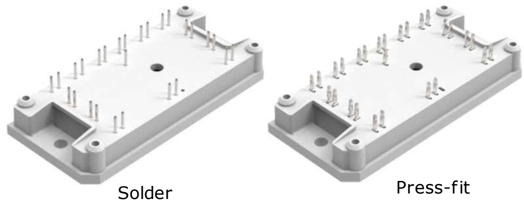
10-FY07HVA050S5-L984F08
10-PY07HVA050S5-L984F08Y
datasheet

flow **PACK 1 H6.5** — **650 V / 50 A**

Features

- Innovative H6.5 Topology
- IGBT S5 + IGBT L5
- NTC

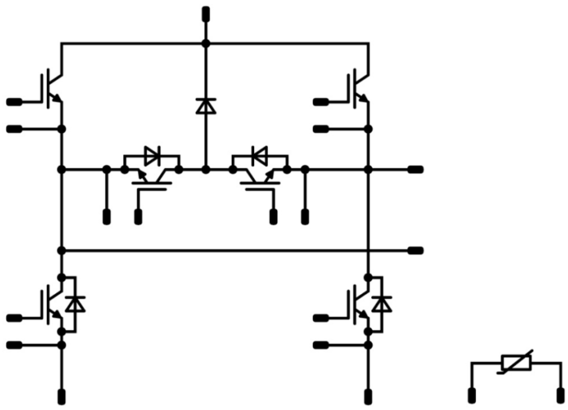
flow 1 12 mm housing



Target applications

- Solar Inverters
- Special Application

Schematic



Types

- 10-FY07HVA050S5-L984F08
- 10-PY07HVA050S5-L984F08Y

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	48	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	73	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	33	A
Repetitive peak forward current	I_{FRM}			60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	50	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	42	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		90	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	67	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	33	A
Repetitive peak forward current	I_{FRM}			60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	50	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		Solder pin		7,99	mm
Clearance		Press-fit pin		8,3	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0005	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 125 150		1,39 1,48 1,51	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		3100		pF
Output capacitance	C_{oes}	f = 1 MHz	0	25		25		88		pF
Reverse transfer capacitance	C_{res}	f = 1 MHz	0	25		25		12		pF
Gate charge	Q_g		15	520	50	25		120		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,29		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	-5/+15	350	50	25 125 150		29 29 29		ns
Rise time	t_r	R_{goff} = 8 Ω R_{gon} = 8 Ω	-5/+15	350	50	25 125 150		7 9 9		ns
Turn-off delay time	$t_{d(off)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	-5/+15	350	50	25 125 150		105 122 125		ns
Fall time	t_f	R_{goff} = 8 Ω R_{gon} = 8 Ω	-5/+15	350	50	25 125 150		11 22 24		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,6 µC Q_{rFWD} = 2,8 µC Q_{rFWD} = 3,1 µC	-5/+15	350	50	25 125 150		0,428 0,612 0,651		mWs
Turn-off energy (per pulse)	E_{off}		-5/+15	350	50	25 125 150		0,301 0,613 0,704		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	
Buck Diode										
Static										
Forward voltage	V_F				30	25		1,52	1,7	V
Reverse leakage current	I_r			650		25			1,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,92		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 4527 A/µs di/dt = 5388 A/µs di/dt = 4657 A/µs	-5/+15	350	50	25 125 150		55 76 80		A
Reverse recovery time	t_{rr}					25 125 150		69 99 114		ns
Recovered charge	Q_r					25 125 150		1,640 2,762 3,133		µC
Reverse recovered energy	E_{rec}					25 125 150		0,307 0,586 0,680		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		4200 5006 5105		A/µs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0004	25	4,2	5	5,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 0 150		1,07 1,03 1,04	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}	f = 1 MHz	0	25		25		4650		pF
Reverse transfer capacitance	C_{res}	f = 1 MHz	0	25		25		12		pF
Gate charge	Q_g		15	520	30	25		168		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,41		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	350	30	25 125 150		97 94 94		ns
Rise time	t_r	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	350	30	25 125 150		9 6 7		ns
Turn-off delay time	$t_{d(off)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	350	30	25 125 150		173 199 205		ns
Fall time	t_f	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	350	30	25 125 150		64 236 275		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,5 µC Q_{rFWD} = 2,8 µC Q_{rFWD} = 2,7 µC	±15	350	30	25 125 150		0,120 0,145 0,166		mWs
Turn-off energy (per pulse)	E_{off}		±15	350	30	25 125 150		1,270 1,894 2,062		mWs

Characteristic Values

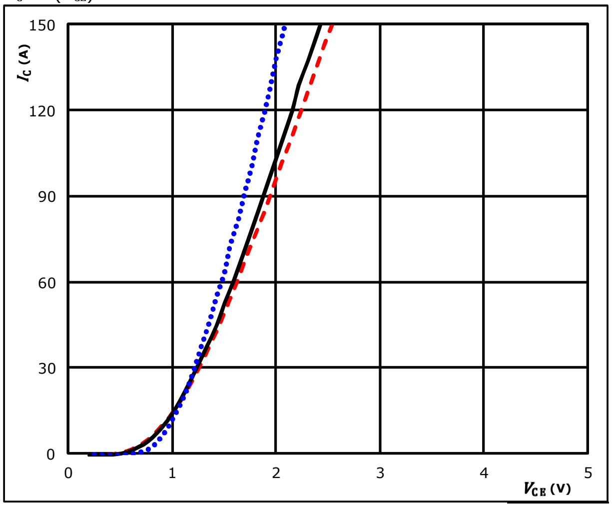
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_j [°C]	Min	Typ	Max	
Boost Diode										
Static										
Forward voltage	V_F				30	25		1,52	1,7	V
Reverse leakage current	I_r			650		25			1,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,92		K/W
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		37 59 64		A
Reverse recovery time	t_{rr}					25 125 150		58 84 93		ns
Recovered charge	Q_r	di/dt = 5645 A/µs di/dt = 5928 A/µs di/dt = 5670 A/µs	±15	350	30	25 125 150		1,061 2,036 2,365		µC
Reverse recovered energy	E_{rec}					25 125 150		0,324 0,496 0,589		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2031 3010 3613		A/µs
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

$I_C = f(V_{CE})$

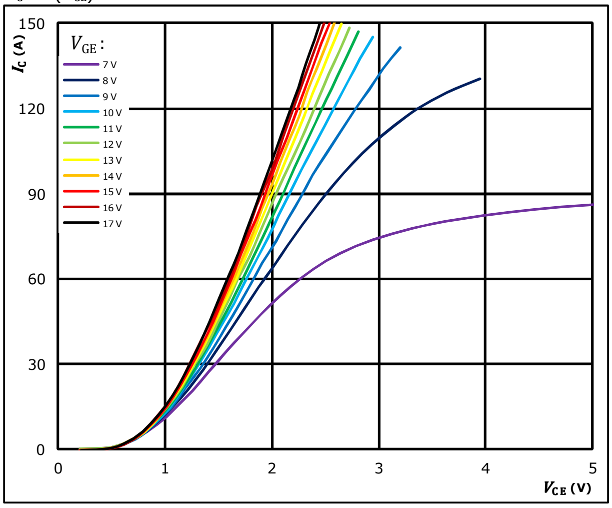


t_p =	250	µs		25	°C
V_{GE} =	15	V	T_j:	125	°C
				150	°C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

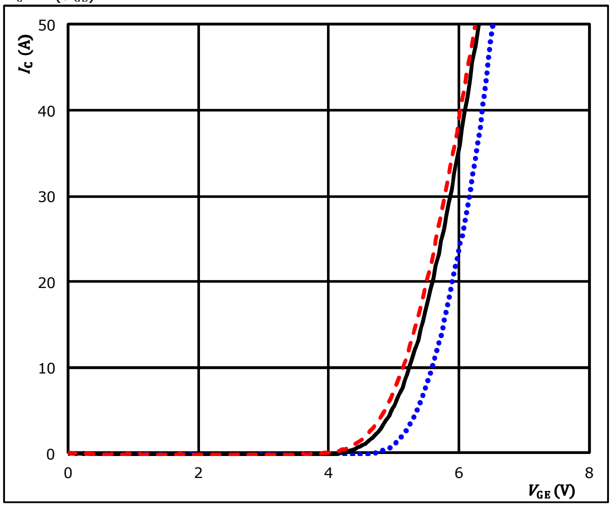


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

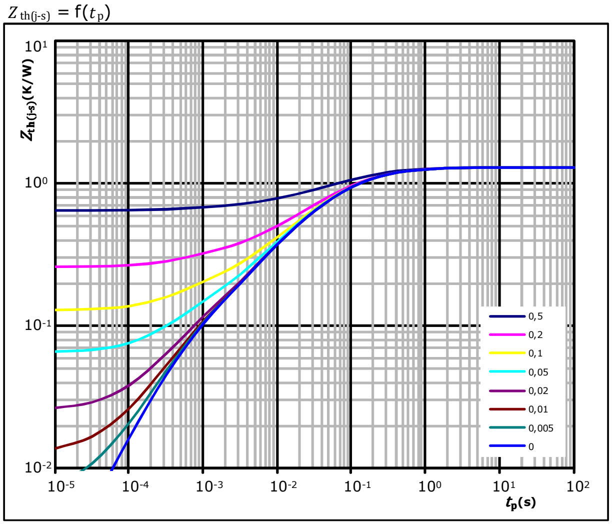


t_p =	100	µs		25	°C
V_{CE} =	10	V	T_j:	125	°C
				150	°C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,29 K/W

IGBT thermal model values

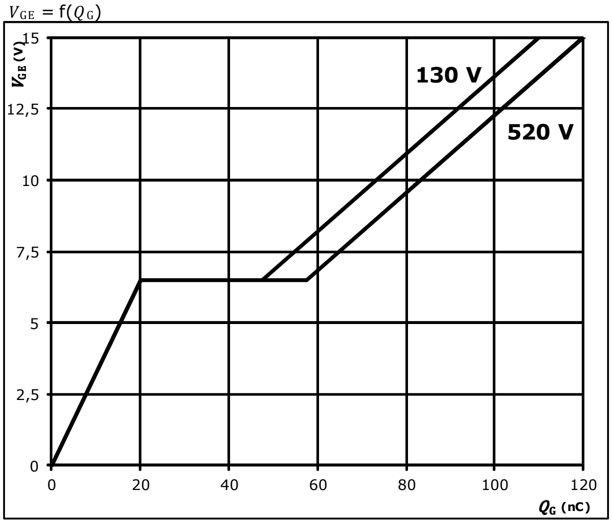
R (K/W)	τ (s)
2,09E-01	5,36E-01
6,00E-01	8,05E-02
3,10E-01	1,69E-02
1,08E-01	4,25E-03
6,63E-02	5,30E-04

