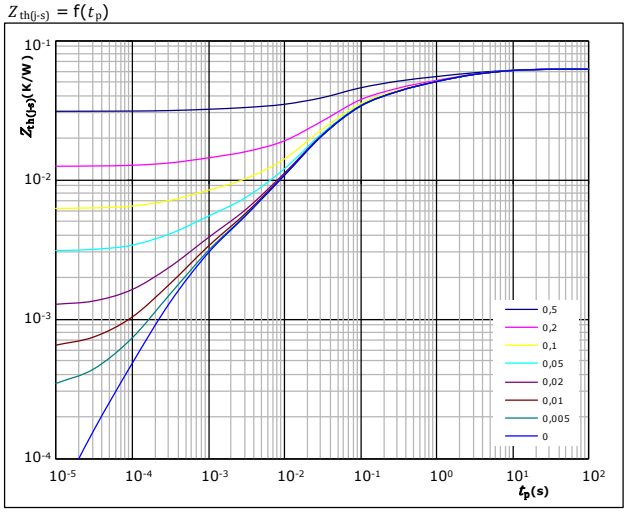


t_p =	250	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,06	K/W

IGBT thermal model values

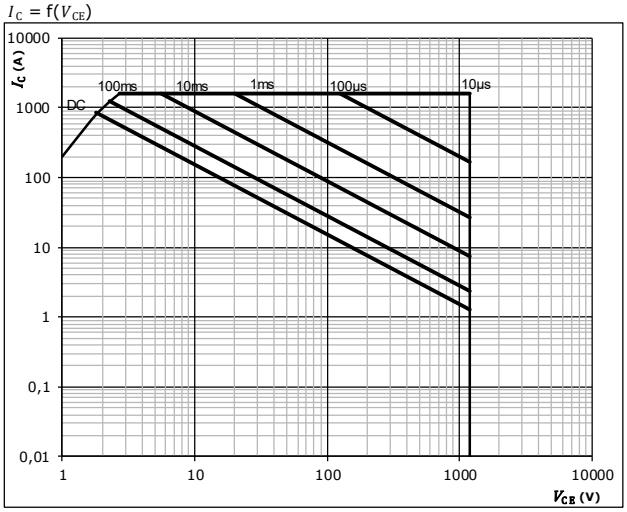
R (K/W)	τ (s)
7,38E-03	5,64E+00
1,16E-02	1,21E+00
1,14E-02	2,33E-01
2,25E-02	4,98E-02
5,89E-03	1,55E-02
1,30E-03	2,19E-03
1,87E-03	5,19E-04

Boost Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



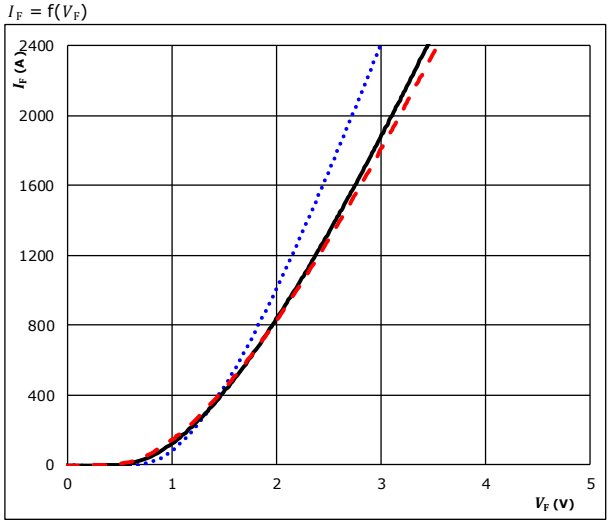
D =	single pulse	
T_s =	80	°C
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



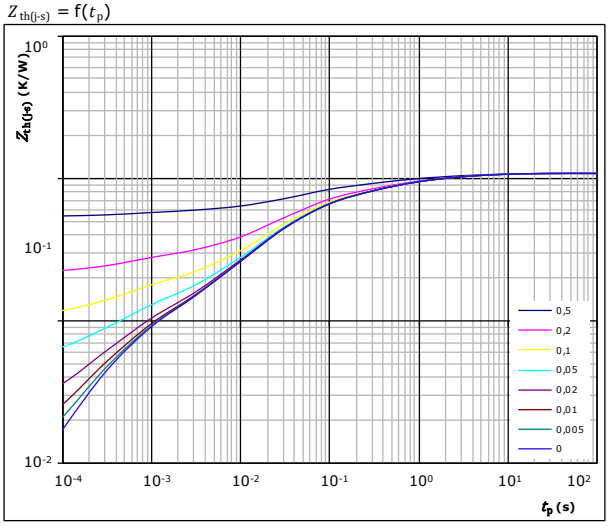
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,11 K/W

FWD thermal model values

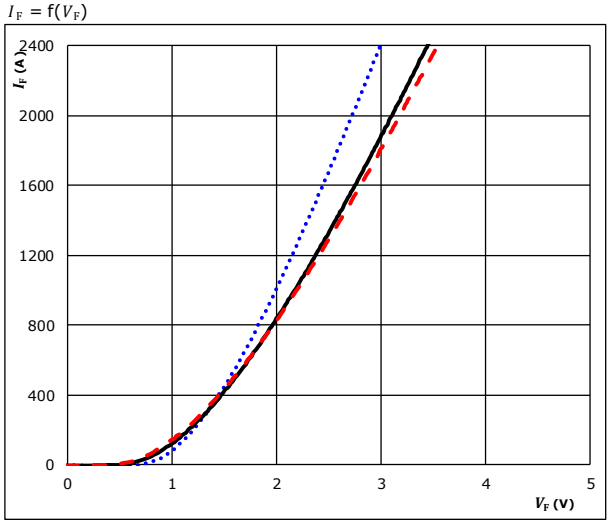
R (K/W)	τ (s)
7,54E-03	5,69E+00
1,57E-02	1,17E+00
2,42E-02	2,48E-01
3,71E-02	4,30E-02
1,34E-02	1,19E-02
3,30E-03	1,90E-03
6,17E-03	4,18E-04

