Vincotech

10-PZ07NIA075S5-P926F53Y
datasheet

flow **NPC 0 IGBT** **1200 V / 75 A**

Features

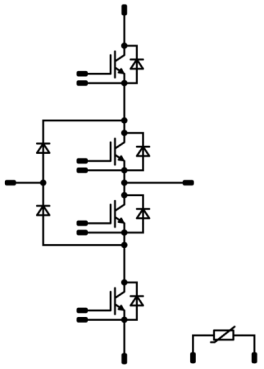
- Three-level topology
- High efficient with latest chip technology
- Low incductive package

flow 0 12 mm housing

Target applications

- Solar Inverters

Schematic



Types

- 10-PZ07NIA075S5-P926F53Y

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	58	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	225	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	86	W
Gate-emitter voltage	V_{GES}		±20	V
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	55	A
Repetitive peak forward current	I_{FRM}	T_j limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	71	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	85	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	225	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	95	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	49	A
Repetitive peak forward current	I_{FRM}		100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	68	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Sw.Inv.Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	47	A
Repetitive peak forward current	I_{FRM}		100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	68	W
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
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 s	6000	V
		AC Voltage t_p = 1 min	2500	V
Creepage distance			min. 12,7	mm
Clearance			9	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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00075	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,56 1,56 1,59	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	25		25		4500		pF
Output capacitance	C_{oes}							130		
Reverse transfer capacitance	C_{res}							17		
Gate charge	Q_g		15	520	75	25		164		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,10		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	75	25 125 150		57 57 56		ns
Rise time	t_r					25 125 150		10 12 13		
Turn-off delay time	$t_{d(off)}$					25 125 150		80 95 99		
Fall time	t_f					25 125 150		20 26 32		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,4 µC Q_{rFWD} = 4,6 µC Q_{rFWD} = 5,3 µC				25 125 150		0,286 0,549 0,652		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,733 1,127 1,277		

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				75	25 125 150		1,53 1,49 1,47	1,92	V
Reverse leakage current	I_r			650		25			3,8	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,34		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 8664 A/µs di/dt = 7459 A/µs di/dt = 7169 A/µs	±15	350	75	25 125 150		87 105 110		A
Reverse recovery time	t_{rr}					25 125 150		54 94 110		ns
Recovered charge	Q_r					25 125 150		2,374 4,557 5,286		µC
Reverse recovered energy	E_{rec}					25 125 150		0,567 1,055 1,207		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3200 2640 2816		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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,001	25	4,2	5	5,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,10 1,08 1,09	1,45	V
Collector-emitter cut-off current	I_{CES}		0	650		25			40	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							12100		
Output capacitance	C_{oes}	f= 1 MHz	0	25		25		150		pF
Reverse transfer capacitance	C_{res}							42		
Gate charge	Q_g		15	520	75	25		436		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,00		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		106 105 106		
Rise time	t_r					25 125 150		8 10 10		
Turn-off delay time	$t_{d(off)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	74	25 125 150		179 207 215		ns
Fall time	t_f					25 125 150		29 183 225		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,2 µC Q_{rFWD} = 3,9 µC Q_{rFWD} = 4,6 µC				25 125 150		0,467 0,572 0,644		
Turn-off energy (per pulse)	E_{off}					25 125 150		3,170 4,558 4,985		mWs

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				50	25 125		1,50 1,44	1,77	V
Reverse leakage current	I_R			650		25			2,65	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,41		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 9000 A/µs di/dt = 7880 A/µs di/dt = 7092 A/µs	±15	350	74	25 125 150		79 93 98		A
Reverse recovery time	t_{rr}					25 125 150		53 93 108		ns
Recovered charge	Q_r					25 125 150		2,173 3,905 4,565		µC
Reverse recovered energy	E_{rec}					25 125 150		0,505 1,017 1,207		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3121 2046 1944		A/µs
Boost Sw.Inv.Diode										
Static										
Forward voltage	V_F				50	25 125		1,63 1,54	1,82	V
Reverse leakage current	I_R			650		25			0,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,40		K/W

Characteristic Values

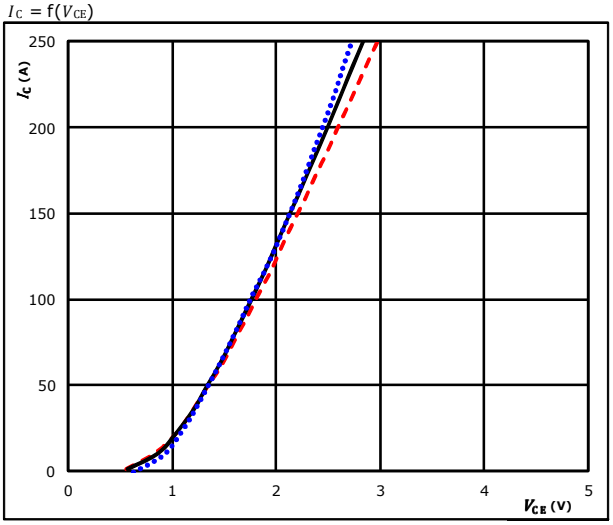
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
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

$I_C = f(V_{CE})$

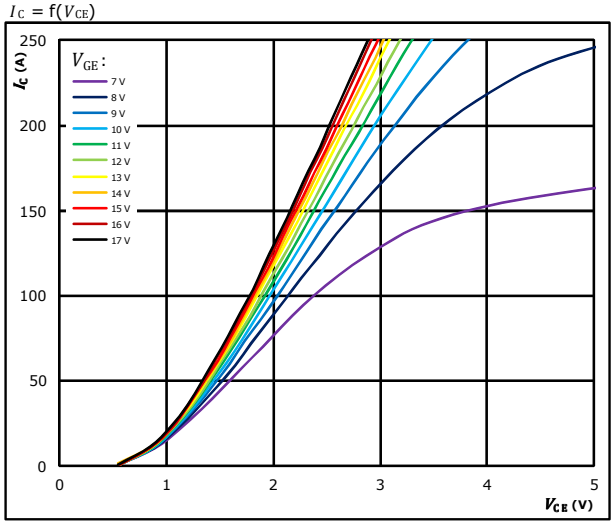


t_p =	250	µs		25 °C	
V_{GE} =	15	V	T_j:	125 °C	
				150 °C	

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

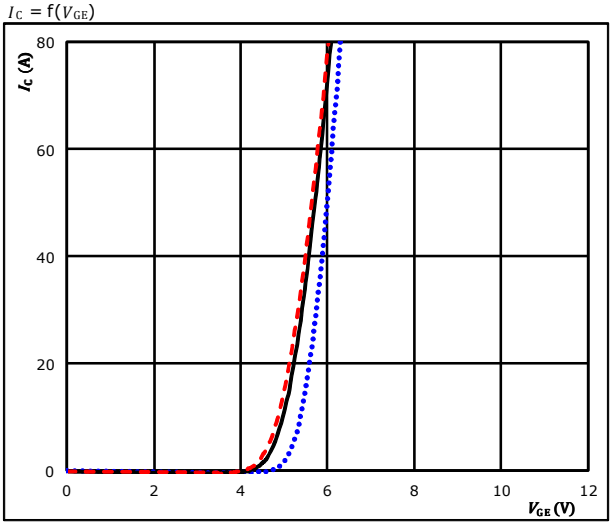


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

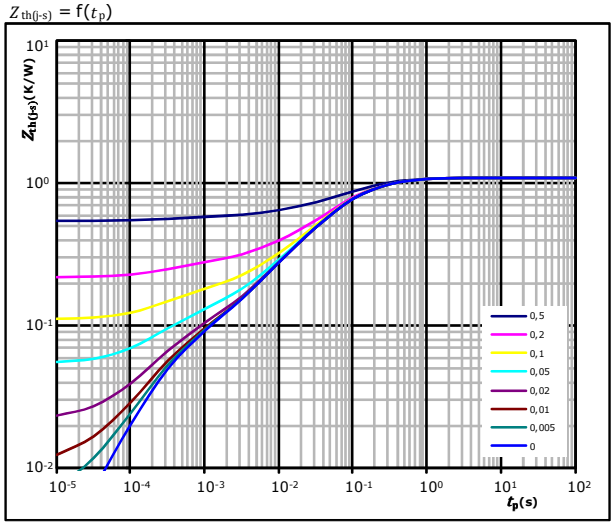


t_p =	100	µs		25 °C	
V_{CE} =	10	V	T_j:	125 °C	
				150 °C	

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,10	K/W

IGBT thermal model values

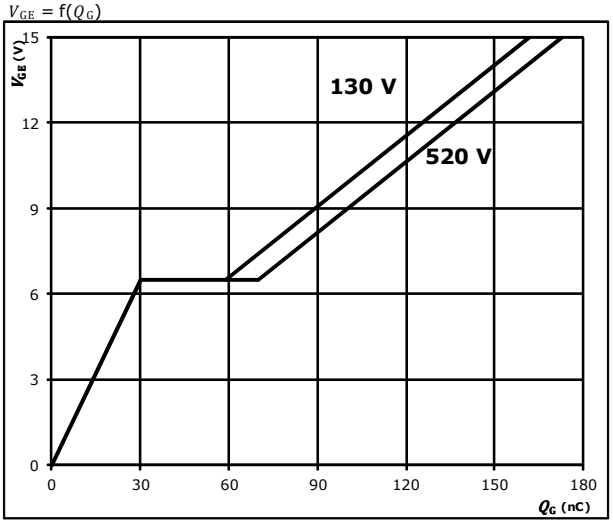
R (K/W)	τ (s)
2,16E-01	4,05E-01
6,30E-01	6,87E-02
1,62E-01	1,13E-02
3,68E-02	2,51E-03
6,02E-02	3,09E-04