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

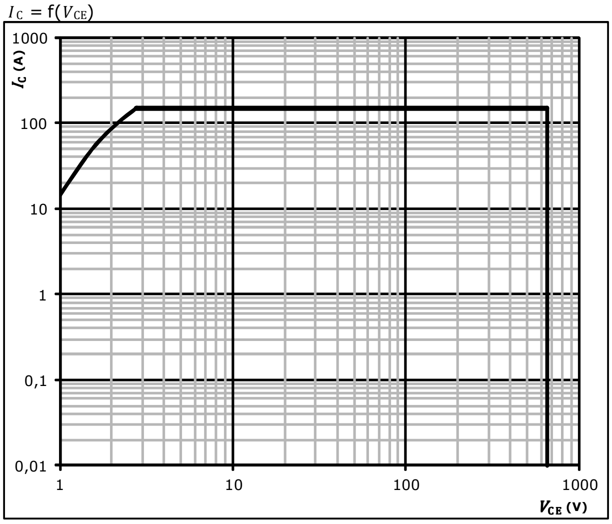


I_C=	50	A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



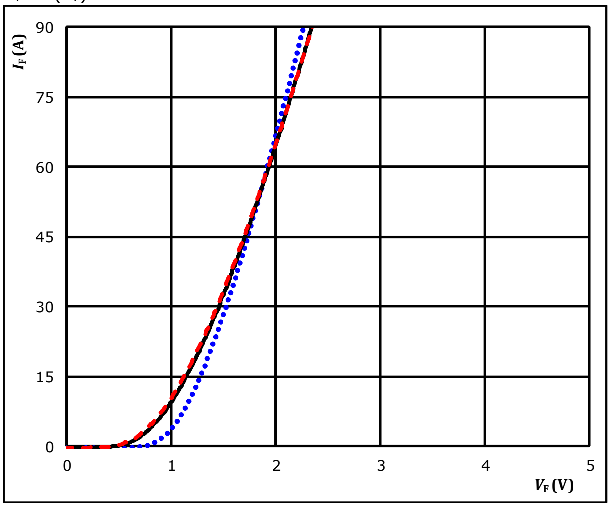
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



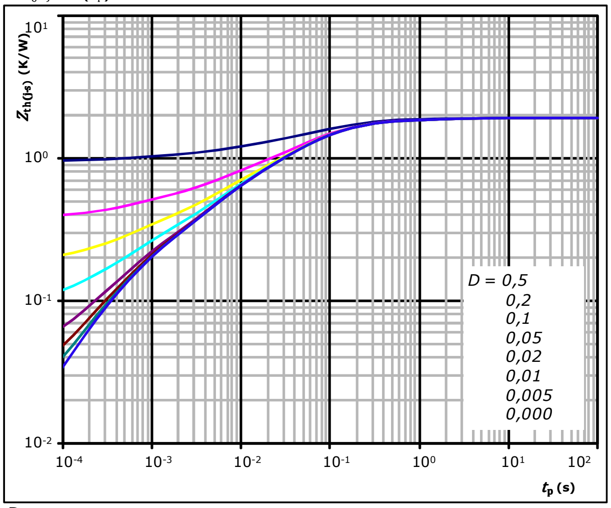
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,92 K/W

FWD thermal model values

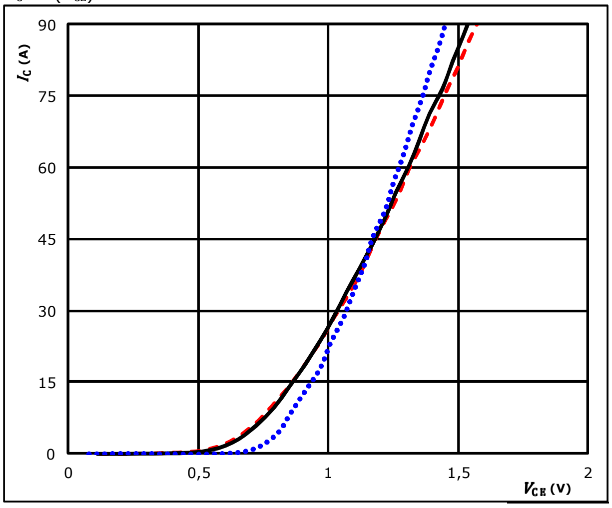
R (K/W)	τ (s)
9,41E-02	2,25E+00
3,44E-01	2,12E-01
8,56E-01	5,84E-02
3,61E-01	9,83E-03
1,37E-01	2,89E-03
1,27E-01	4,79E-04

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

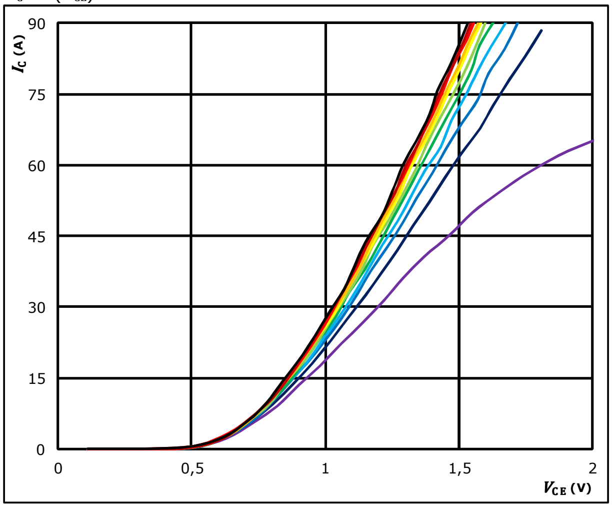


t_p =	250	µs		25	°C	blue dotted
V_{GE} =	15	V	T_j:	125	°C	black solid
				150	°C	red dashed

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 µs

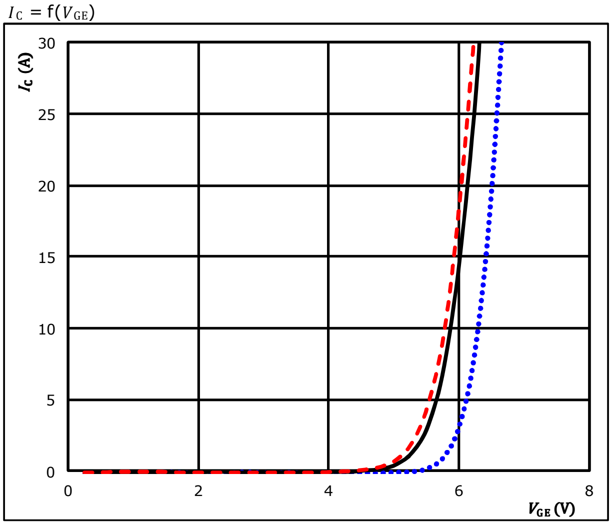
T_j = 150 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

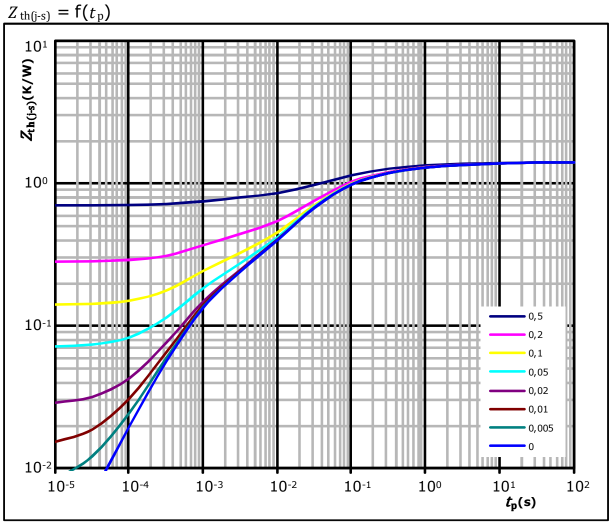


t_p =	100	µs		25	°C	blue dotted
V_{CE} =	10	V	T_j:	125	°C	black solid
				150	°C	red dashed

figure 4. **IGBT**

Transient Thermal Impedance as function of Pulse duration

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



D = t_p / T

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

IGBT thermal model values

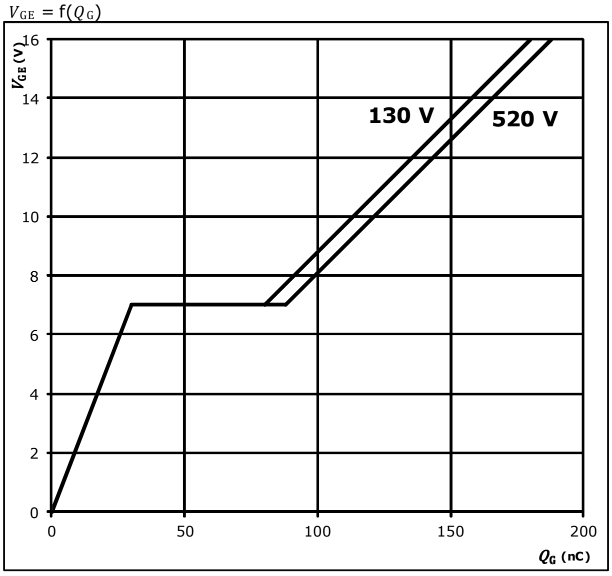
R (K/W)	τ (s)
8,53E-02	8,35E+00
2,62E-01	4,97E-01
5,87E-01	6,43E-02
2,62E-01	1,70E-02
6,47E-02	8,32E-03
1,51E-01	8,63E-04