Boost Sw.Inv.Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



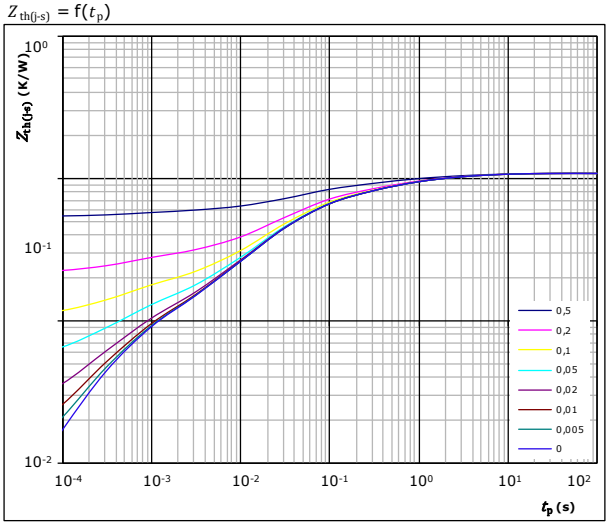
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,11 K/W

FWD thermal model values

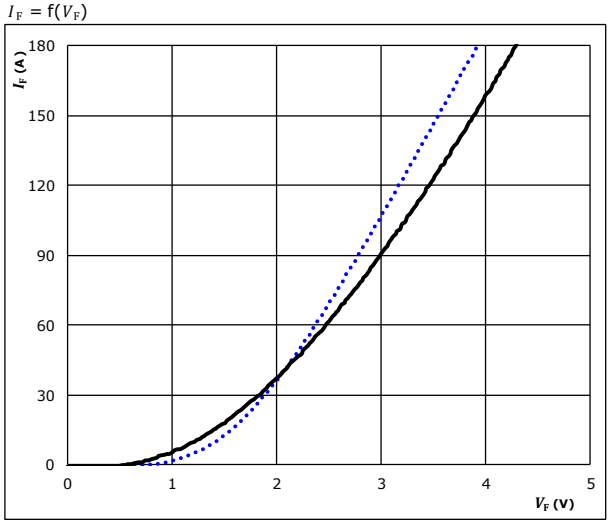
R (K/W)	τ (s)
7,54E-03	5,69E+00
1,57E-02	1,17E+00
2,42E-02	2,48E-01
3,71E-02	4,30E-02
1,34E-02	1,19E-02
3,30E-03	1,90E-03
6,17E-03	4,18E-04

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



t_p = 250 µs

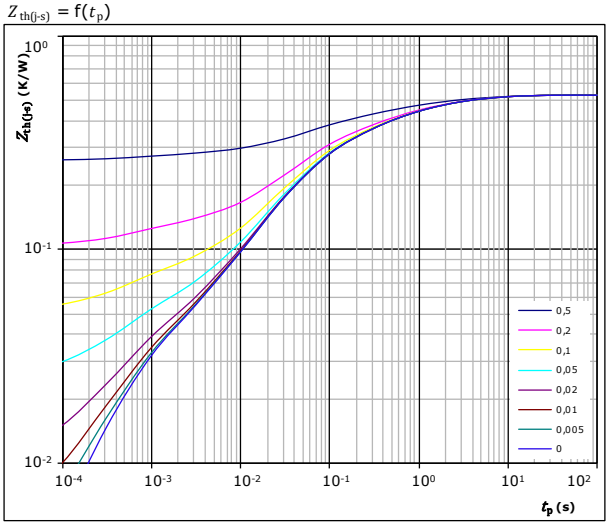
T_j: 25 °C

125 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,53 K/W

FWD thermal model values

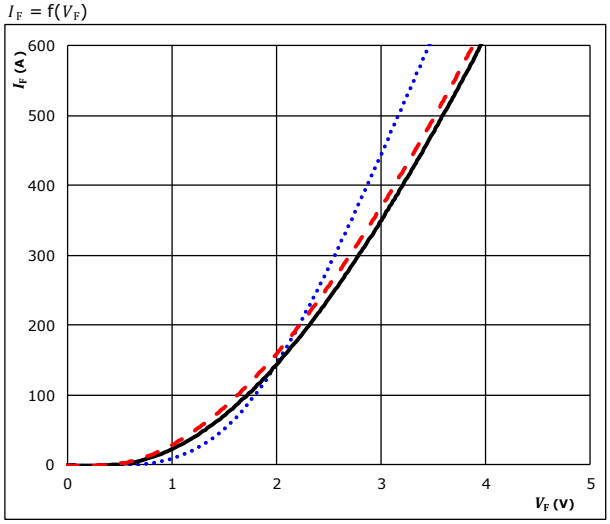
R (K/W)	τ (s)
4,78E-02	7,53E+00
9,08E-02	1,57E+00
1,17E-01	3,99E-01
1,51E-01	8,31E-02
7,91E-02	2,68E-02
1,69E-02	3,51E-03
2,28E-02	6,58E-04

Snubber Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



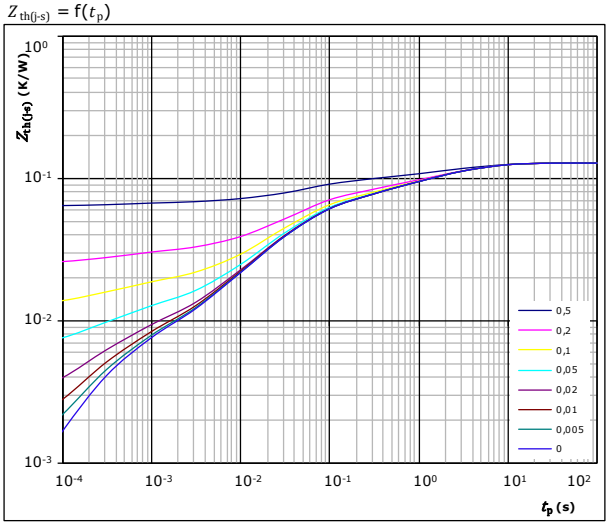
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,13 K/W

FWD thermal model values

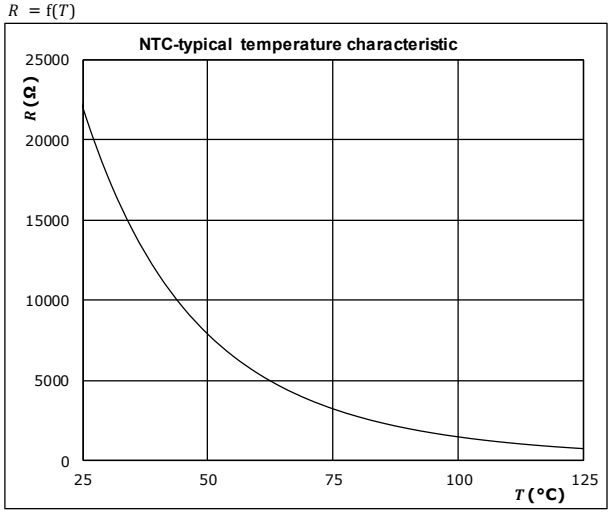
R (K/W)	τ (s)
2,85E-02	4,51E+00
2,95E-02	9,09E-01
1,94E-02	1,46E-01
3,88E-02	3,45E-02
5,18E-03	4,36E-03
5,50E-03	3,37E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