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

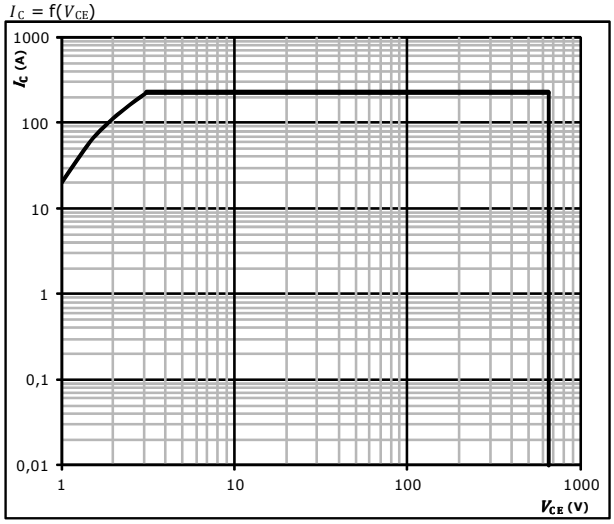


I_C= 75 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



D = single pulse

T_s = 80 °C

V_{GE} = ±15 V

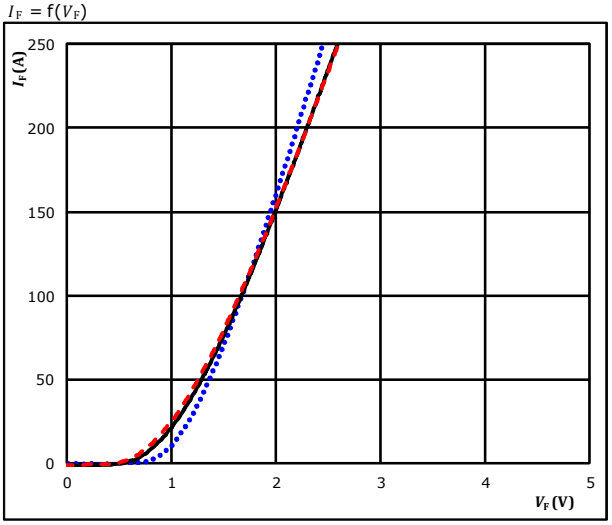
T_j = T_{jmax}

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



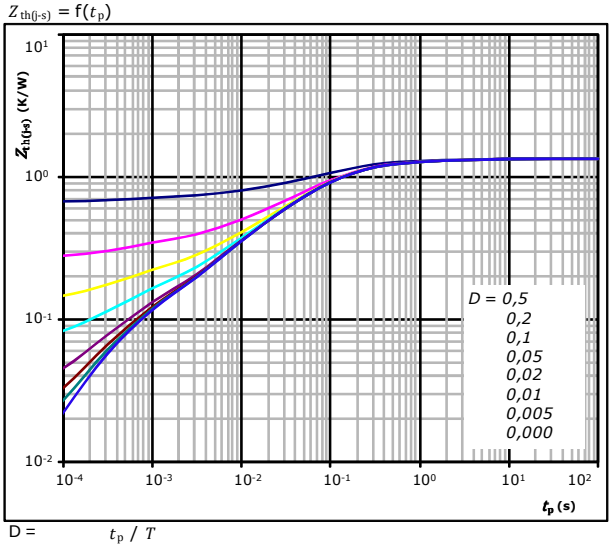
t_p = 250 µs

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

$R_{th(j-s)}$ = 1,34 K/W

FWD thermal model values

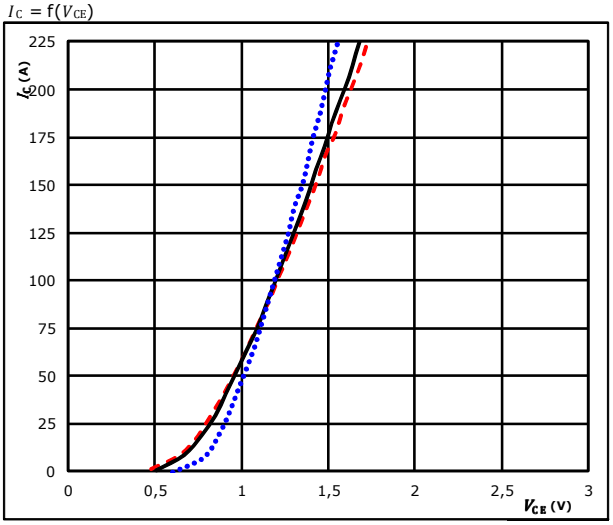
R (K/W)	τ (s)
5,84E-02	3,64E+00
1,57E-01	5,25E-01
5,86E-01	1,06E-01
3,27E-01	2,57E-02
1,27E-01	4,84E-03
8,12E-02	4,11E-04

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

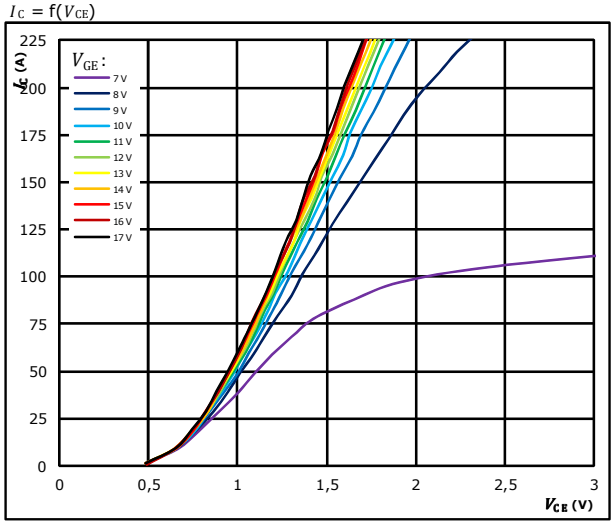


t_p =	250	µs		25 °C	
V_{GE} =	15	V	T_j:	125 °C	
				150 °C	

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

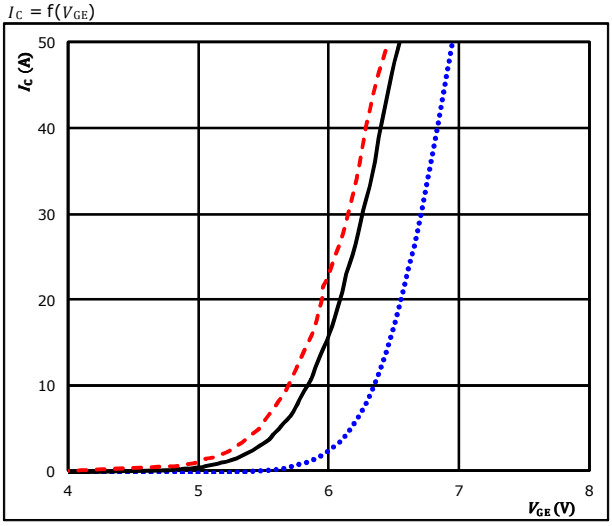


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

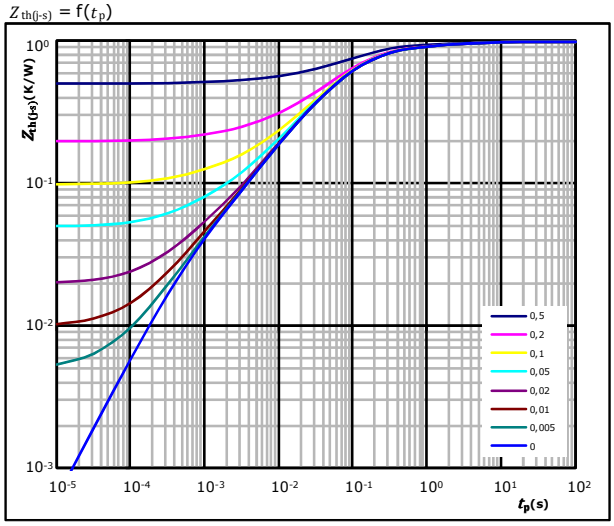


t_p =	100	µs		25 °C	
V_{CE} =	10	V	T_j:	125 °C	
				150 °C	

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,00	K/W

IGBT thermal model values

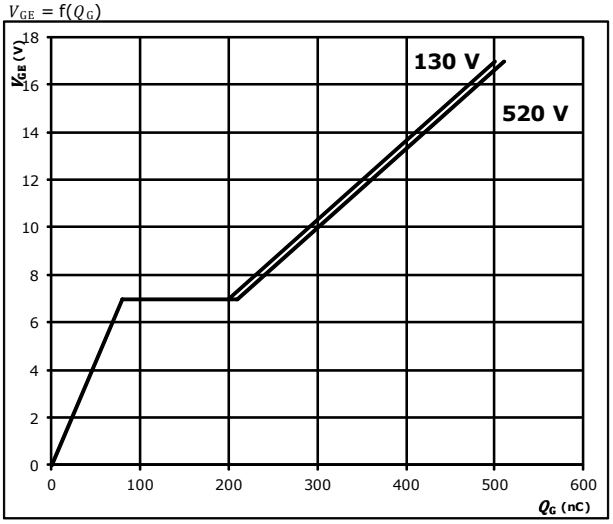
R (K/W)	τ (s)
8,80E-02	2,68E+00
1,67E-01	3,70E-01
5,38E-01	8,09E-02
1,47E-01	1,56E-02
3,80E-02	3,42E-03
1,88E-02	5,45E-04