Boost Switch Characteristics

figure 5.	IGBT

Gate voltage vs Gate charge

$V_{GE} = f(Q_G)$



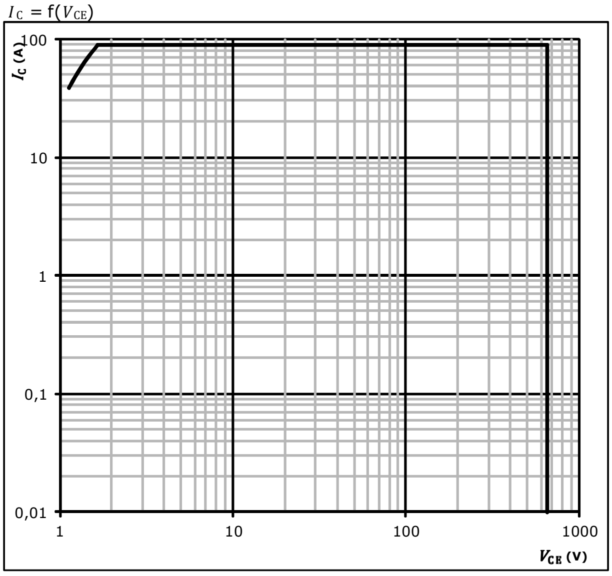
At

I_C= 30 A

figure 6.	IGBT

Safe operating area

$I_C = f(V_{CE})$



At

D = single pulse

T_s = 80 ºC

V_{GE} = ±15 V

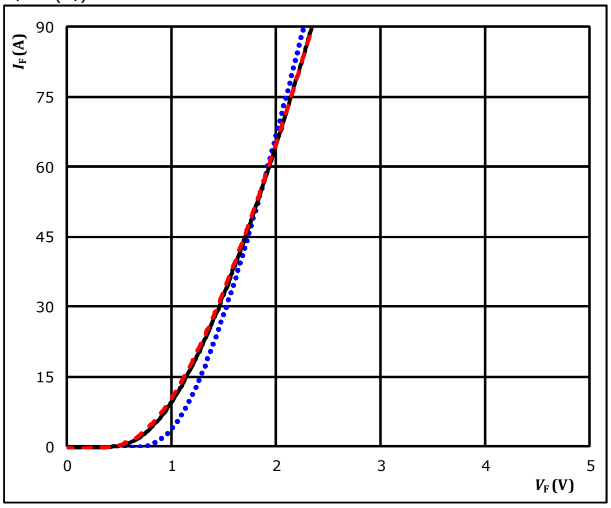
T_j = T_{jmax}

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



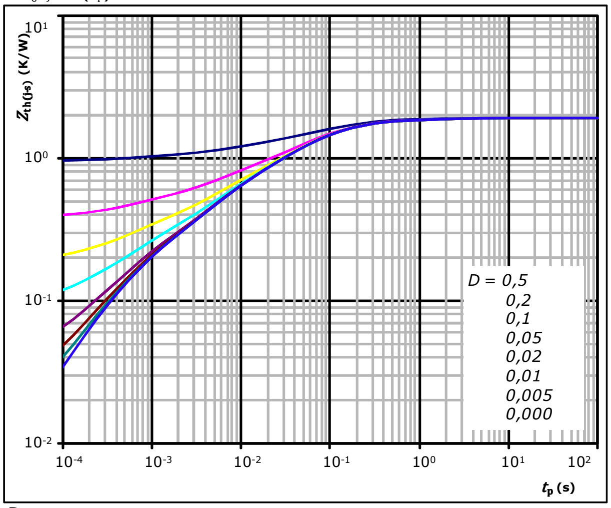
t_p = 250 µs

T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,92 K/W

FWD thermal model values

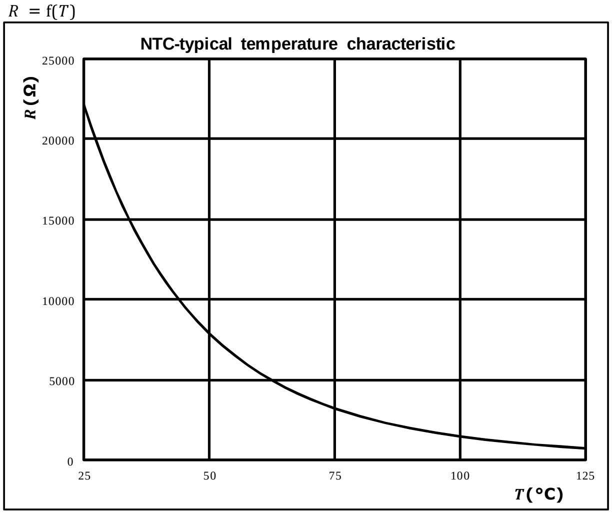
R (K/W)	τ (s)
9,41E-02	2,25E+00
3,44E-01	2,12E-01
8,56E-01	5,84E-02
3,61E-01	9,83E-03
1,37E-01	2,89E-03
1,27E-01	4,79E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic
as a function of temperature

$R = f(T)$

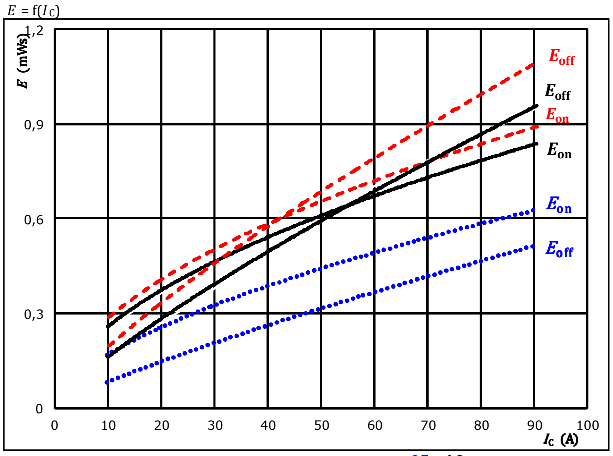


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



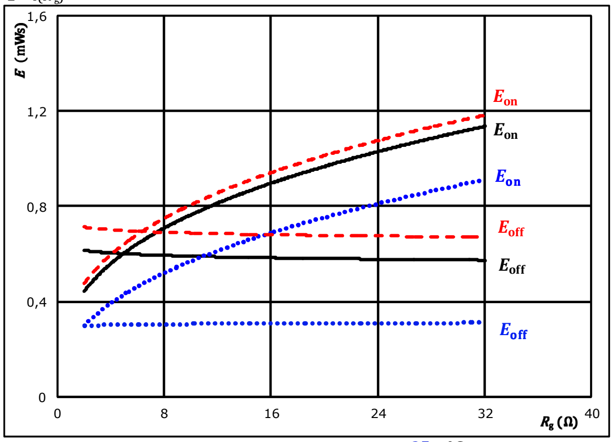
With an inductive load at

V_{CE} =	350	V	T_j:	25	°C	•••••••••••••
V_{GE} =	-5/+15	V		125	°C	————
R_{gon} =	8	Ω		150	°C	– – – –
R_{goff} =	8	Ω				

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



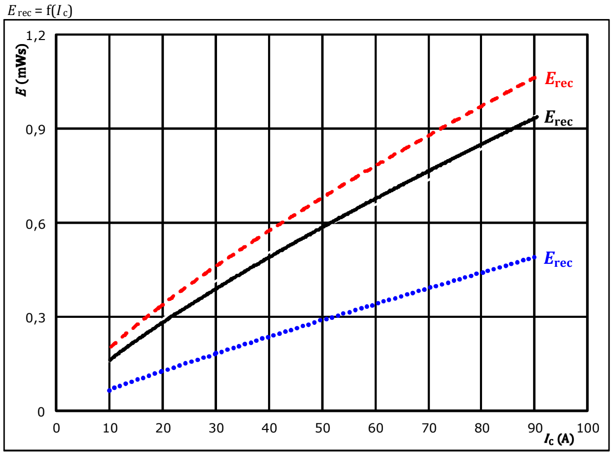
With an inductive load at

V_{CE} =	350	V	T_j:	25	°C	•••••••••••••
V_{GE} =	-5/+15	V		125	°C	————
I_C =	50	A		150	°C	– – – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



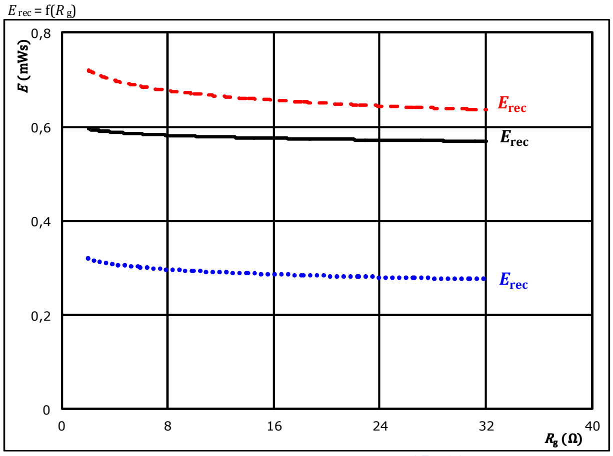
With an inductive load at

V_{CE} =	350	V	T_j:	25	°C	•••••••••••••
V_{GE} =	-5/+15	V		125	°C	————
R_{gon} =	8	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

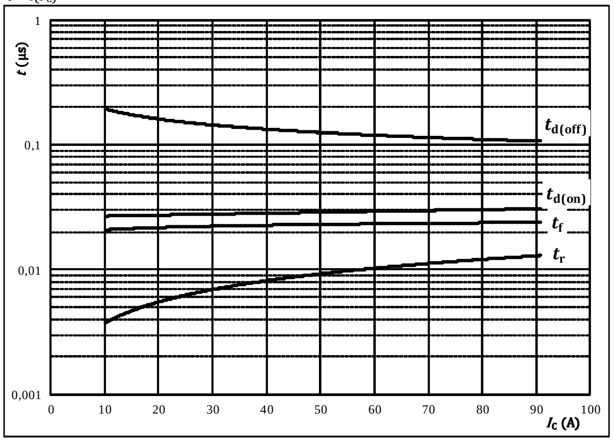
V_{CE} =	350	V	T_j:	25	°C	•••••••••••••
V_{GE} =	-5/+15	V		125	°C	————
I_C =	50	A		150	°C	– – – –