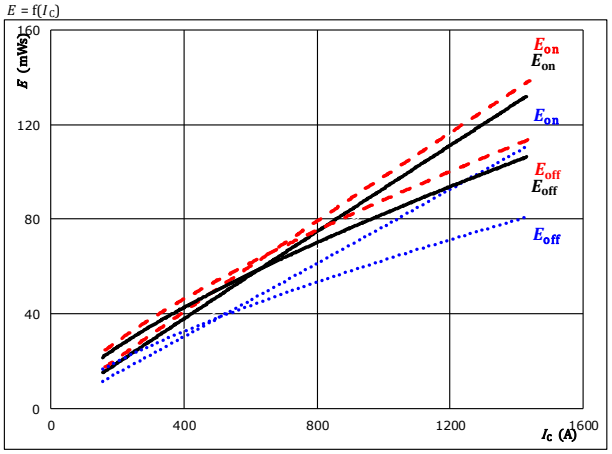


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



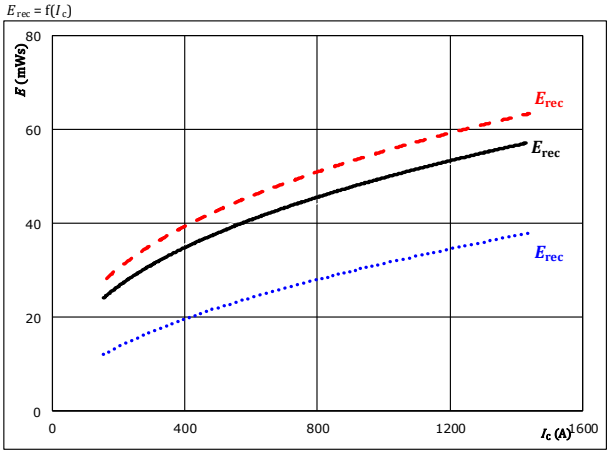
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C
R_{goff} =	1	Ω		

figure 2. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



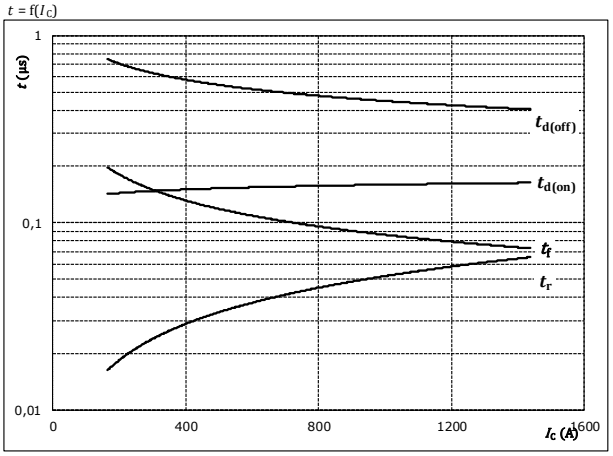
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C

figure 3. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



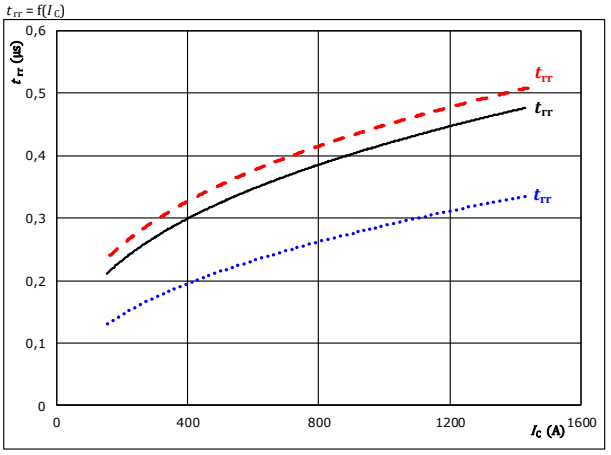
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	-8 / 16	V
R_{gon} =	1	Ω
R_{goff} =	1	Ω

figure 4. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

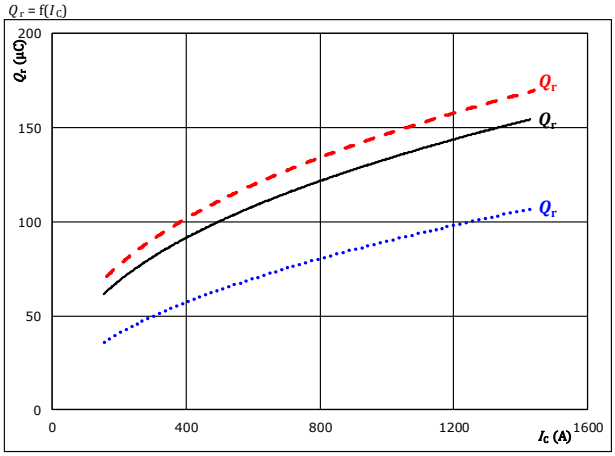
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C

Buck Switching Characteristics

figure 5. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



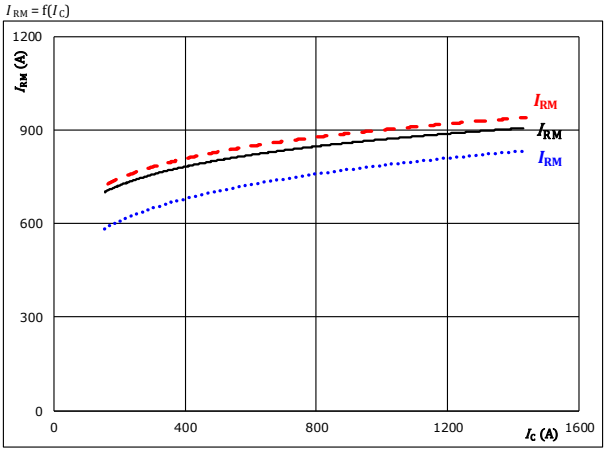
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C