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

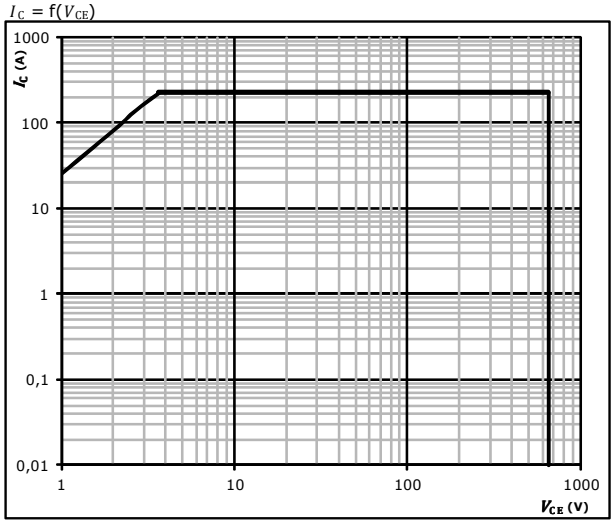


I_C= 75 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



D = single pulse

T_s = 80 °C

V_{GE} = ±15 V

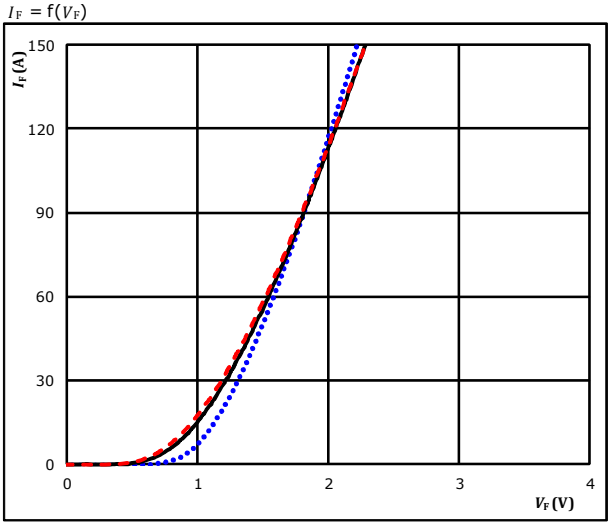
T_j = T_{jmax}

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



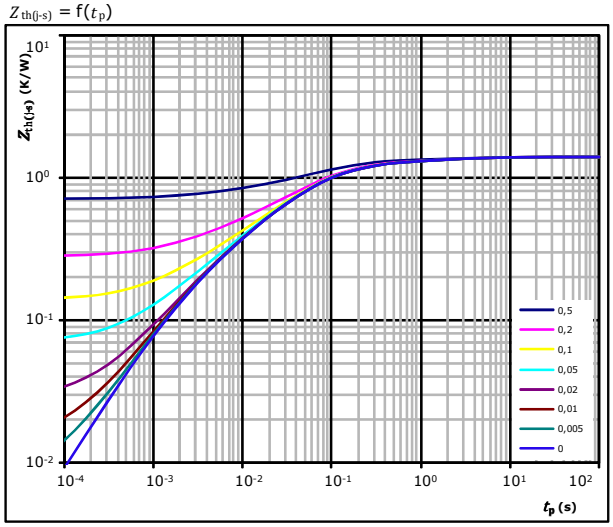
t_p = 250 µs

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

$R_{th(j-s)}$ = 1,41 K/W

FWD thermal model values

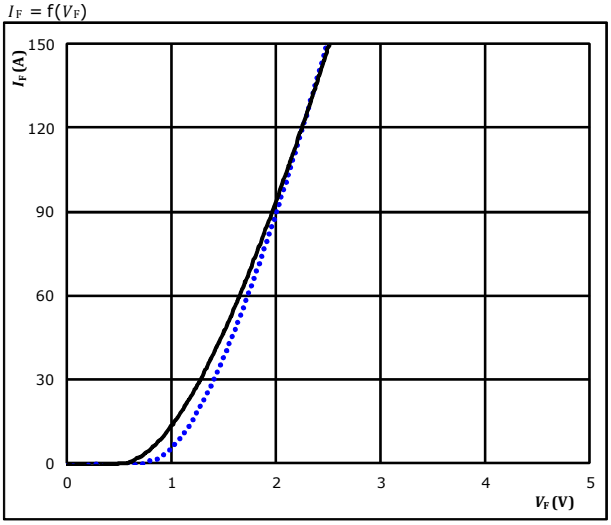
R (K/W)	τ (s)
8,12E-02	4,01E+00
1,48E-01	6,15E-01
5,58E-01	9,08E-02
3,75E-01	2,92E-02
1,82E-01	6,56E-03
6,20E-02	1,34E-03

Boost Sw.Inv.Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



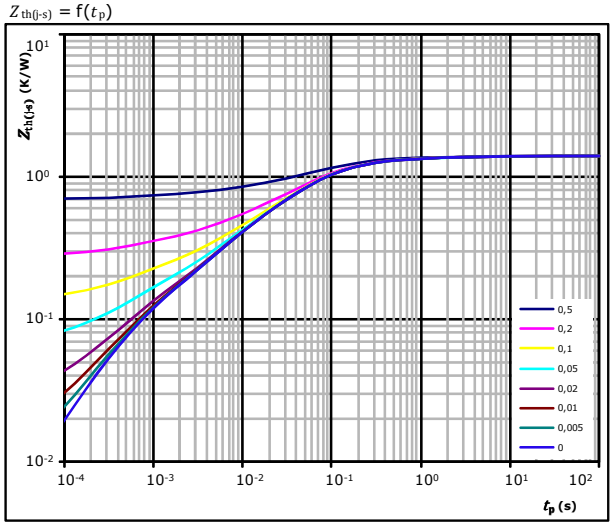
t_p = 250 µs

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

$R_{th(j-s)}$ = 1,40 K/W

FWD thermal model values

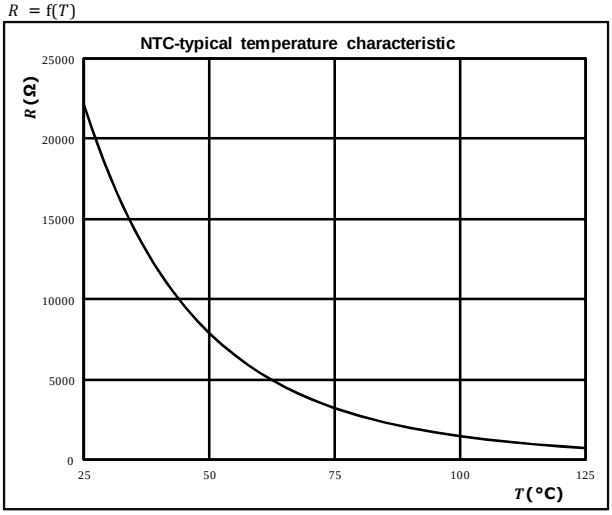
R (K/W)	τ (s)
6,76E-02	3,05E+00
1,79E-01	3,50E-01
6,70E-01	7,08E-02
2,72E-01	1,81E-02
1,35E-01	4,13E-03
7,56E-02	5,11E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

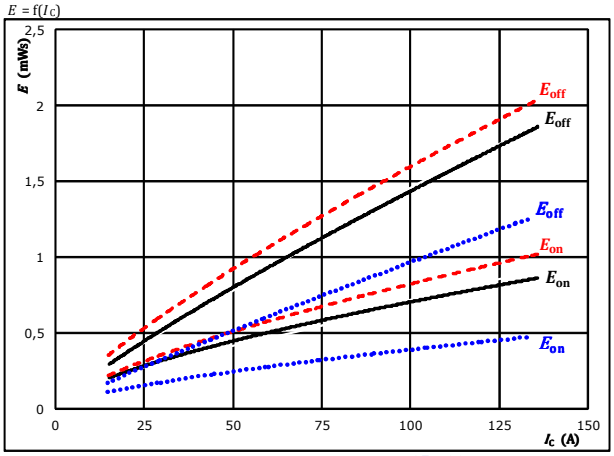


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



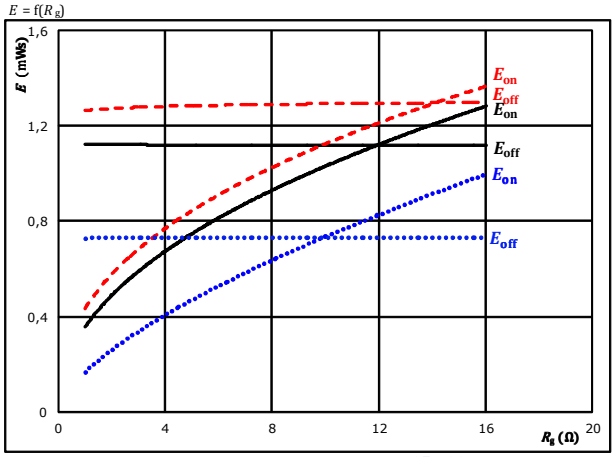
With an inductive load at

V_{CE} =	350	V	T_J:	25 °C	
V_{GE} =	±15	V		125 °C	
R_{gon} =	4	Ω		150 °C	
R_{goff} =	4	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



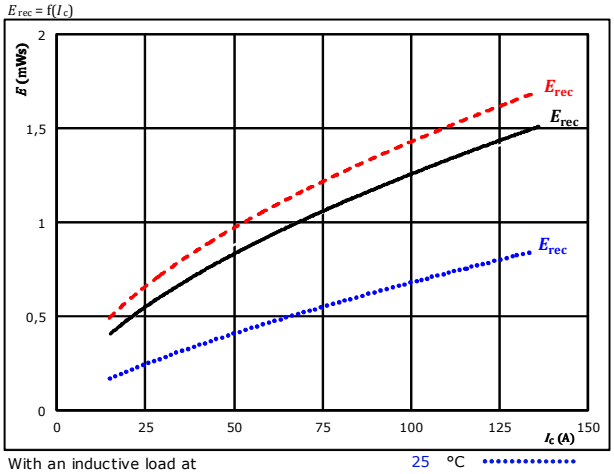
With an inductive load at

V_{CE} =	350	V	T_J:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C =	75	A		150 °C	

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



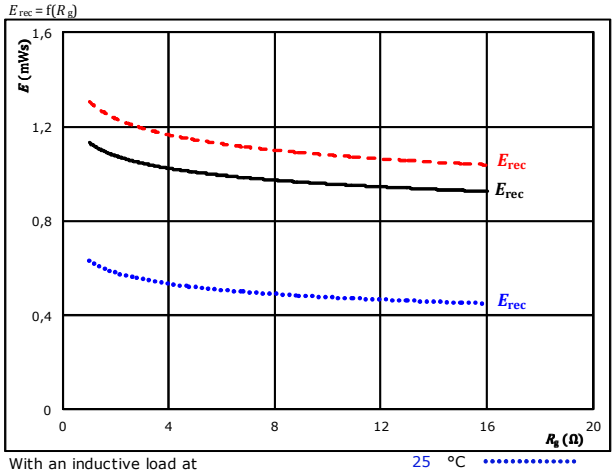
With an inductive load at

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

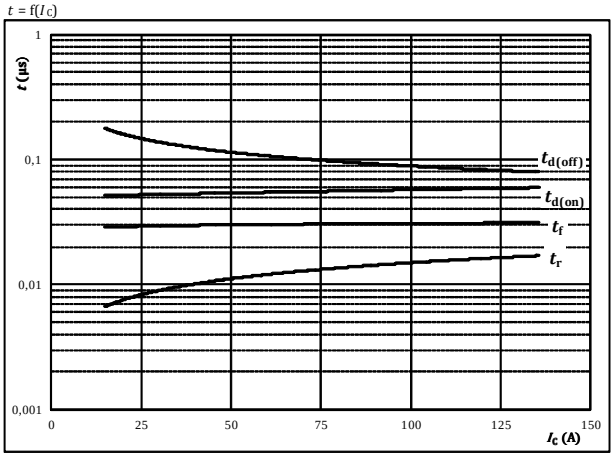
V_{CE} =	350	V	T_J:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C =	75	A		150 °C	