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



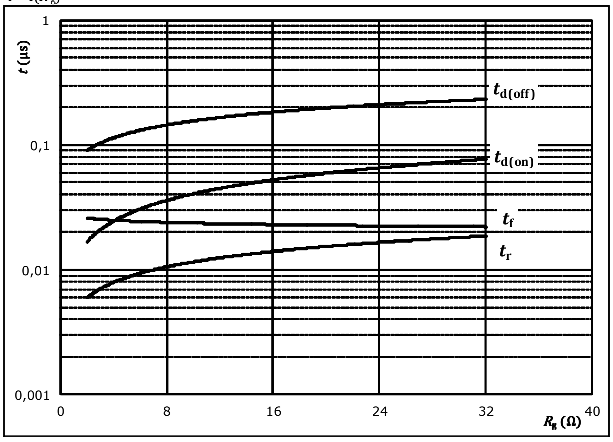
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/+15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



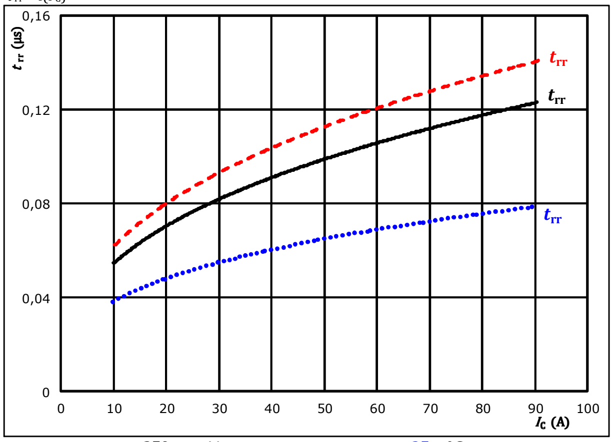
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/+15	V
I_C =	50	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

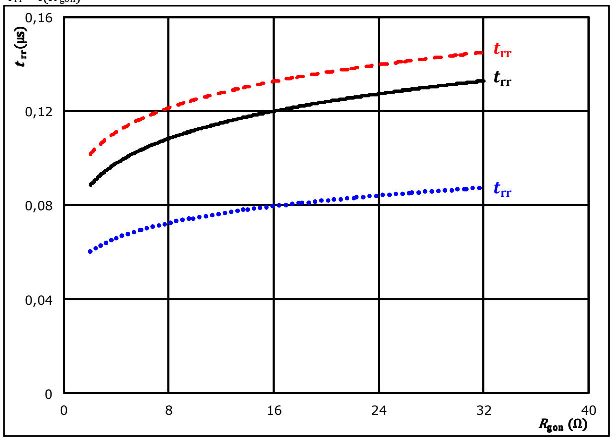


At V_{CE} =	350	V		25	°C
V_{GE} =	-5/+15	V	T_j:	125	°C
R_{gon} =	8	Ω		150	°C

figure 8. **FWD**

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

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



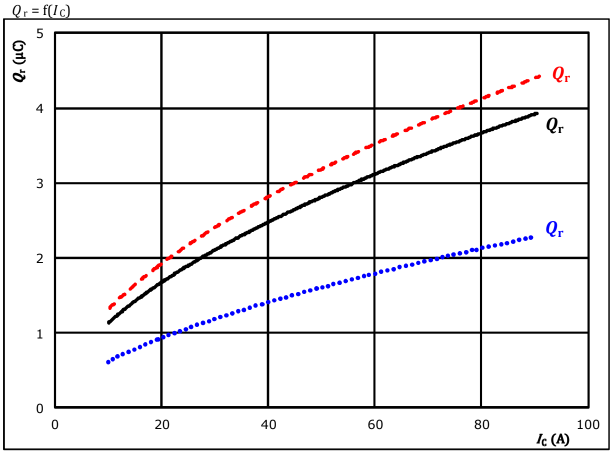
At V_{CE} =	350	V		25	°C
V_{GE} =	-5/+15	V	T_j:	125	°C
I_C =	50	A		150	°C

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

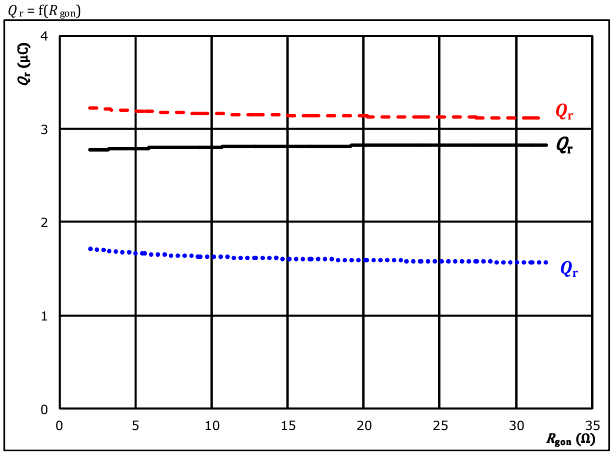


At	V_{CE} =	350	V	T_j:	25 °C	dotted
	V_{GE} =	-5/+15	V		125 °C	solid
	R_{gon} =	8	Ω		150 °C	dashed

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

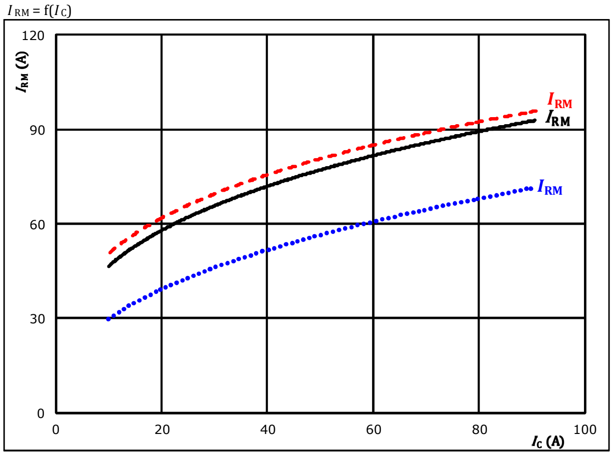


At	V_{CE}=	350	V	T_j:	25 °C	dotted
	V_{GE} =	-5/+15	V		125 °C	solid
	I_C=	50	A		150 °C	dashed

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

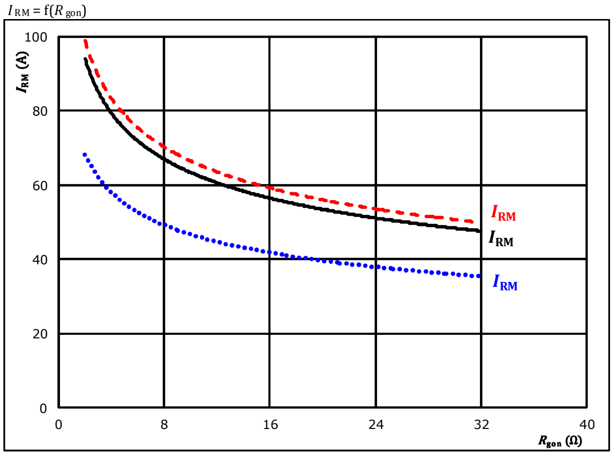


At	V_{CE}:	350	V	T_j:	25 °C	dotted
	V_{GE} =	-5/+15	V		125 °C	solid
	R_{gon} =	8	Ω		150 °C	dashed

figure 12. **FWD**

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

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



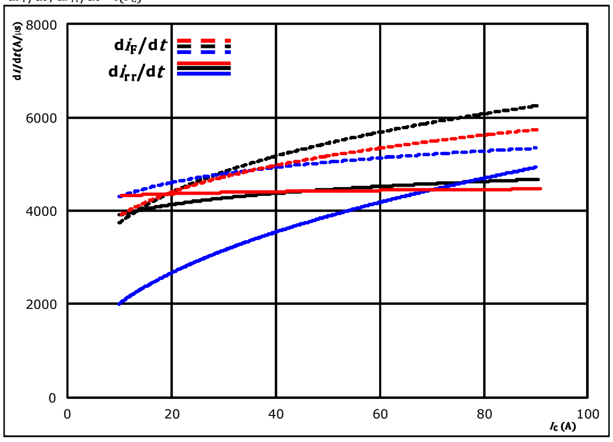
At	V_{CE} =	350	V	T_j:	25 °C	dotted
	V_{GE} =	-5/+15	V		125 °C	solid
	I_C =	50	A		150 °C	dashed

Buck Switching Characteristics

figure 13. **FWD**

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

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

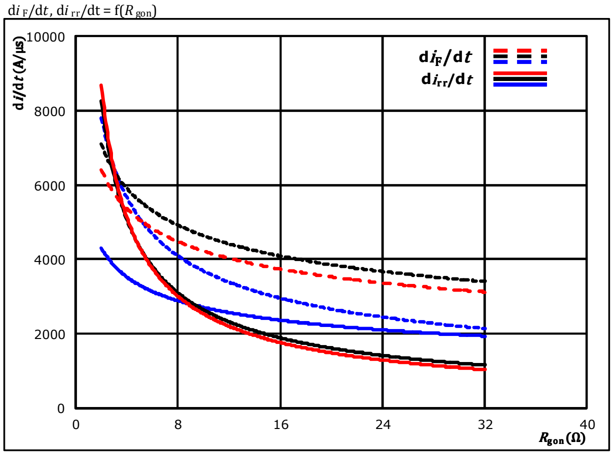


At						
V_{CE} =	350	V	T_j:	25	°C	dotted
V_{GE} =	-5/+15	V		125	°C	solid
R_{gon} =	8	Ω		150	°C	dashed

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})

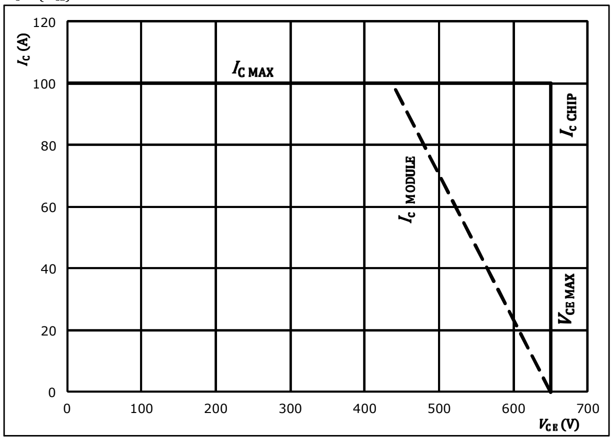


At						
V_{CE} =	350	V	T_j:	25	°C	dotted
V_{GE} =	-5/+15	V		125	°C	solid
I_C =	50	A		150	°C	dashed

figure 15. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At		
T_j =	175	°C
R_{gon} =	8	Ω
R_{goff} =	8	Ω