figure 6. **FWD**

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

$I_{RM} = f(I_C)$



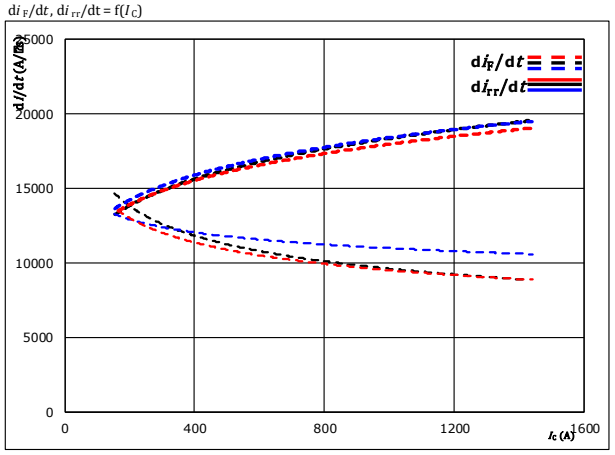
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C

figure 7. **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

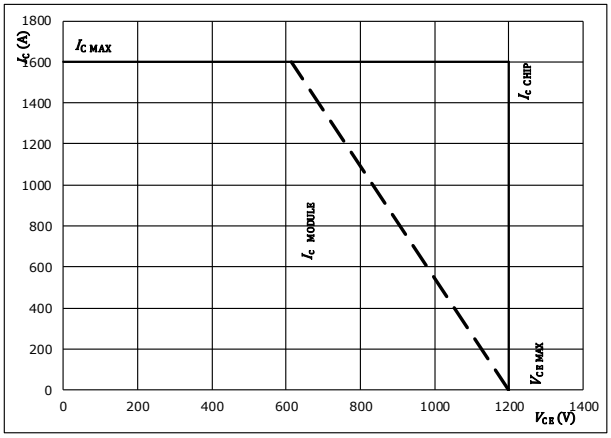
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C

Buck Switching Characteristics

figure 8. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	150	°C
R_{gon} =	1	Ω
R_{goff} =	1	Ω

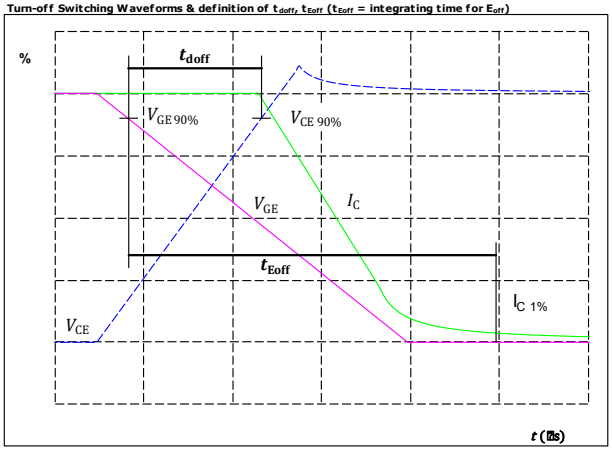
Buck Switching Definitions

General conditions

T_j	=	150 °C
R_{gon}	=	1 Ω
R_{goff}	=	1 Ω

figure 1. IGBT

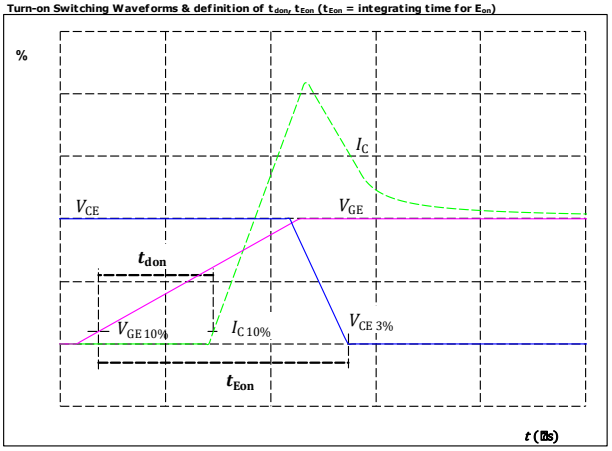
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-8	V
$V_{GE}(100\%)$ =	16	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_{doff} =	390	ns

figure 2. IGBT

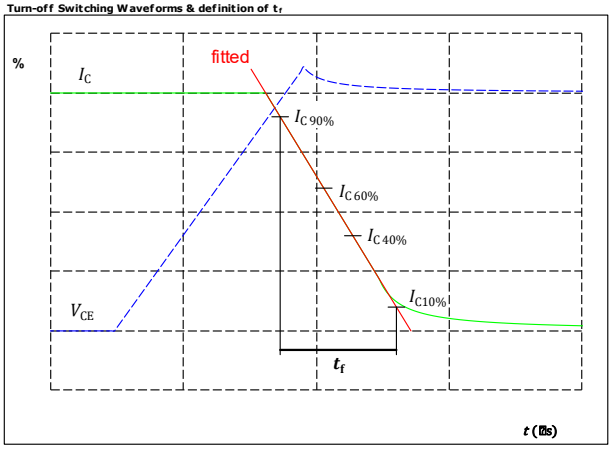
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-8	V
$V_{GE}(100\%)$ =	16	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_{don} =	165	ns

figure 3. IGBT

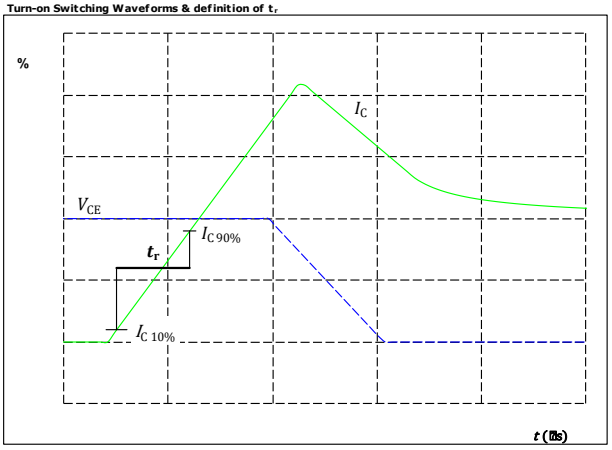
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_f =	74	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