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



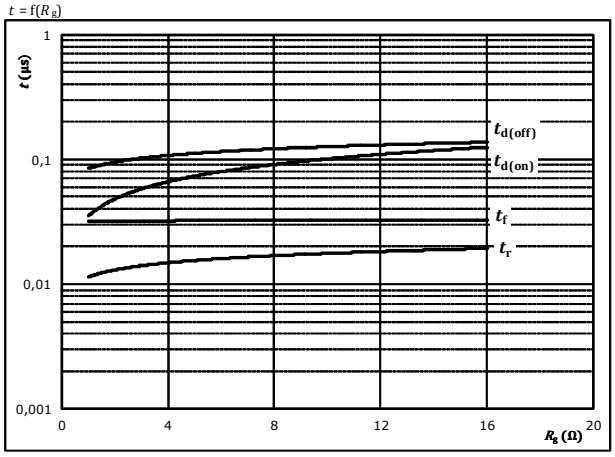
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



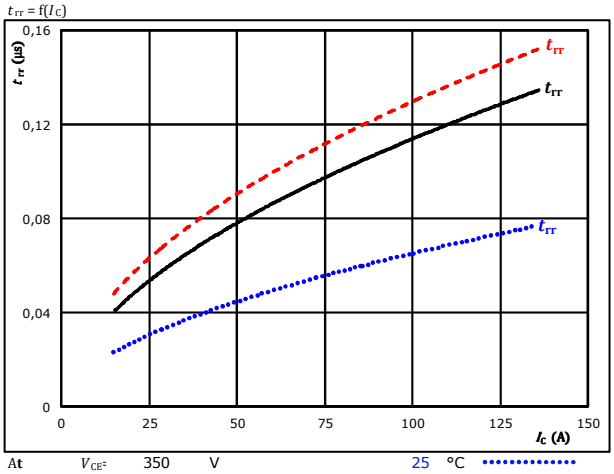
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	75	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



At

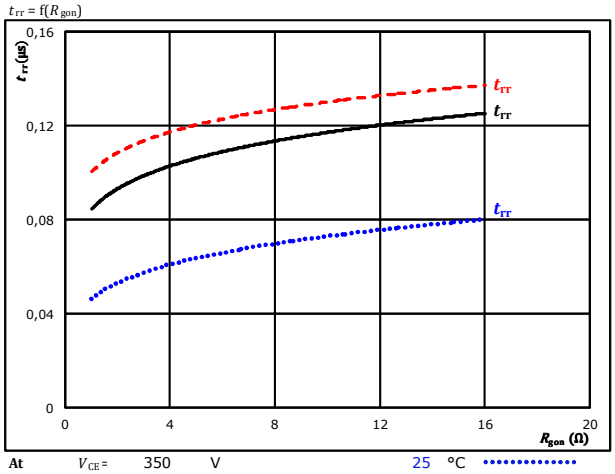
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

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

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



At

V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	75	A

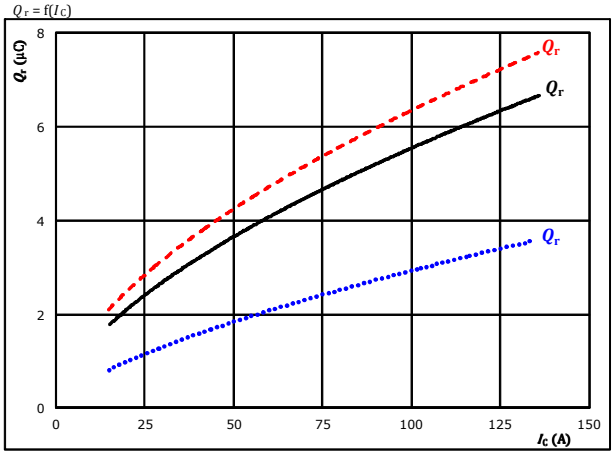
T_j: 25 °C, 125 °C, 150 °C

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

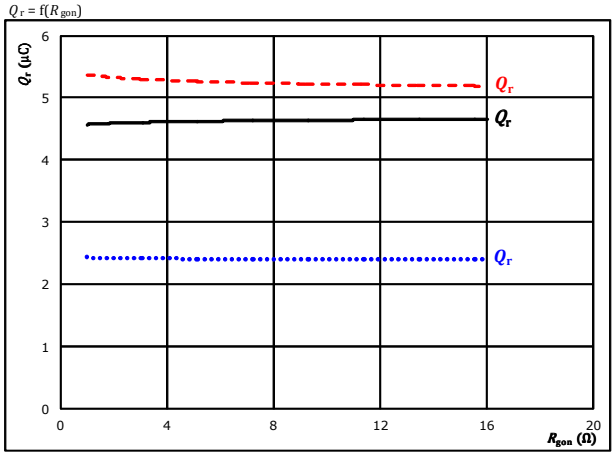


At						
	V_{CE} =	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	4	Ω		150 °C	

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

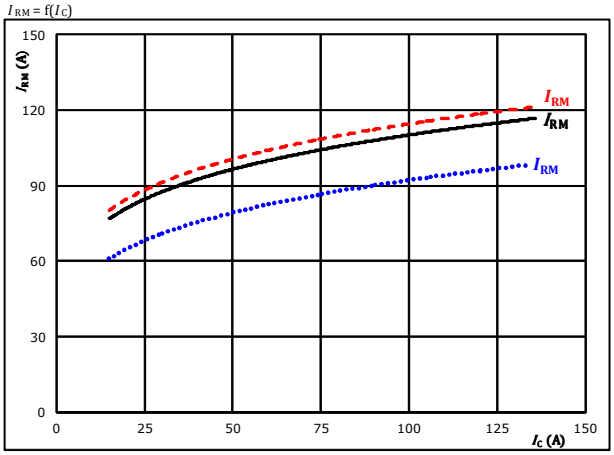


At						
	V_{CE}=	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	75	A		150 °C	

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

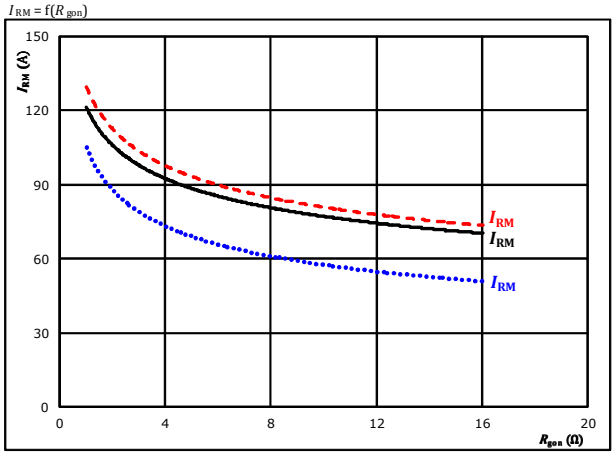


At						
	V_{CE}:	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	4	Ω		150 °C	

figure 12. **FWD**

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

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



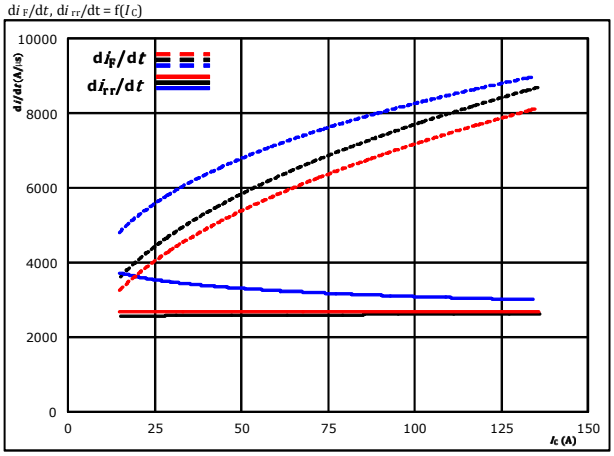
At						
	V_{CE} =	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C =	75	A		150 °C	

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

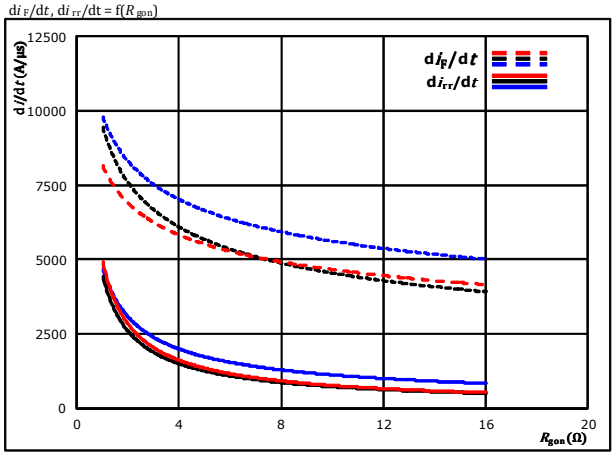


At						
V_{CE} =	350	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – – –

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

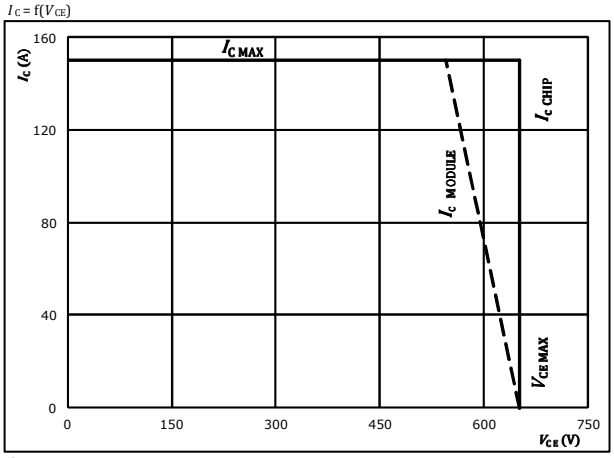


At						
V_{CE} =	350	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
I_C =	75	A		150 °C	– – – –