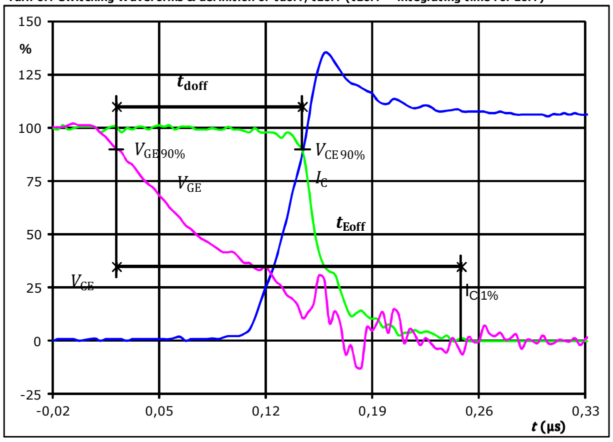
Buck Switching Definitions

General conditions

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

figure 1. IGBT

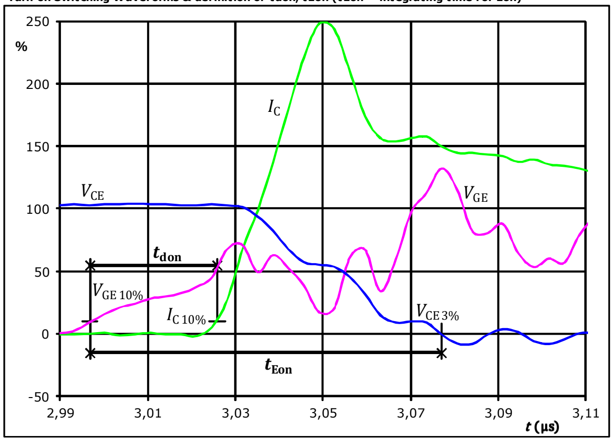
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	+15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_{doff} =	0,122	µs
t_{Eoff} =	0,226	µs

figure 2. IGBT

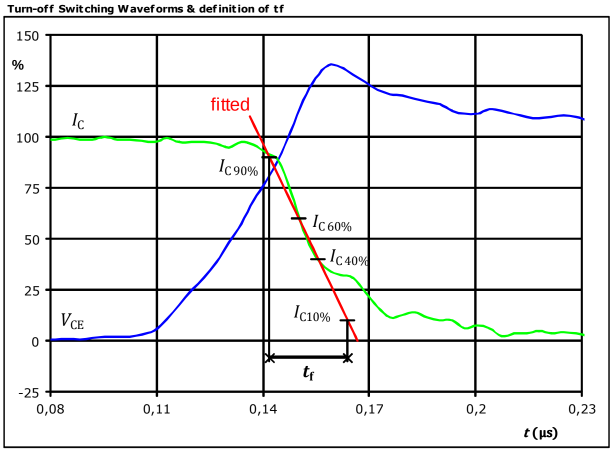
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	+15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_{don} =	0,029	µs
t_{Eon} =	0,080	µs

figure 3. IGBT

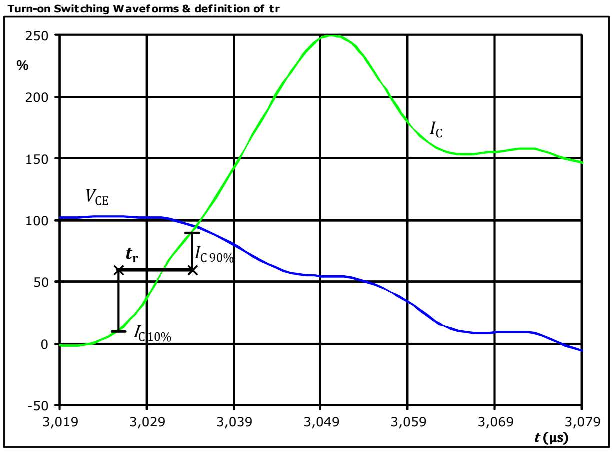
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_f =	0,022	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

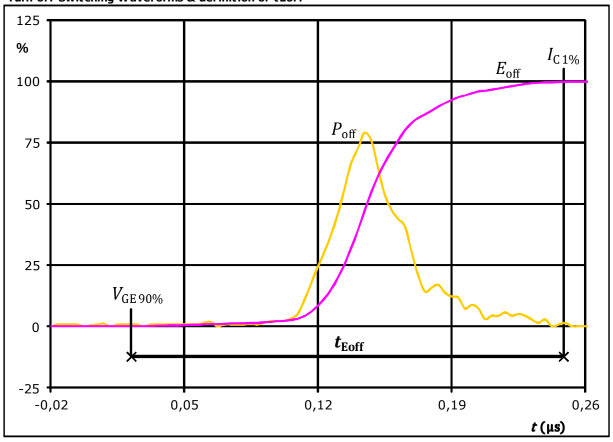


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_r =	0,009	µs

Buck Switching Characteristics

figure 5. **IGBT**

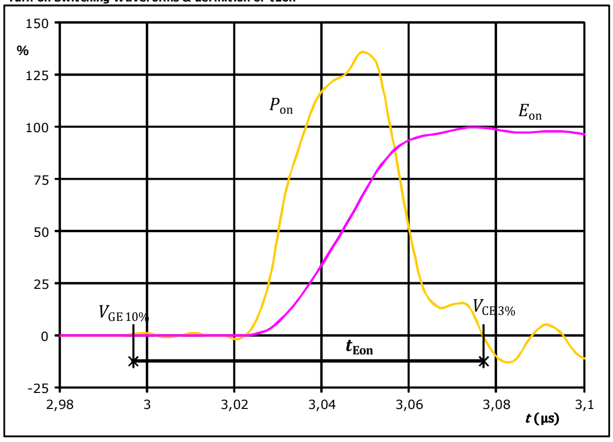
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	17,59	kW
E_{off} (100%) =	0,61	mJ
t_{Eoff} =	0,23	µs

figure 6. **IGBT**

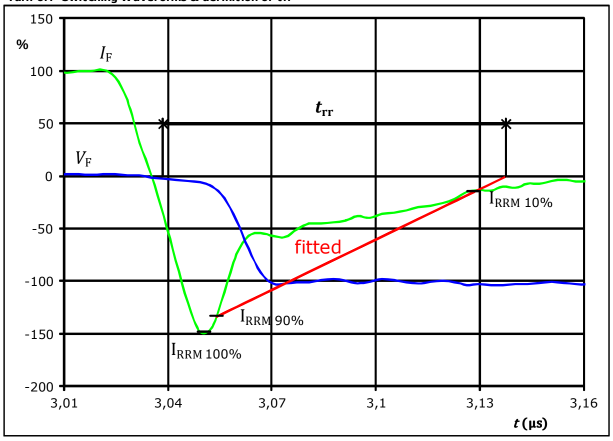
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	17,59	kW
E_{on} (100%) =	0,61	mJ
t_{Eon} =	0,08	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

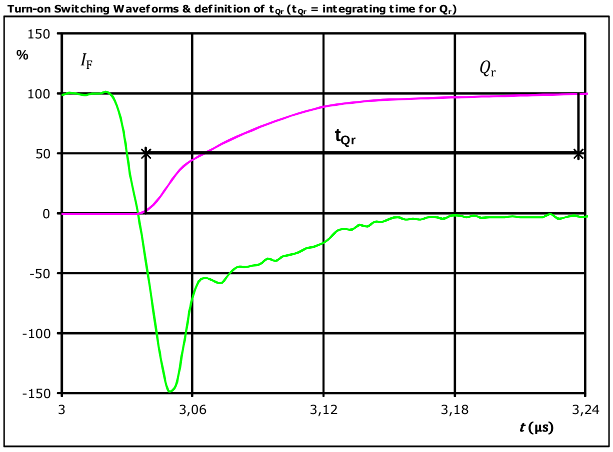


V_F (100%) =	350	V
I_F (100%) =	50	A
I_{RRM} (100%) =	-76	A
t_{rr} =	0,099	µs

Buck Switching Characteristics

figure 8. **FWD**

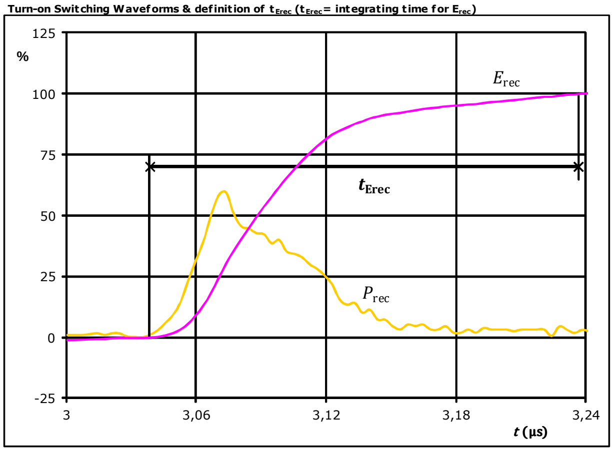
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	50	A
Q_r (100%) =	2,76	µC
t_{Qr} =	0,20	µs

figure 9. **FWD**

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



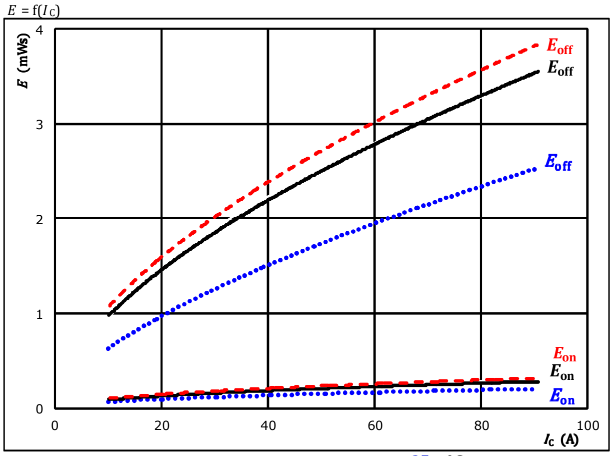
P_{rec} (100%) =	17,59	kW
E_{rec} (100%) =	0,59	mJ
t_{Erec} =	0,20	µs