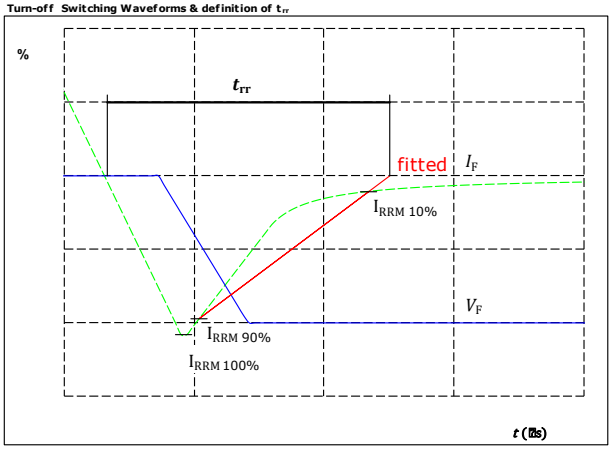


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_r =	70	ns

Buck Switching Characteristics

figure 5. **FWD**

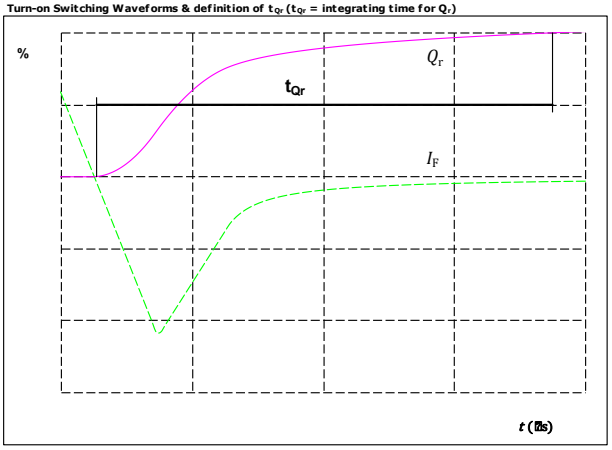
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%)$ =	600	V
$I_F(100\%)$ =	800	A
$I_{RRM}(100\%)$ =	899	A
t_{rr} =	528	ns

figure 6. **FWD**

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



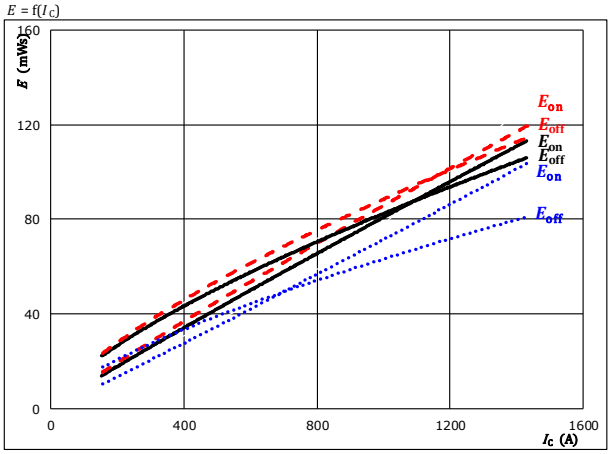
$I_F(100\%)$ =	800	A
$Q_r(100\%)$ =	173	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



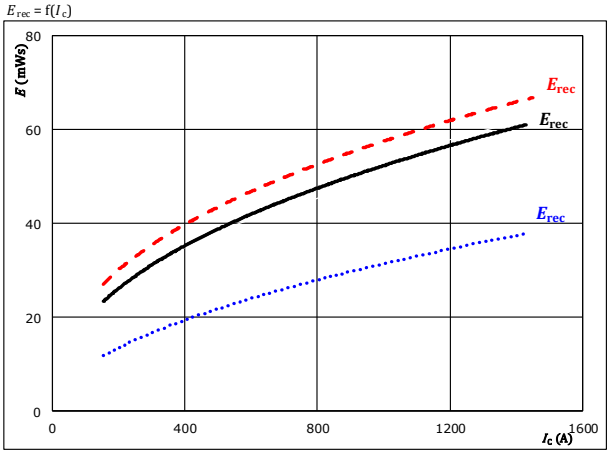
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C
R_{goff} =	1	Ω		

figure 2. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



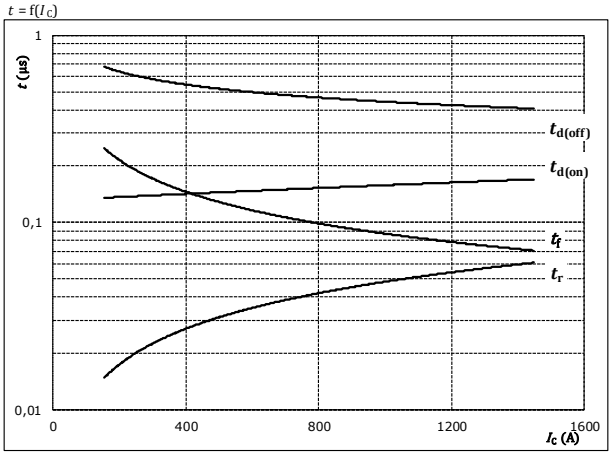
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C

figure 3. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



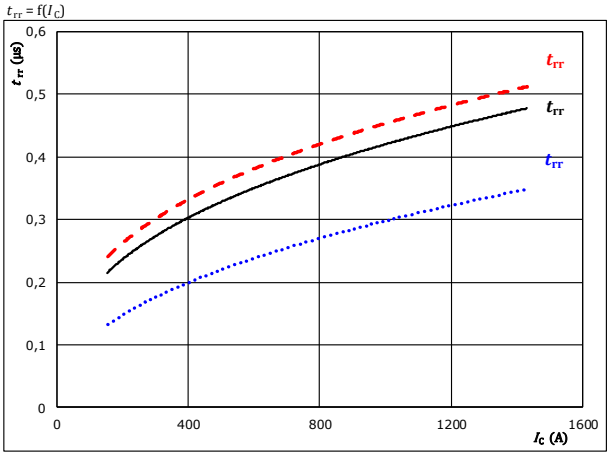
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	-8 / 16	V
R_{gon} =	1	Ω
R_{goff} =	1	Ω

figure 4. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

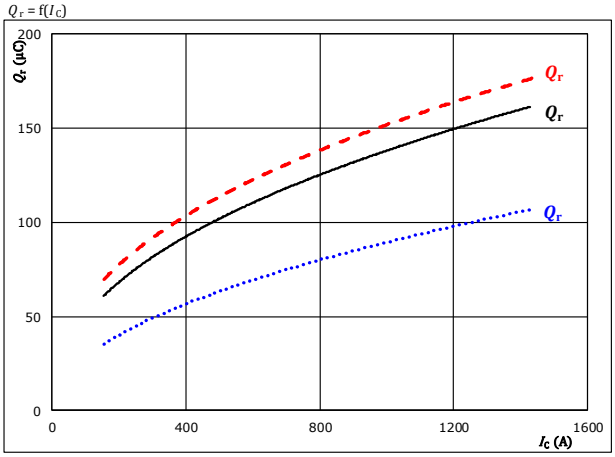
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	-8 / 16	V		125 °C
R_{gon} =	1	Ω		150 °C