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

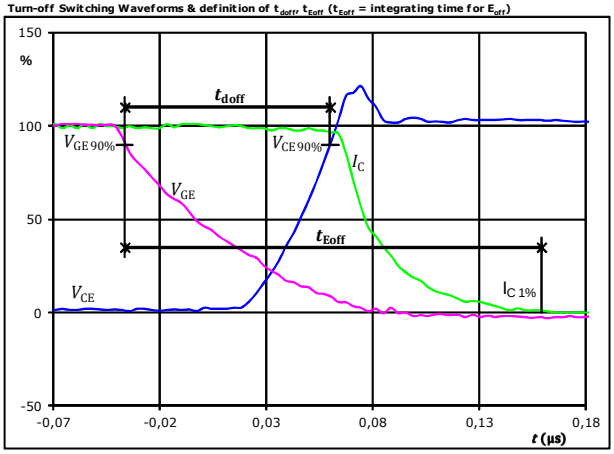
Buck Switching Definitions

General conditions

T_j	=	**125 °C**
R_{gon}	=	**4 Ω**
R_{goff}	=	**4 Ω**

figure 1. **IGBT**

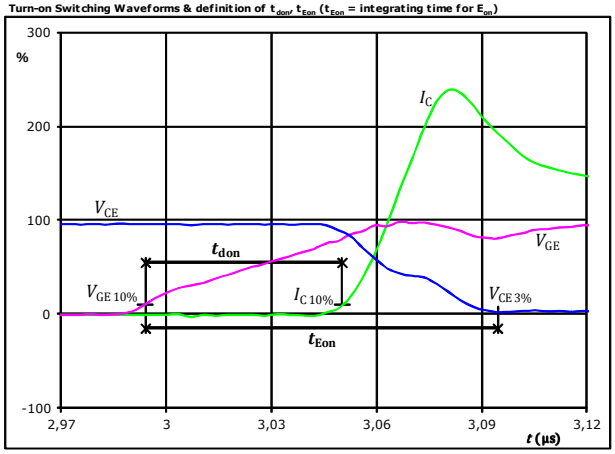
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{doff} =	0,095	µs
t_{Eoff} =	0,195	µs

figure 2. **IGBT**

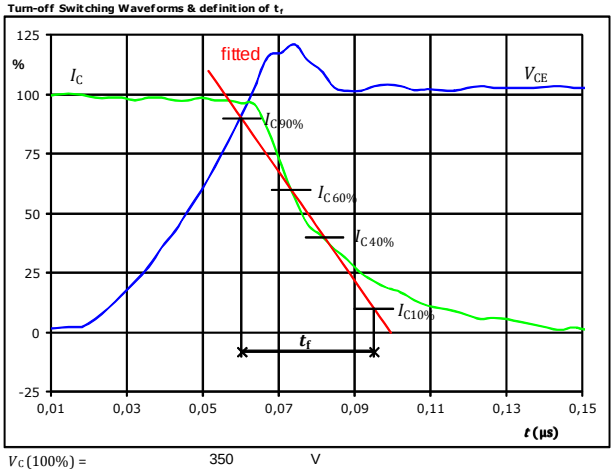
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{don} =	0,057	µs
t_{Eon} =	0,100	µs

figure 3. **IGBT**

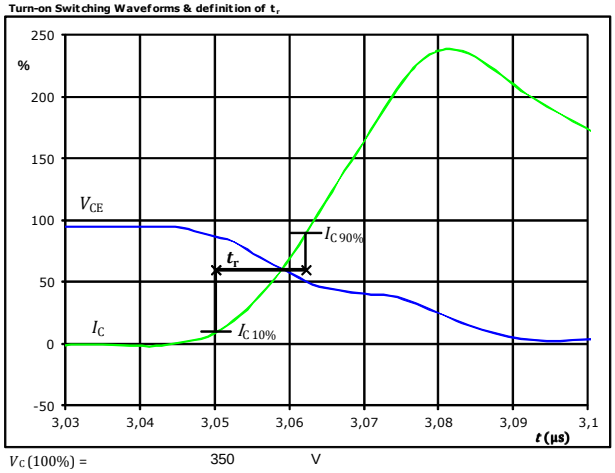
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_f =	0,026	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

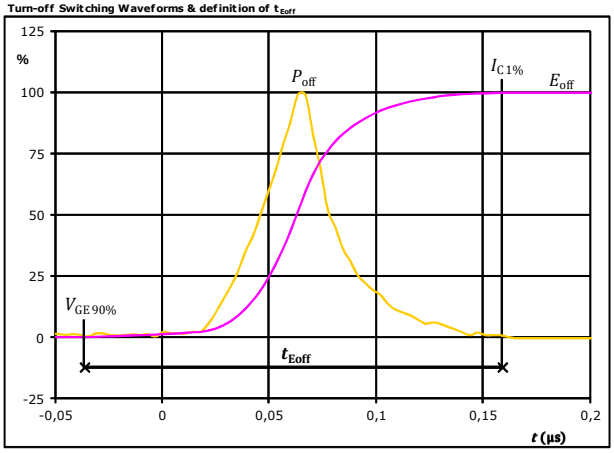


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_r =	0,012	µs

Buck Switching Characteristics

figure 5. **IGBT**

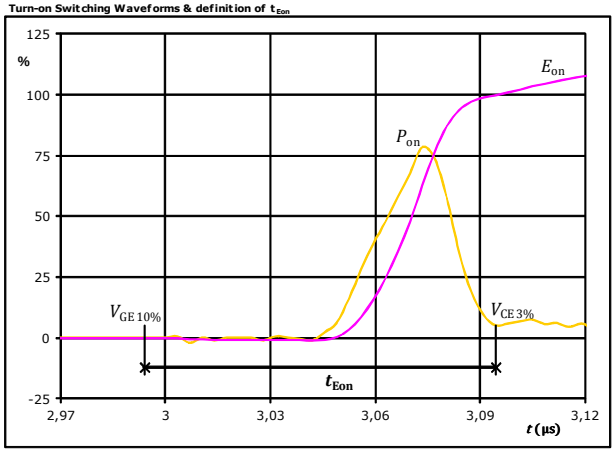
Turn-off Switching Waveforms & definition of t_{Eoff}



$P_{off}(100\%) =$	26,36	kW
$E_{off}(100\%) =$	1,13	mJ
$t_{Eoff} =$	0,20	µs

figure 6. **IGBT**

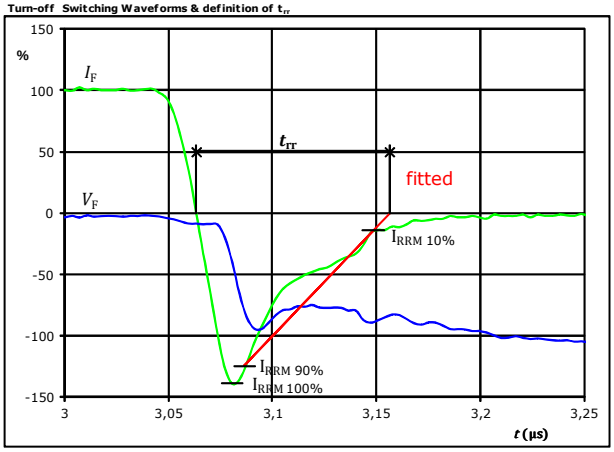
Turn-on Switching Waveforms & definition of t_{Eon}



$P_{on}(100\%) =$	26,36	kW
$E_{on}(100\%) =$	0,55	mJ
$t_{Eon} =$	0,10	µs

figure 7. **FWD**

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

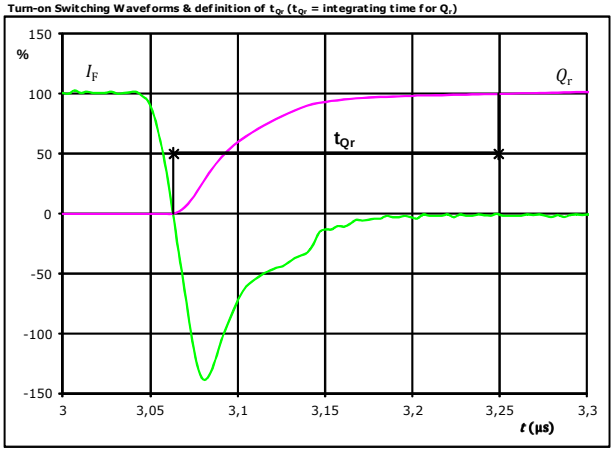


$V_F(100\%) =$	350	V
$I_F(100\%) =$	75	A
$I_{RRM}(100\%) =$	-105	A
$t_{rr} =$	0,094	µs