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



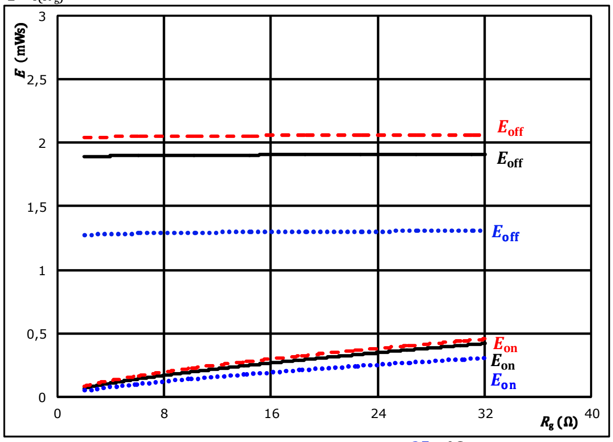
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
R_{gon} =	8	Ω		150 °C	dashed (red)
R_{goff} =	8	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



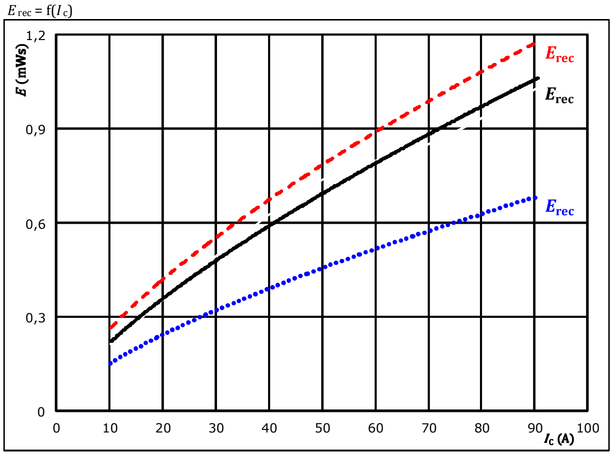
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
I_C =	30	A		150 °C	dashed (red)

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



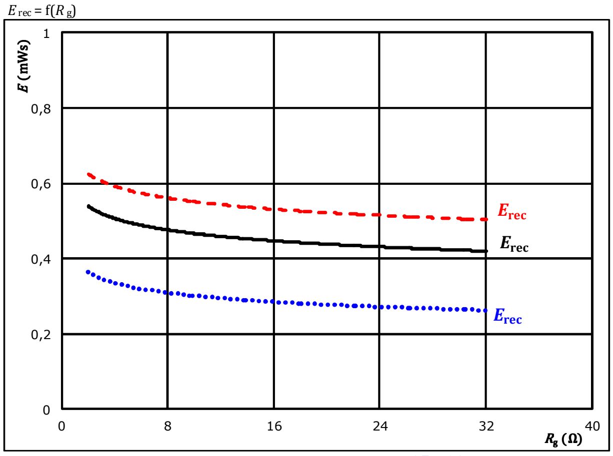
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
R_{gon} =	8	Ω		150 °C	dashed (red)

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

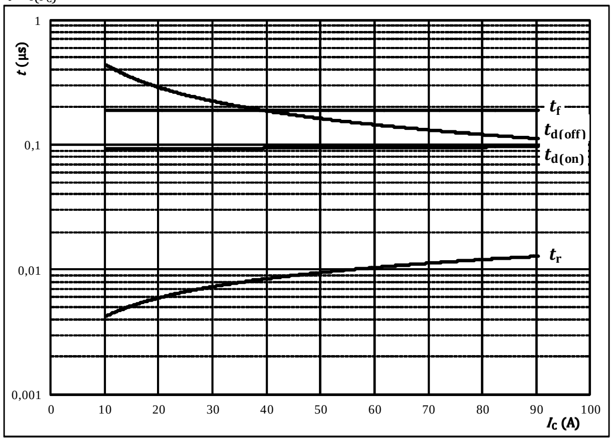
V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
I_C =	30	A		150 °C	dashed (red)

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



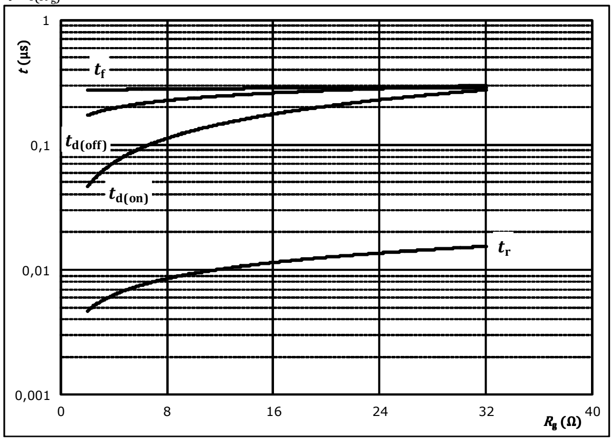
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



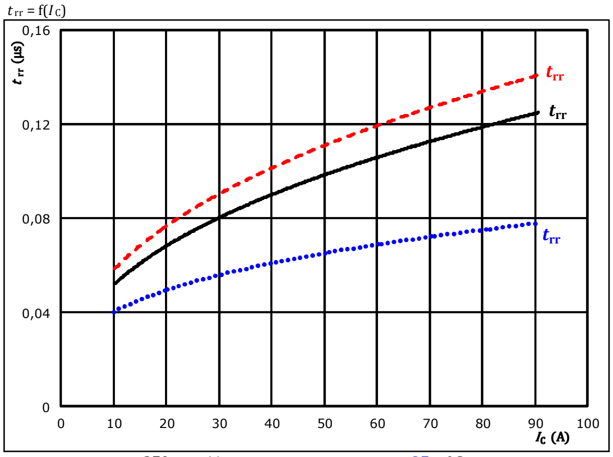
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

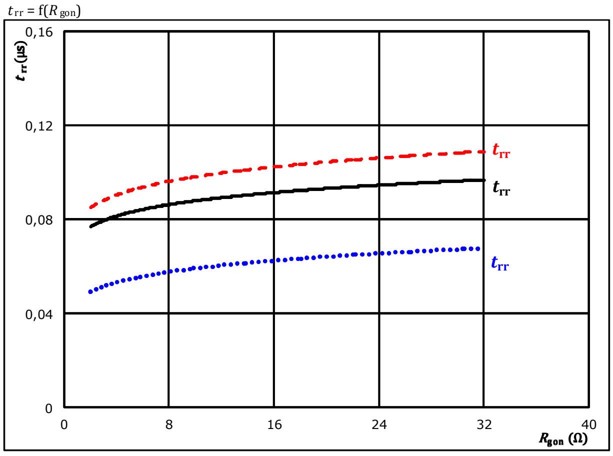


At					
V_{CE} =	350	V		25 °C	········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	8	Ω		150 °C	– – –

figure 8. **FWD**

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

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



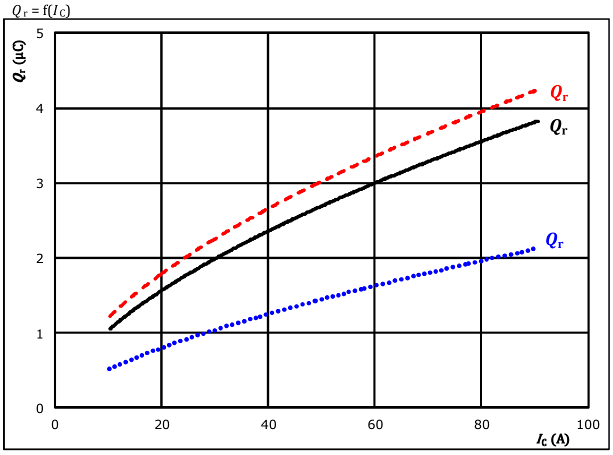
At					
V_{CE} =	350	V		25 °C	········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	30	A		150 °C	– – –

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

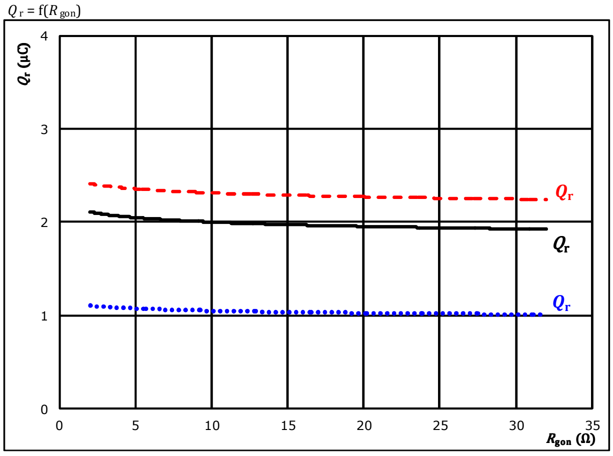


At	V_{CE} =	350	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	R_{gon} =	8	Ω		150	°C

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

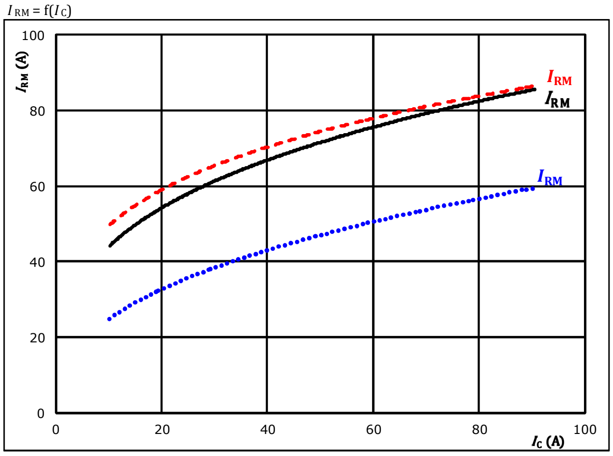


At	V_{CE}=	350	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	I_C=	30	A		150	°C