Boost Switching Characteristics

figure 5. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



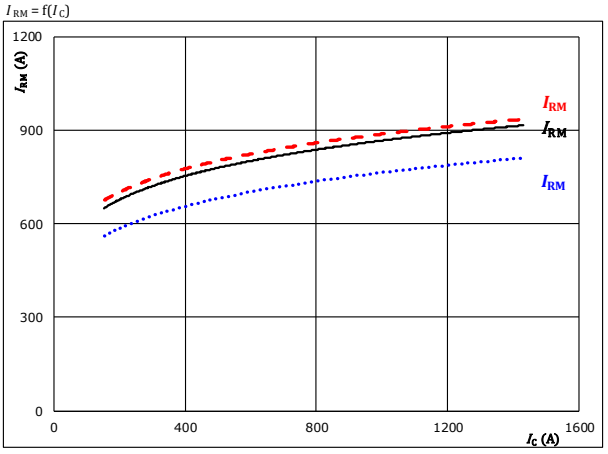
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C, 125 °C, 150 °C
V_{GE} =	-8 / 16	V		
R_{gon} =	1	Ω		

figure 6. **FWD**

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

$I_{RM} = f(I_C)$



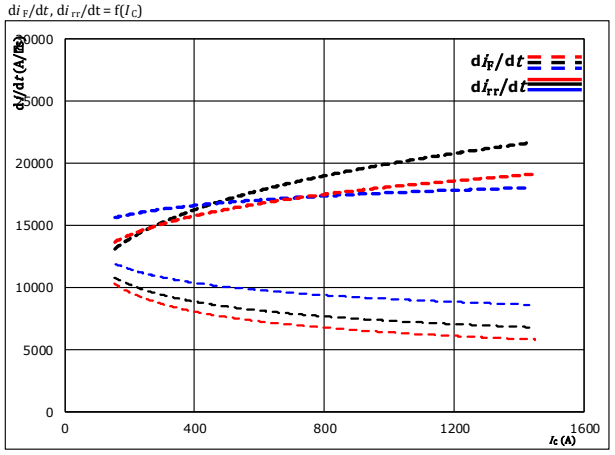
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C, 125 °C, 150 °C
V_{GE} =	-8 / 16	V		
R_{gon} =	1	Ω		

figure 7. **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

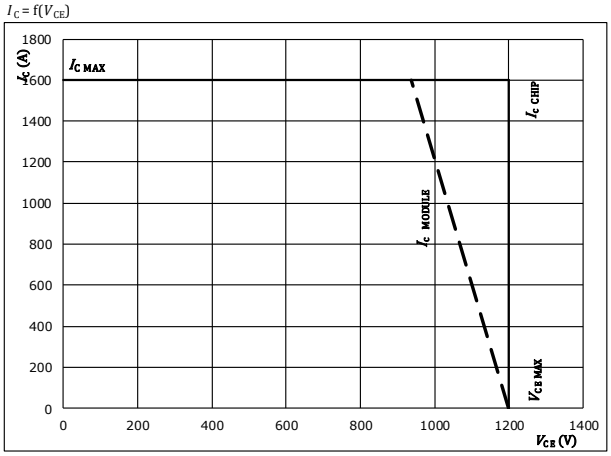
V_{CE} =	600	V	T_j:	25 °C, 125 °C, 150 °C
V_{GE} =	-8 / 16	V		
R_{gon} =	1	Ω		

Boost Switching Characteristics

figure 8. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	150	°C
R_{gon} =	1	Ω
R_{goff} =	1	Ω

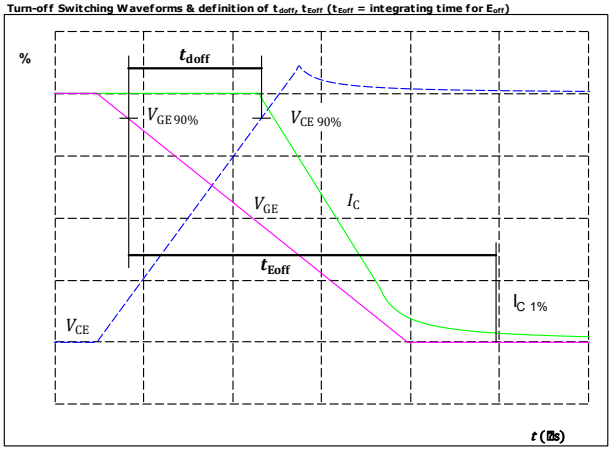
Boost Switching Definitions

General conditions

T_j	=	150 °C
R_{gon}	=	1 Ω
R_{goff}	=	1 Ω

figure 1. IGBT

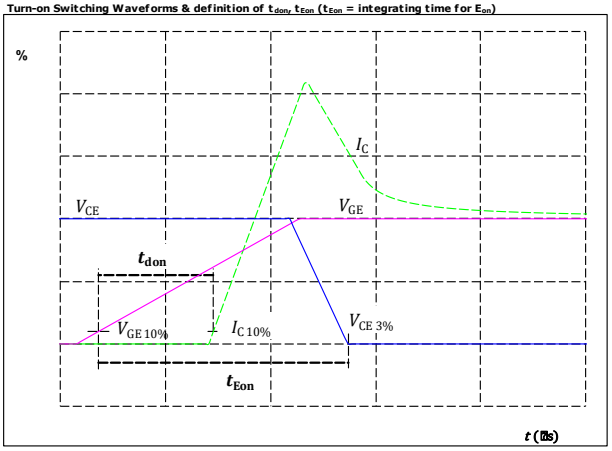
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-8	V
$V_{GE}(100\%)$ =	16	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_{doff} =	485	ns