Buck Switching Characteristics

figure 8. **FWD**

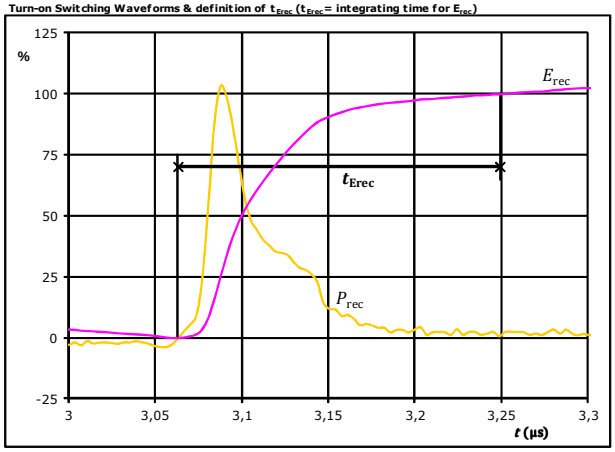
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	75	A
Q_r (100%) =	4,56	µC
t_{Qr} =	0,19	µs

figure 9. **FWD**

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



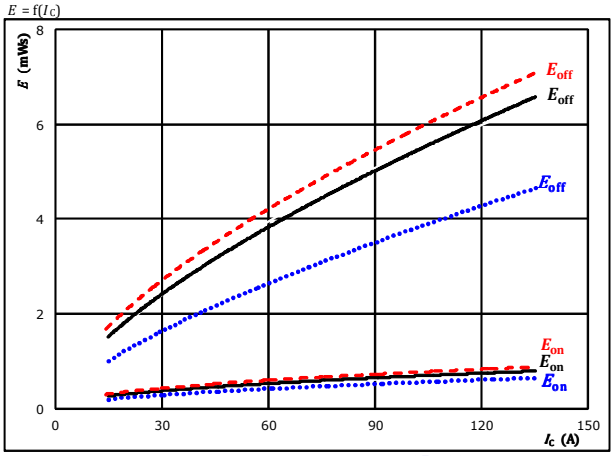
P_{rec} (100%) =	26,36	kW
E_{rec} (100%) =	1,06	mJ
t_{Erec} =	0,19	µs

Boost Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



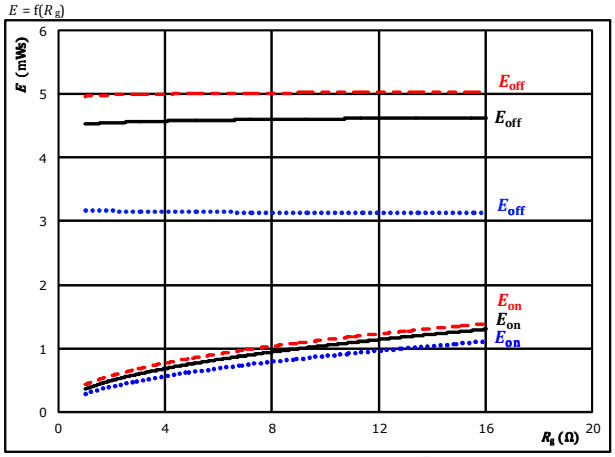
With an inductive load at

V_{CE} =	350	V	T_J:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – –
R_{goff} =	4	Ω			

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



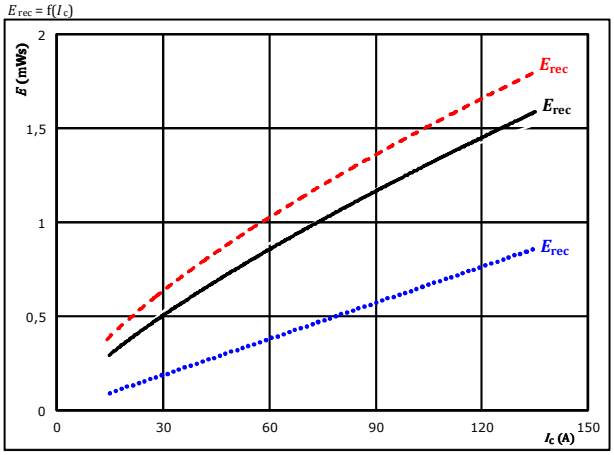
With an inductive load at

V_{CE} =	350	V	T_J:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
I_C =	74	A		150 °C	– – –

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



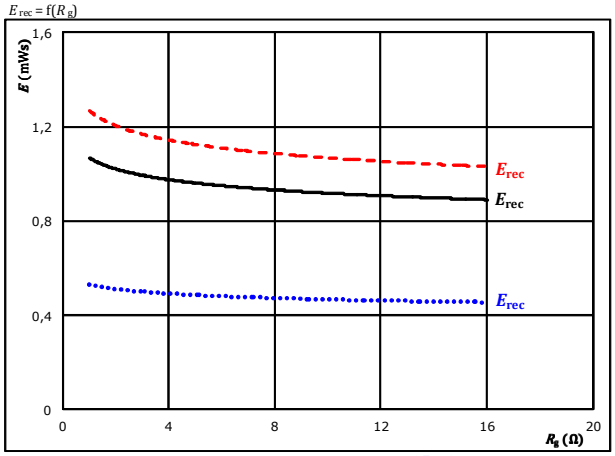
With an inductive load at

V_{CE} =	350	V	T_J:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	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

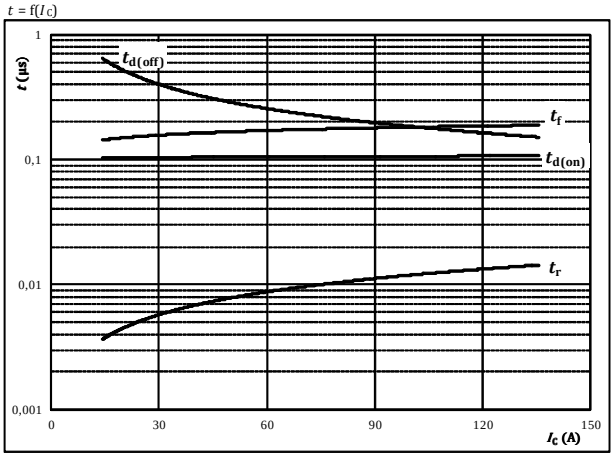
V_{CE} =	350	V	T_J:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
I_C =	74	A		150 °C	– – –

Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



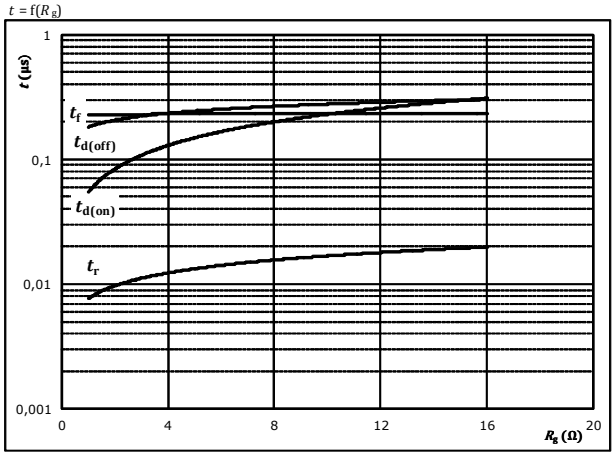
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



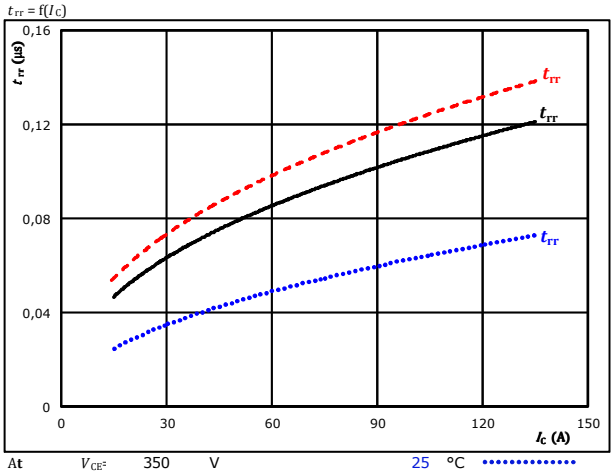
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	74	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



At

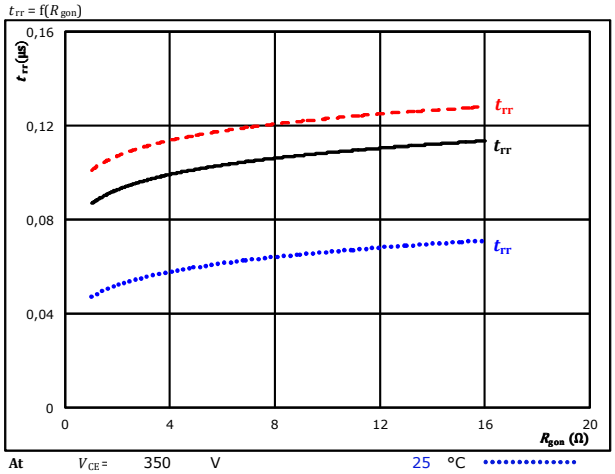
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 8. FWD

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

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



At

V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	74	A

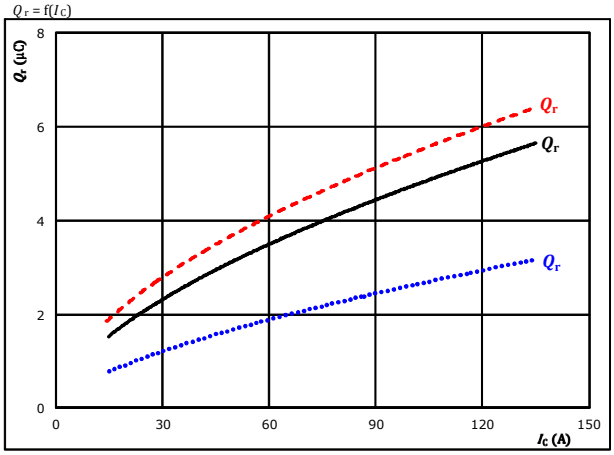
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

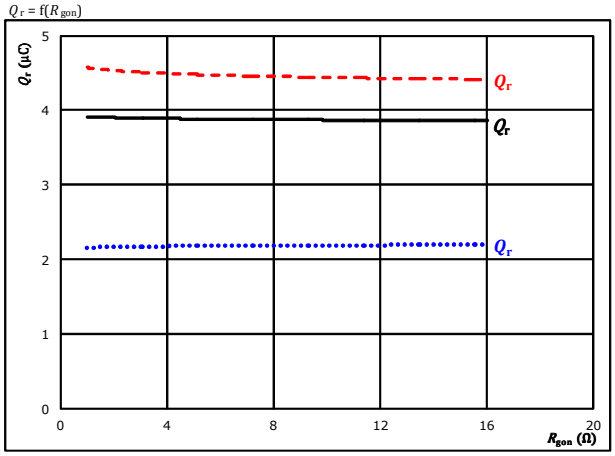


At						
	V_{CE} =	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	4	Ω		150 °C	