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

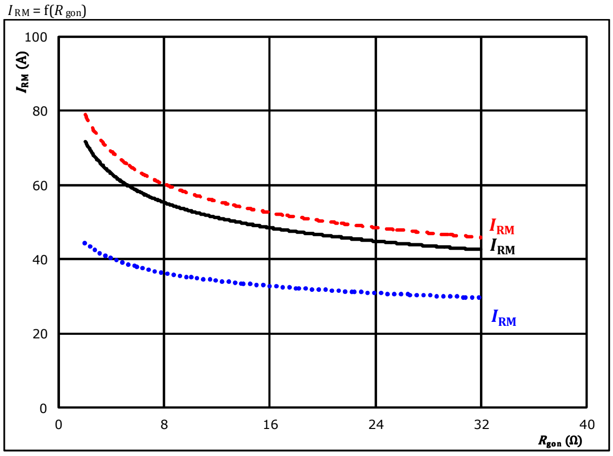


At	V_{CE}:	350	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	R_{gon} =	8	Ω		150	°C

figure 12. **FWD**

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

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



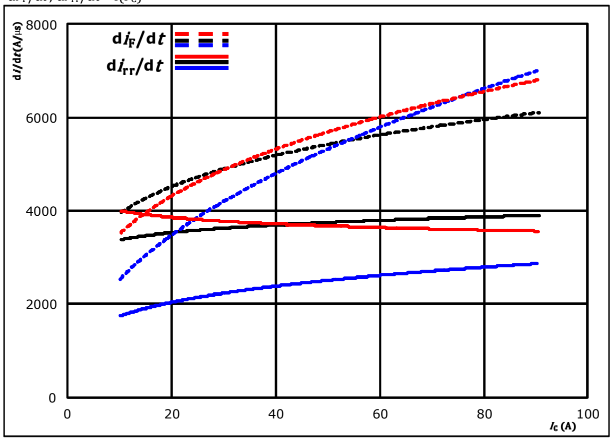
At	V_{CE} =	350	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	I_C =	30	A		150	°C

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

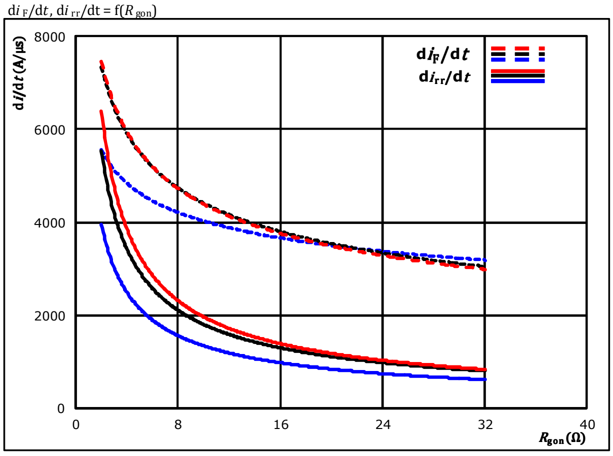


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	8	Ω		150 °C	dashed

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

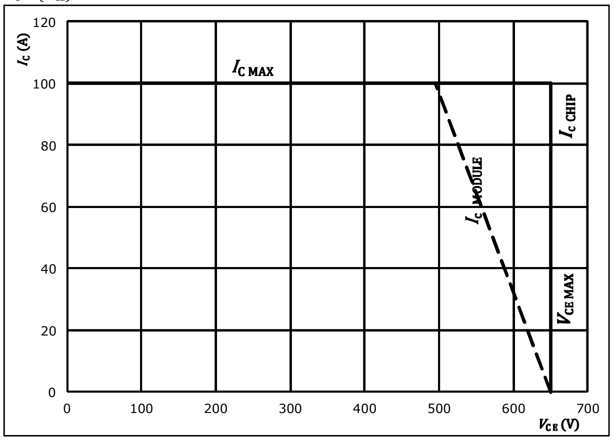


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	30	A		150 °C	dashed

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	8	Ω
R_{goff} =	8	Ω

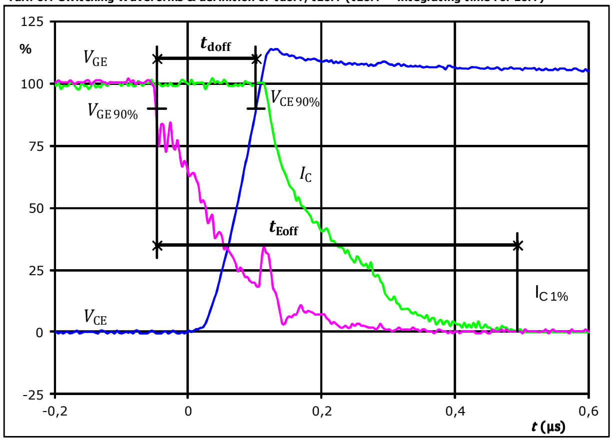
Boost Switching Definitions

General conditions

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

figure 1. **IGBT**

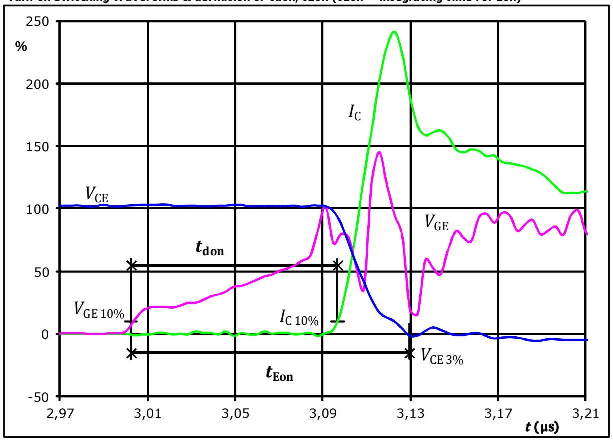
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,149	µs
t_{Eoff} =	0,541	µs

figure 2. **IGBT**

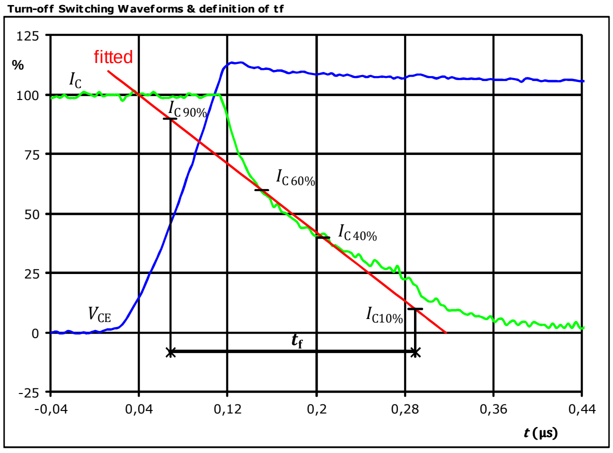
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_{don} =	0,095	µs
t_{Eon} =	0,127	µs

figure 3. **IGBT**

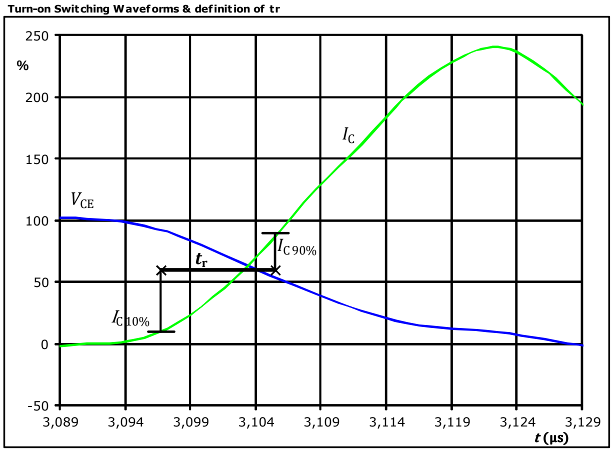
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_f =	0,221	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

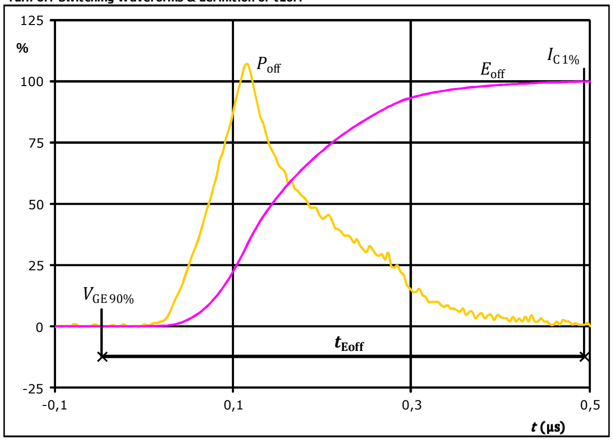


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_r =	0,009	µs

Boost Switching Characteristics

figure 5. **IGBT**

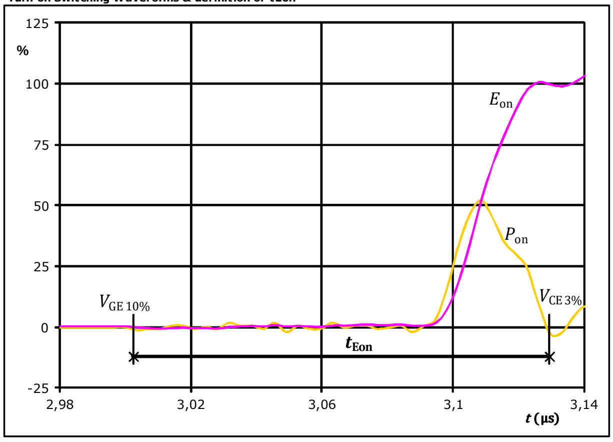
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	10,53	kW
E_{off} (100%) =	2,52	mJ
t_{Eoff} =	0,54	μs

figure 6. **IGBT**

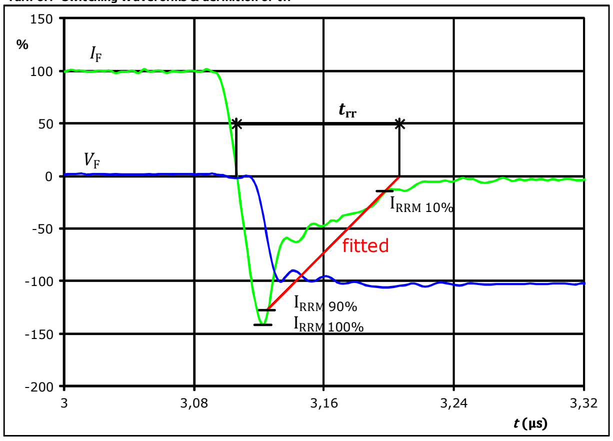
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	10,53	kW
E_{on} (100%) =	0,18	mJ
t_{Eon} =	0,13	μs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