figure 2. IGBT

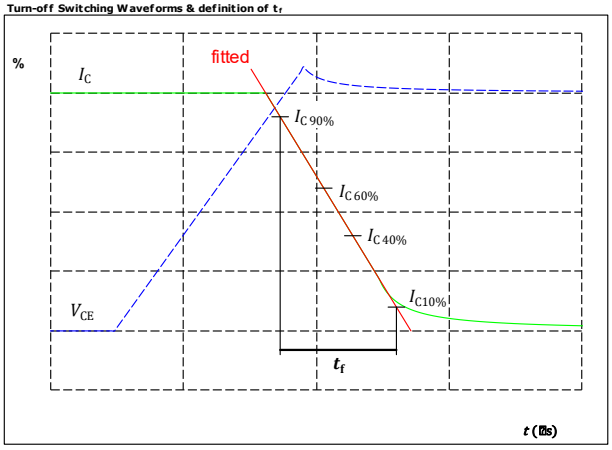
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-8	V
$V_{GE}(100\%)$ =	16	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_{don} =	153	ns

figure 3. IGBT

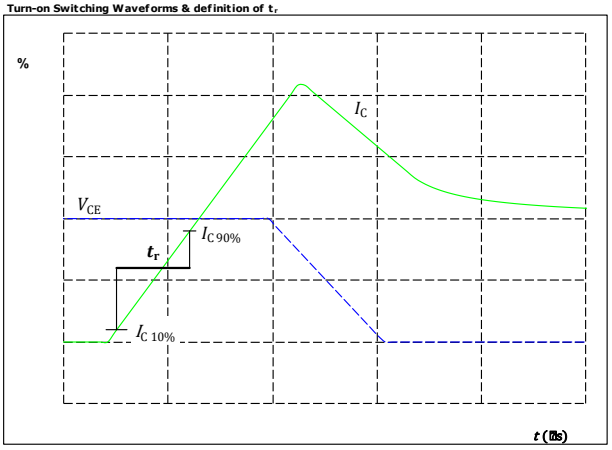
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_f =	101	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

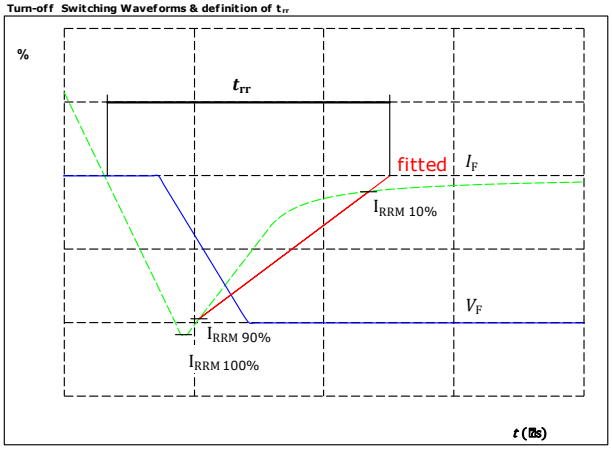


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	800	A
t_r =	41	ns

Boost Switching Characteristics

figure 5. **FWD**

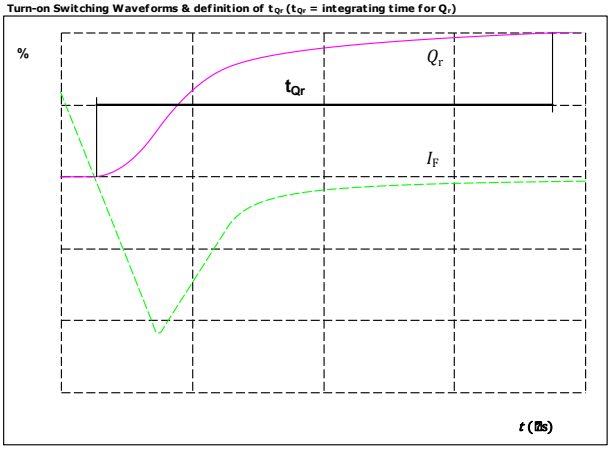
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%)$ =	600	V
$I_F(100\%)$ =	800	A
$I_{RRM}(100\%)$ =	879	A
t_{rr} =	402	ns

figure 6. **FWD**

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



$I_F(100\%)$ =	800	A
$Q_r(100\%)$ =	135	µC

Ordering Code & Marking

Version	Ordering Code
without thermal paste	70-W424NIA800M7-M800F70
with thermal paste	70-W424NIA800M7-M800F70-/3/

NN-NNNNNNNNNNNNNN
TTTTTTVV WWYY UL
VIN LLLLL SSSS

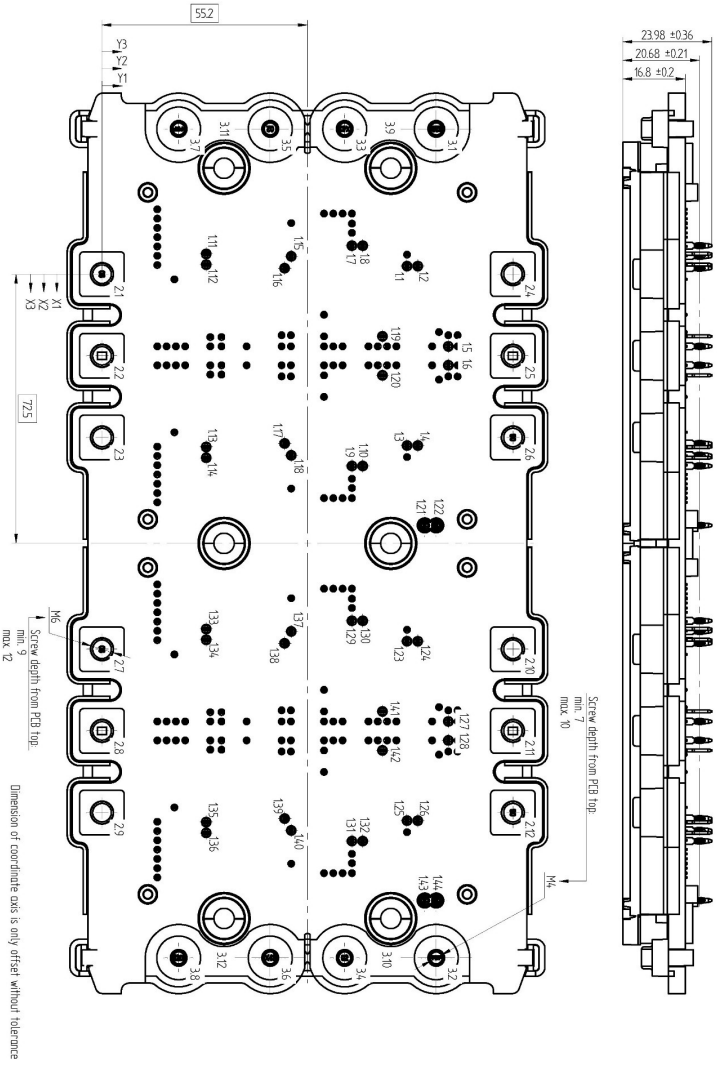
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	**Lot number**	**Serial**	**Date code**		
Datamatrix	TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