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

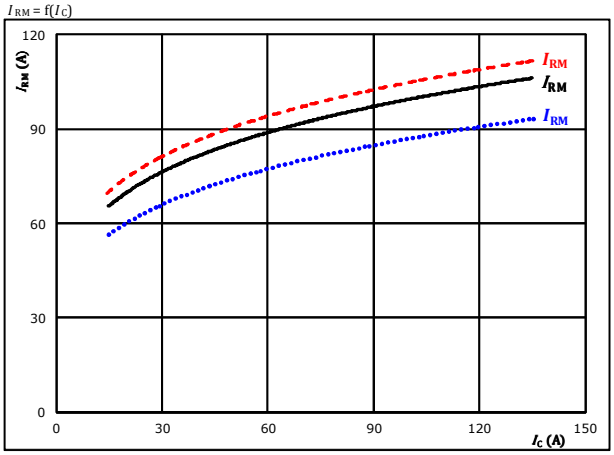


At						
	V_{CE}=	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	74	A		150 °C	

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

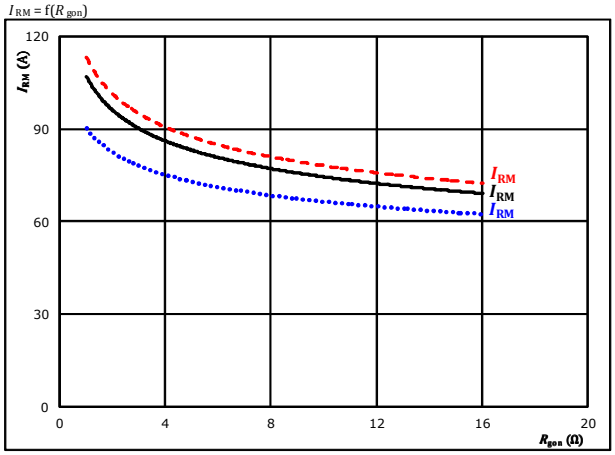


At						
	V_{CE}:	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	4	Ω		150 °C	

figure 12. **FWD**

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

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



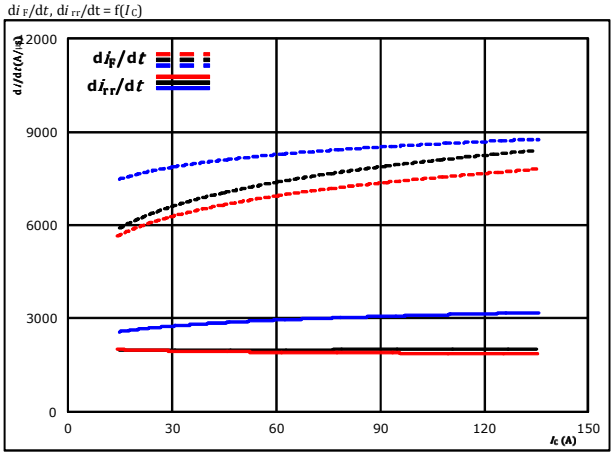
At						
	V_{CE} =	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C =	74	A		150 °C	

Boost Switching Characteristics

figure 13. **FWD**

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

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

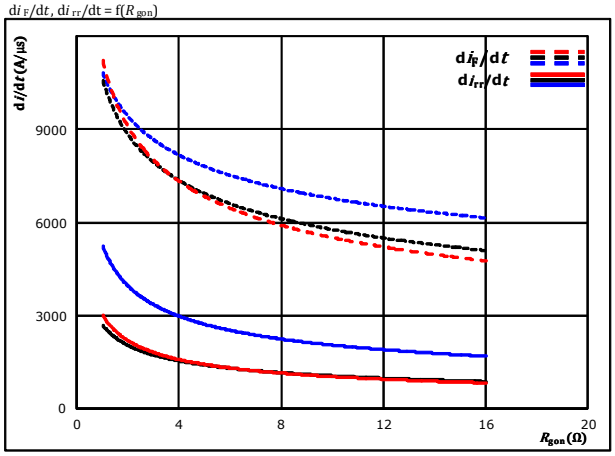


At						
V_{CE} =	350	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – – –

figure 14. **FWD**

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

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

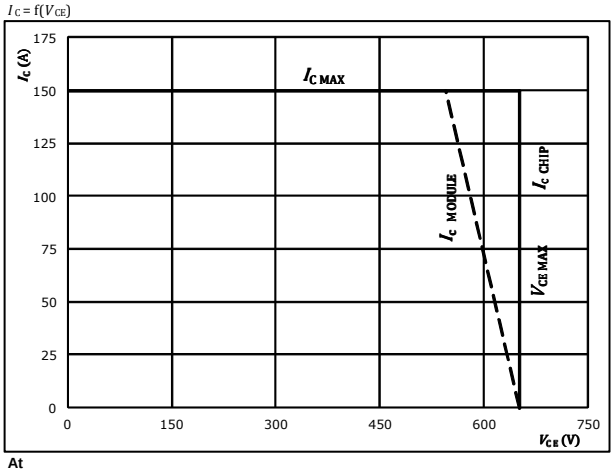


At						
V_{CE} =	350	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
I_C=	74	A		150 °C	– – – –

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

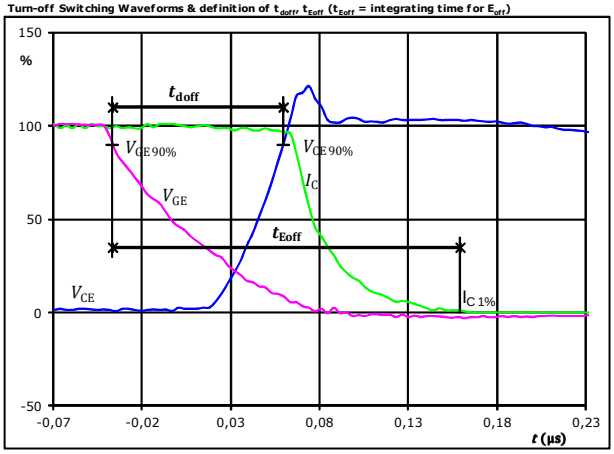
Boost Switching Definitions

General conditions

T_j	=	**125 °C**
R_{gon}	=	**4 Ω**
R_{goff}	=	**4 Ω**

figure 1. IGBT

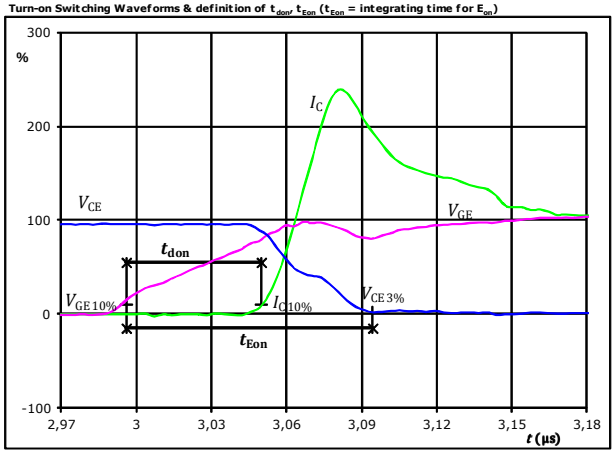
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{doff} =	0,095	µs
t_{Eoff} =	0,195	µs

figure 2. IGBT

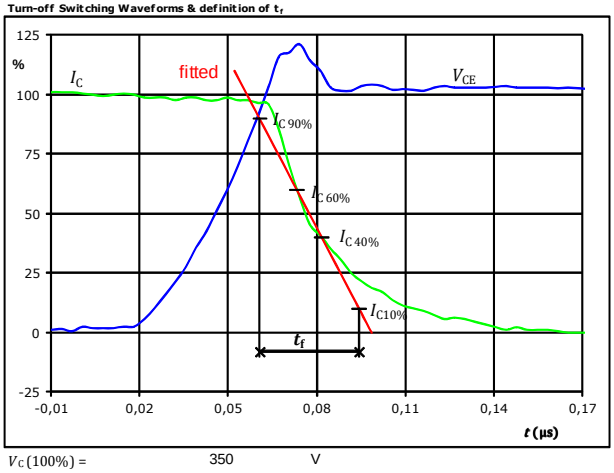
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{don} =	0,057	µs
t_{Eon} =	0,098	µs

figure 3. IGBT

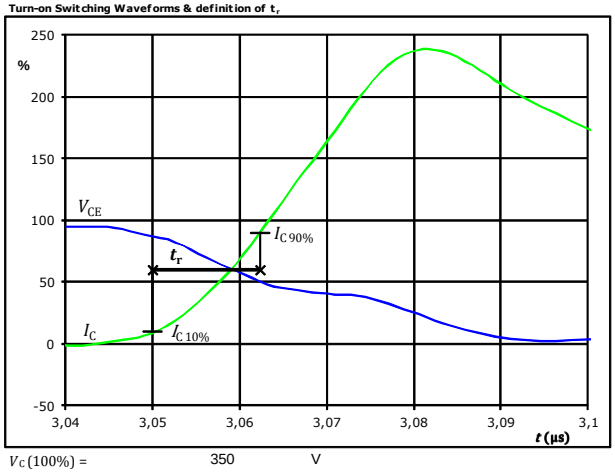
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_f =	0,026	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