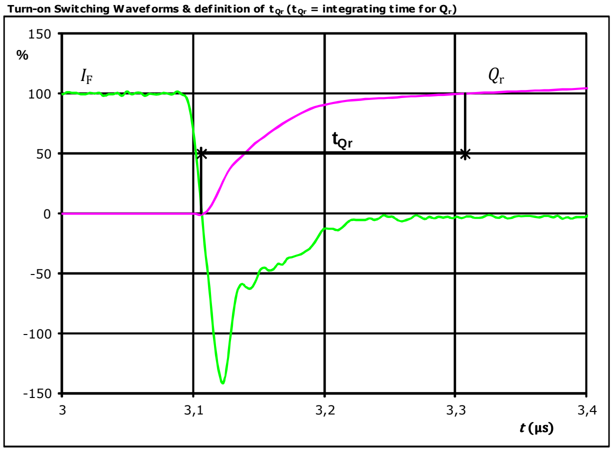


V_F (100%) =	350	V
I_F (100%) =	30	A
I_{RRM} (100%) =	-71	A
t_{rr} =	0,100	μs

Boost Switching Characteristics

figure 8. **FWD**

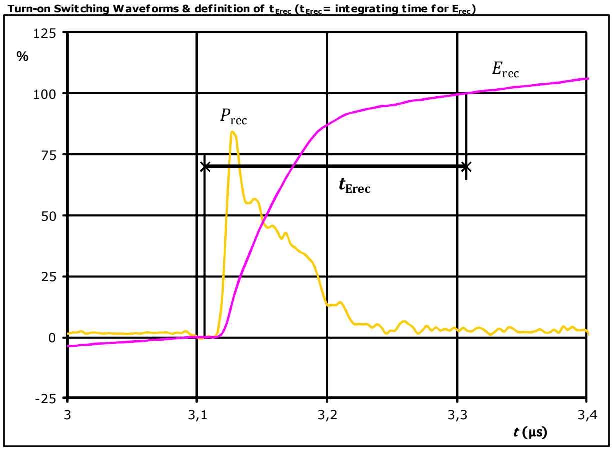
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	2,84	µC
t_{Qr} =	0,20	µs

figure 9. **FWD**

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



P_{rec} (100%) =	10,53	kW
E_{rec} (100%) =	0,74	mJ
t_{Erec} =	0,20	µs

Ordering Code & Marking

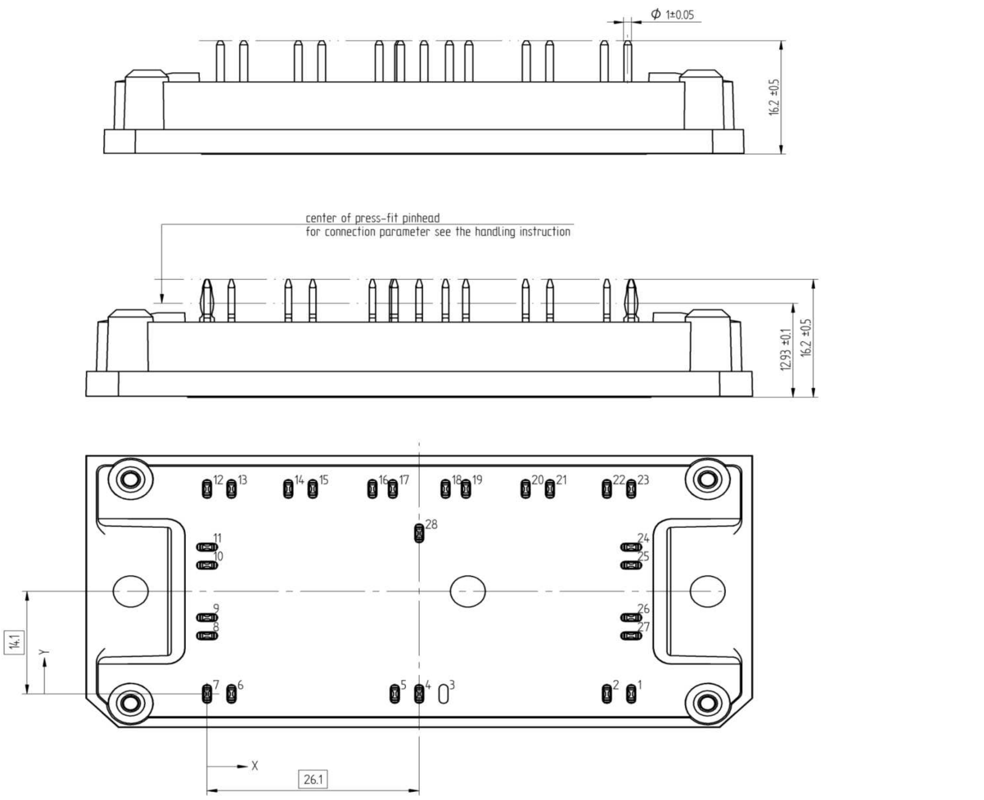
Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FY07HVA050S5-L984F08
with thermal paste 12 mm housing with solder pins	10-FY07HVA050S5-L984F08-/3/
without thermal paste 12 mm housing with press-fit pins	10-PY07HVA050S5-L984F08Y
with thermal paste 12 mm housing with press-fit pins	10-PY07HVA050S5-L984F08Y-/3/

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

Outline

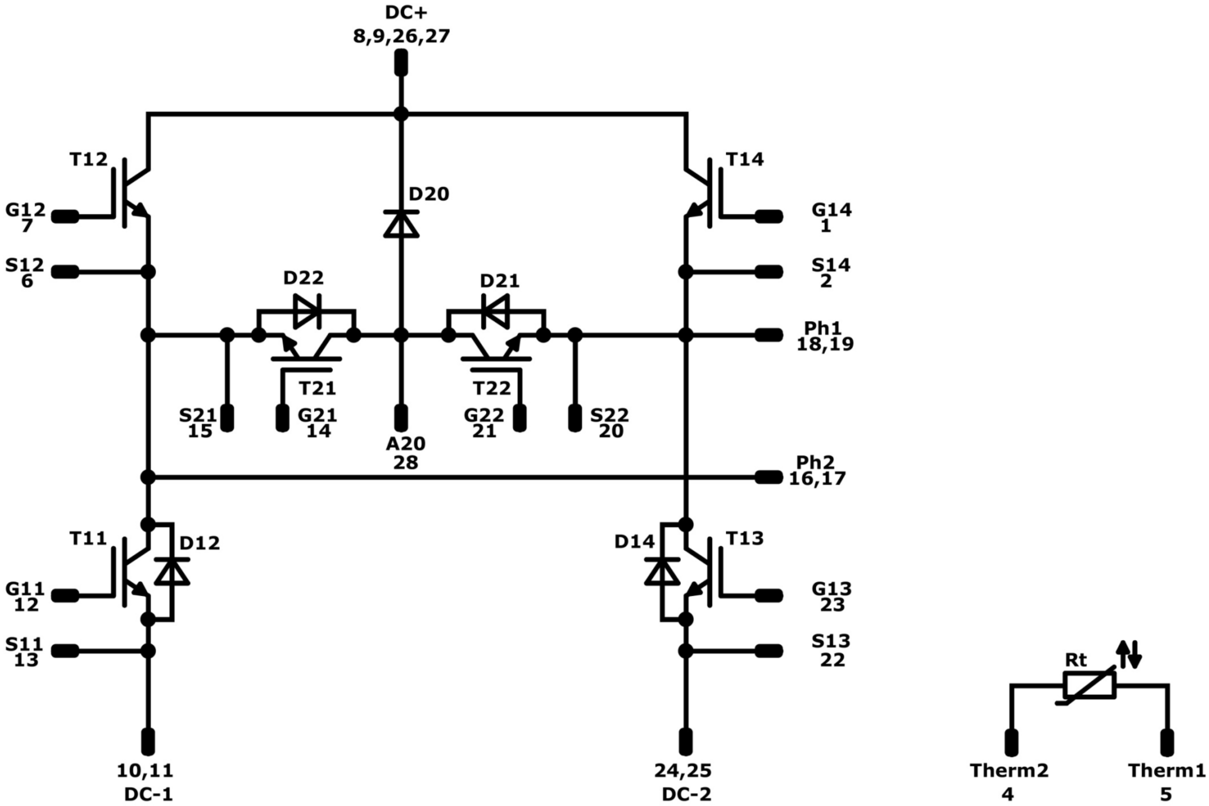
Pin table

Pin	X	Y	Function
1	52,2	0	G14
2	49,2	0	S14
3	Not assembled		
4	26,1	0	Therm2
5	23,1	0	Therm1
6	3	0	S12
7	0	0	G12
8	0	8	DC+
9	0	10,5	DC+
10	0	17,7	DC-1
11	0	20,2	DC-1
12	0	28,2	G11
13	3	28,2	S11
14	10	28,2	G21
15	13	28,2	S21
16	20,35	28,2	Ph2
17	22,85	28,2	Ph2
18	29,35	28,2	Ph1
19	31,85	28,2	Ph1
20	39,2	28,2	S22
21	42,2	28,2	G22
22	49,2	28,2	S13
23	52,2	28,2	G13
24	52,2	20,2	DC-2
25	52,2	17,7	DC-2
26	52,2	10,5	DC+
27	52,2	8	DC+
28	26,1	22,1	A20



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 , T13 , T14	IGBT	650 V	50 A	Buck Switch	
D12 , D14 , D20	FWD	650 V	30 A	Boost Diode	
T21 , T22	IGBT	650 V	30 A	Boost Switch	
D21 , D22	FWD	650 V	30 A	Buck Diode	
Rt	NTC			Thermistor	

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

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 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-xY07HVA050S5-L984F08x-D1-14	21 Jul. 2017		