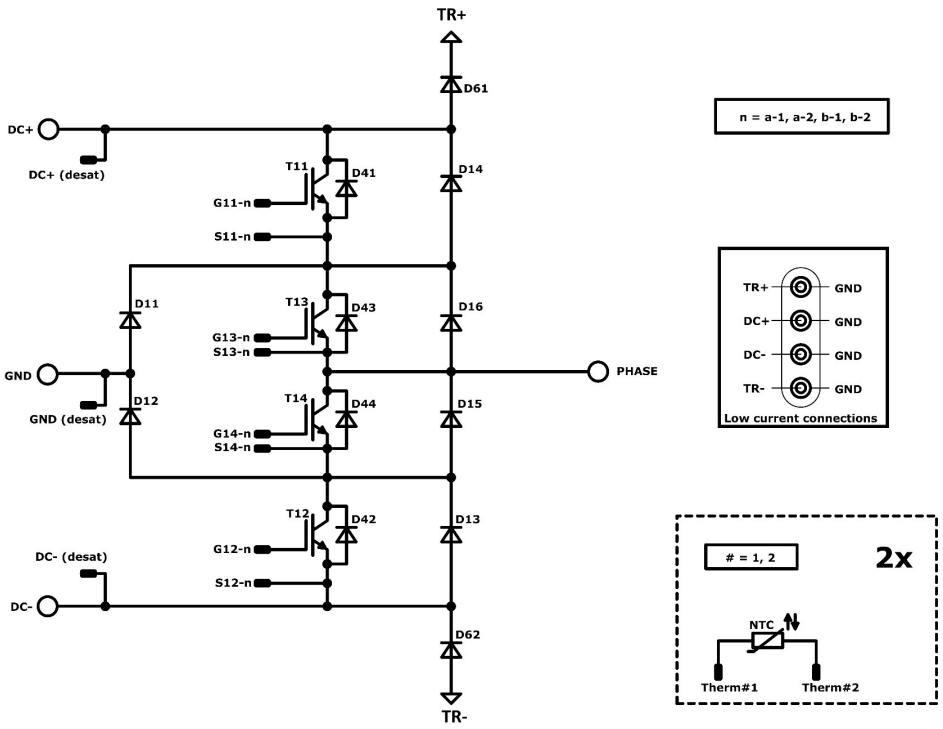
Driver pins			
Pin	X1	Y1	Function
1.1	-2,15	81,95	S11-a-1
1.2	-2,15	84,85	G11-a-1
1.3	46,15	81,95	S11-a-2
1.4	46,15	84,85	G11-a-2
1.5	19,45	93,05	DC+ (desat)
1.6	24,55	93,05	DC+ (desat)
1.7	-7,65	67,15	S13-a-1
1.8	-7,65	70,05	G13-a-1
1.9	51,65	67,15	S13-a-2
1.10	51,65	70,05	G13-a-2
1.11	-5,45	28	S14-a-1
1.12	-2,55	28	G14-a-1
1.13	46,55	28	G14-a-2
1.14	49,45	28	S14-a-2
1.15	-4,8	50,85	G12-a-1
1.16	-1,6	49,05	S12-a-1
1.17	45,6	49,05	S12-a-2
1.18	48,8	50,85	G12-a-2
1.19	16,75	75,35	GND (desat)
1.20	27,25	75,35	GND (desat)
1.21	67,65	86,7	Therm12
1.22	67,65	89,8	Therm11
1.23	98,85	81,95	S11-b-1
1.24	98,85	84,85	G11-b-1
1.25	147,15	81,95	S11-b-2
1.26	147,15	84,85	G11-b-2
1.27	120,45	93,05	DC+ (desat)
1.28	125,55	93,05	DC+ (desat)
1.29	93,35	67,15	S13-b-1
1.30	93,35	70,05	G13-b-1
1.31	152,65	67,15	S13-b-2
1.32	152,65	70,05	G13-b-2
1.33	95,55	28	S14-b-1
1.34	98,45	28	G14-b-1
1.35	147,55	28	G14-b-2
1.36	150,45	28	S14-b-2
1.37	96,2	50,85	G12-b-1
1.38	99,4	49,05	S12-b-1
1.39	146,6	49,05	S12-b-2
1.40	149,8	50,85	G12-b-2
1.41	117,75	75,35	GND (desat)
1.42	128,25	75,35	GND (desat)
1.43	168,65	86,7	Therm22
1.44	168,65	89,8	Therm21

Power connections			
M6 screw	X2	Y2	Function
2.1	0	0	Phase
2.2	22	0	Phase
2.3	44	0	Phase
2.4	0	110,4	DC+
2.5	22	110,4	GND
2.6	44	110,4	DC-
2.7	101	0	Phase
2.8	123	0	Phase
2.9	145	0	Phase
2.10	101	110,4	DC+
2.11	123	110,4	GND
2.12	145	110,4	DC-

Low current connections			
M4 screw	X3	Y3	Function
3.1	-39,1	89,8	TR+
3.2	184,1	89,8	TR+
3.3	-39,1	65,2	DC+
3.4	184,1	65,2	DC+
3.5	-39,1	45,2	DC-
3.6	184,1	45,2	DC-
3.7	-39,1	20,6	TR-
3.8	184,1	20,6	TR-
3.9	-39,1	89,8	GND
3.10	184,1	89,8	GND
3.11	-39,1	45,2	GND
3.12	184,1	45,2	GND



Pinout



NOTE: Driver pins for parallel devices are not connected inside the module!

Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	MOSFET	1200 V	800 A	Buck Switch	
D11, D12	FWD	1200 V	800 A	Buck Diode	
T13, T14	IGBT	1200 V	800 A	Boost Switch	
D13, D14	FWD	1200 V	800 A	Boost Diode	
D15, D16	FWD	1200 V	800 A	Boost Sw.Inv.Diode	
D41, D42, D43, D44	FWD	1200 V	60 A	Boost Sw. Protection Diode	
D61, D62	FWD	1200 V	200 A	Snubber Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 4	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for Widebody 2phase packages see vincotech.com website.

Package data
Package data for Widebody 2phase 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
70-W424NIA800M7-M800F70-D1-14	09 Dec. 2019	AC test voltage and maximum PCB temperature added	3