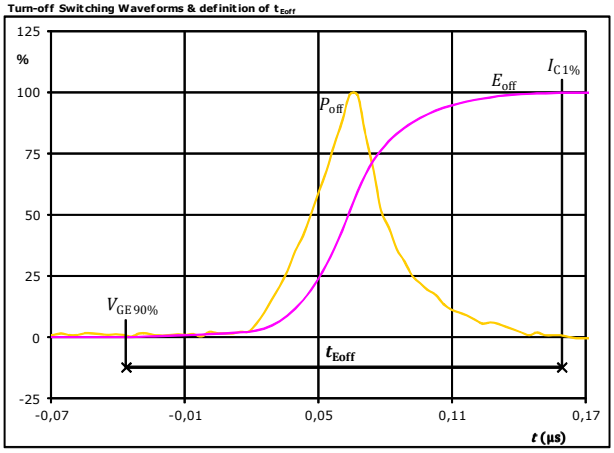


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_r =	0,012	µs

Boost Switching Characteristics

figure 5. **IGBT**

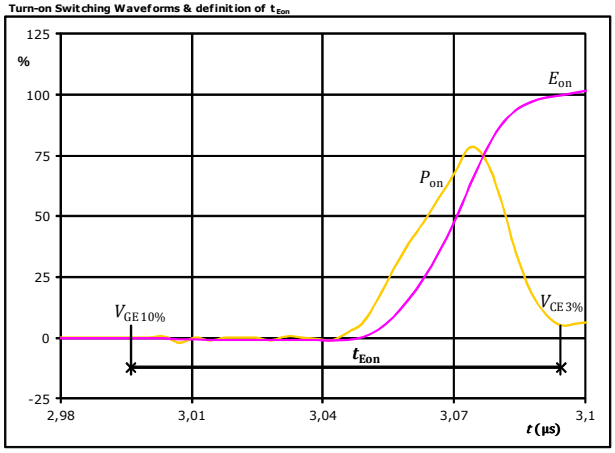
Turn-off Switching Waveforms & definition of t_{Eoff}



$P_{off}(100\%)$ =	26,36	kW
$E_{off}(100\%)$ =	1,13	mJ
t_{Eoff} =	0,20	µs

figure 6. **IGBT**

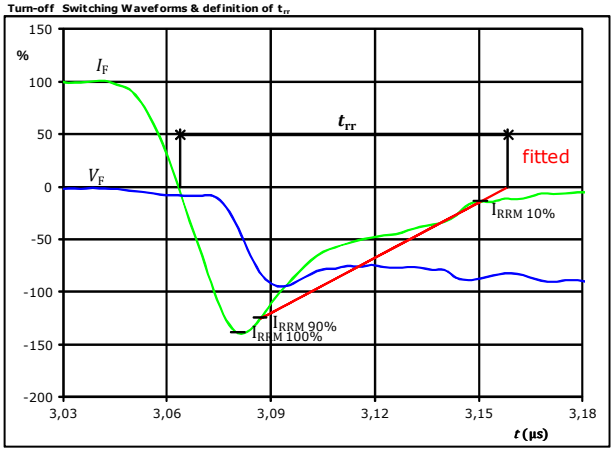
Turn-on Switching Waveforms & definition of t_{Eon}



$P_{on}(100\%)$ =	26,36	kW
$E_{on}(100\%)$ =	0,55	mJ
t_{Eon} =	0,10	µs

figure 7. **FWD**

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

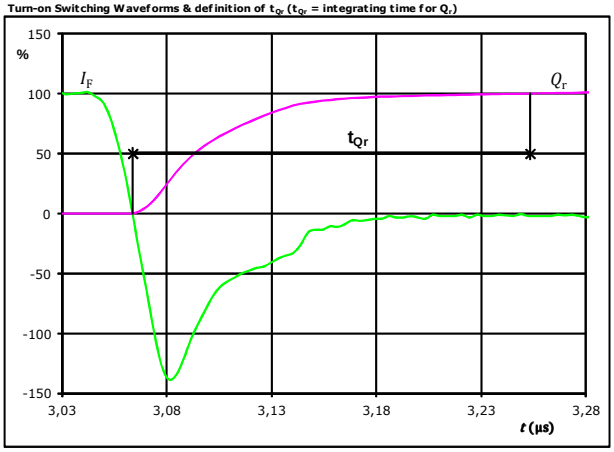


$V_F(100\%)$ =	350	V
$I_F(100\%)$ =	75	A
$I_{RRM}(100\%)$ =	-105	A
t_{rr} =	0,094	µs

Boost Switching Characteristics

figure 8. **FWD**

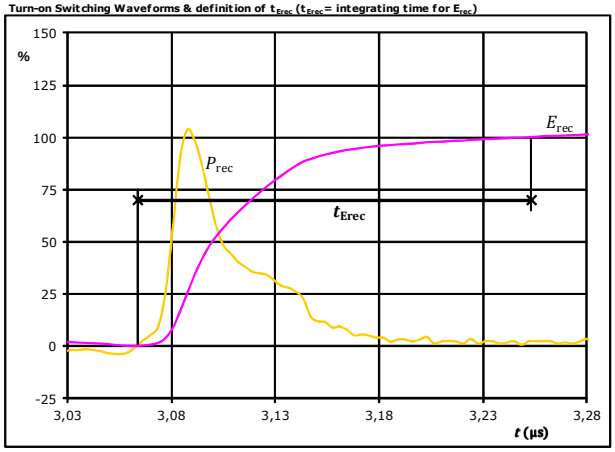
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	75	A
Q_r (100%) =	4,56	µC
t_{Qr} =	0,19	µs

figure 9. **FWD**

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



P_{rec} (100%) =	26,36	kW
E_{rec} (100%) =	1,06	mJ
t_{Erec} =	0,19	µs

Vincotech

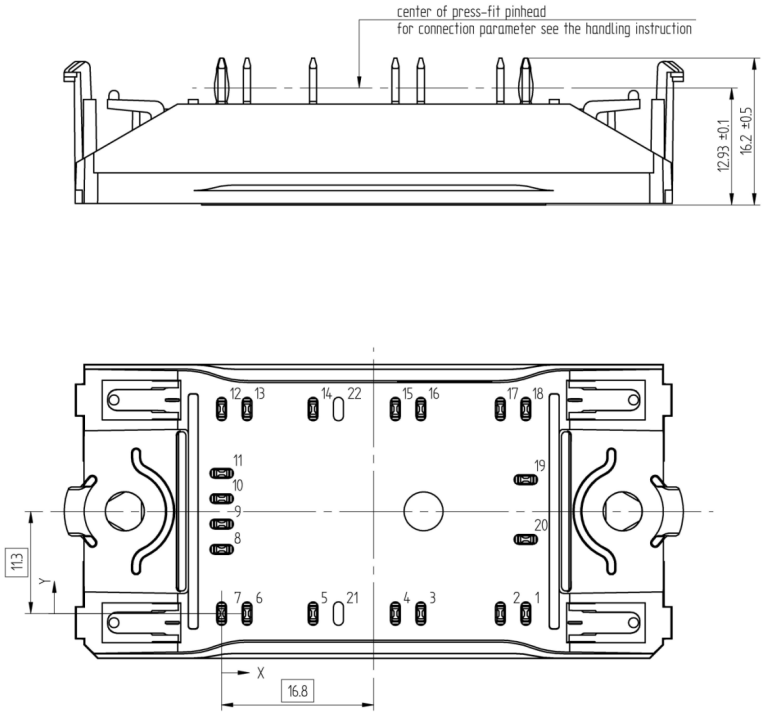
Ordering Code & Marking

Version	Ordering Code
without thermal paste 12 mm housing with press-fit pins	10-PZ07NIA075S5-P926F53Y
with thermal paste 12 mm housing with press-fit pins	10-PZ07NIA075S5-P926F53Y-/3/

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

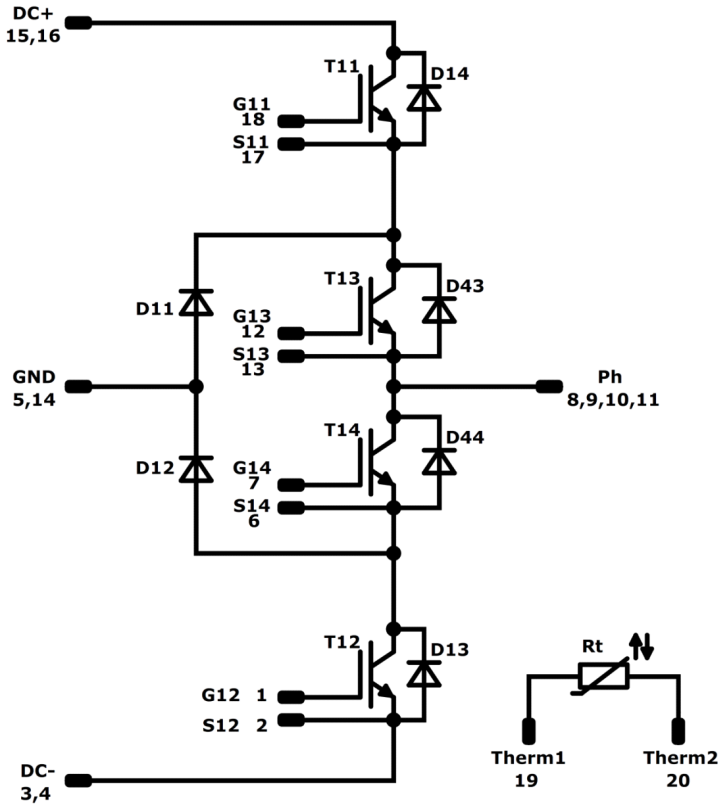
Outline

Pin table			
Pin	X	Y	Function
1	33,6	0	G12
2	30,8	0	S12
3	22	0	DC-
4	19,2	0	DC-
5	10,1	0	GND
6	2,8	0	S14
7	0	0	G14
8	0	7,1	Ph
9	0	9,9	Ph
10	0	12,7	Ph
11	0	15,5	Ph
12	0	22,6	G13
13	2,8	22,6	S13
14	10,1	22,6	GND
15	19,2	22,6	DC+
16	22	22,6	DC+
17	30,8	22,6	S11
18	33,6	22,6	G11
19	33,6	14,8	Therm1
20	33,6	8,2	Therm2
21	Not assembled		
22	Not assembled		



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

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	650 V	75 A	Buck Switch	
D11, D12	FWD	650 V	75 A	Buck Diode	
T13, T14	IGBT	650 V	75 A	Boost Switch	
D13, D14	FWD	650 V	50 A	Boost Diode	
D44, D43	FWD	650 V	50 A	Boost Sw.Inv.Diode	
Rt	NTC			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 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
10-PZ07NIA075S5-P926F53Y-D1-14	24 Aug. 2017		