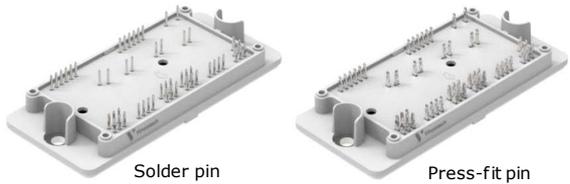
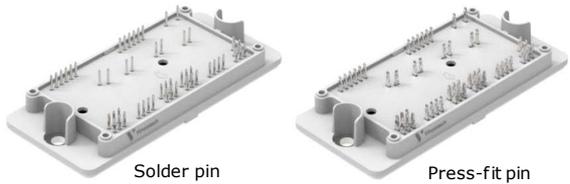
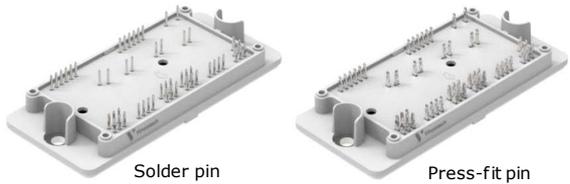
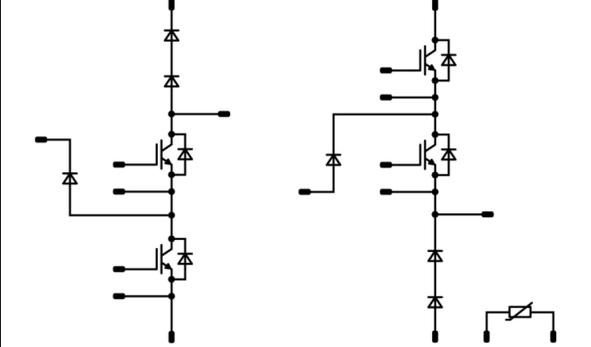
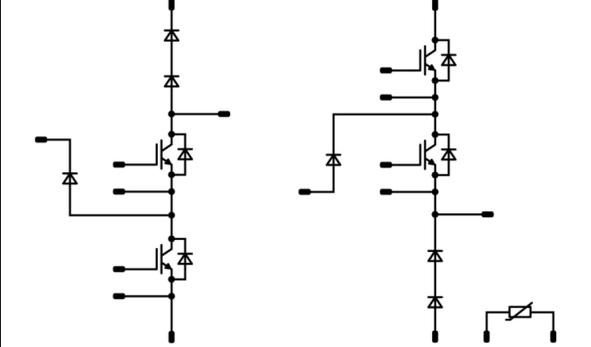
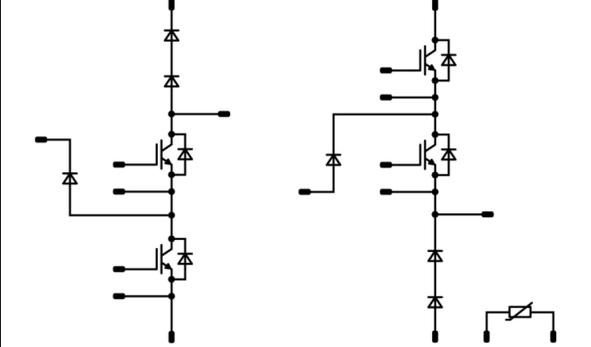




<i>flow NPC 2</i>	1200 V / 300 A					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ccc;"> <th style="text-align: center; padding: 2px;">Features</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"> <ul style="list-style-type: none"> Enhanced efficiency Enables high switching frequencies Low inductive package Allows four quadrant operation </td> </tr> </tbody> </table>	Features	<ul style="list-style-type: none"> Enhanced efficiency Enables high switching frequencies Low inductive package Allows four quadrant operation 	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ccc;"> <th style="text-align: center; padding: 2px;"><i>flow 2 13 mm housing</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">  </td> </tr> <tr> <td style="text-align: center; padding: 5px;"> <div style="display: flex; justify-content: space-around;"> Solder pin Press-fit pin </div> </td> </tr> </tbody> </table>	<i>flow 2 13 mm housing</i>		<div style="display: flex; justify-content: space-around;"> Solder pin Press-fit pin </div>
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Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Buck Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	260	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	389	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Buck Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	215	A
Repetitive peak forward current	I_{FRM}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	273	W
Maximum junction temperature	T_{jmax}		175	°C
Buck Sw. Protection Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F		30	A
Repetitive peak forward current	I_{FRM}		60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	59	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	260	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	389	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1300	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	160	A
Repetitive peak forward current	I_{FRM}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	405	W
Maximum junction temperature	T_{jmax}		175	°C



Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Boost Sw. Protection Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F		30	A
Repetitive peak forward current	I_{FRM}		60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	59	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

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	4000	V
		AC Voltage $t_p = 1\text{ min}$	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_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

Buck Switch

Static

Parameter	Symbol	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$				0,003	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CESat}	15			300	25 125 150		1,43 1,52 1,55	1,75	V
Collector-emitter cut-off current	I_{CES}	0	650			25			200	μA
Gate-emitter leakage current	I_{GES}	20	0			25			400	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							18000		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25		25		520		
Reverse transfer capacitance	C_{res}							68		
Gate charge	Q_g	15	520	300		25		656		nC

Thermal

Parameter	Symbol	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	K/W

Dynamic

Parameter	Symbol	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$					25 125 150		117 116 116		ns
Rise time	t_r					25 125 150		16 18 17		
Turn-off delay time	$t_{d(off)}$					25 125 150		130 148 153		
Fall time	t_f					25 125 150		14 21 24		
Turn-on energy (per pulse)	E_{on}					25 125 150		2,72 3,17 5,61		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,88 3,47 4,01		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

Buck Diode

Static

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			300	25 125 150		1,53 1,49 1,47	1,92	V
Reverse leakage current	I_R		650		25			15,2	µA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,35	K/W

Dynamic

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}				25 125 150		211 298 328		A
Reverse recovery time	t_{rr}				25 125 150		56 77 86		ns
Recovered charge	Q_r	$di/dt = 12198$ A/µs $di/dt = 11950$ A/µs $di/dt = 11550$ A/µs	±15	350	252	25 125 150	7,34 14,87 17,59		µC
Reverse recovered energy	E_{rec}				25 125 150		1,52 3,49 3,95		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$				25 125 150		6515 6781 5496		A/µs

Buck Sw. Protection Diode

Static

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			30	25 150		1,64 1,56	1,87	V
Reverse leakage current	I_R		650		25			0,36	µA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	1,61	K/W



Characteristic Values

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

Boost Switch

Static

Parameter	Symbol	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$				0,003	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CESat}	15			300	25 125 150		1,43 1,52 1,55	1,75	V
Collector-emitter cut-off current	I_{CES}	0	650			25			200	μA
Gate-emitter leakage current	I_{GES}	20	0			25			400	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							18000		pF
Output capacitance	C_{oes}	$f = 1 \text{ Mhz}$	0	25		25		520		
Reverse transfer capacitance	C_{res}							68		
Gate charge	Q_g	15	520	300		25		656		nC

Thermal

Parameter	Symbol	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)	K/W

Dynamic

Parameter	Symbol	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$					25 125 150		86 88 89		ns
Rise time	t_r					25 125 150		18 19 19		
Turn-off delay time	$t_{d(off)}$					25 125 150		131 152 158		
Fall time	t_f					25 125 150		17 25 28		
Turn-on energy (per pulse)	E_{on}					25 125 150		2,49 3,48 4,09		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		2,20 3,81 4,34		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

Boost Diode

Static

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			300	25 125 150		3,52 3,42 3,36	3,84	V
Reverse leakage current	I_R		1300		25			15,2	μA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,23	K/W

Dynamic

Parameter	Symbol	\pm	I_C [A]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}				25 125 150		159 241 260		A
Reverse recovery time	t_{rr}				25 125 150		100 126 146		ns
Recovered charge	Q_r	± 15	350	252	25 125 150		7,03 14,75 17,77		μC
Reverse recovered energy	E_{rec}				25 125 150		1,91 3,99 4,84		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$				25 125 150		7071 4239 4684		A/μs

Boost Sw. Protection Diode

Static

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			30	25 150		1,64 1,56	1,87	V
Reverse leakage current	I_R		650		25			0,36	μA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	1,61	K/W



Vincotech

30-FT07NIB300S502-LE06F58
30-PT07NIB300S502-LE06F58Y
 datasheet

Characteristic Values

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

Thermistor

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$				25		3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$				25		4000		K
Vincotech NTC Reference									I	

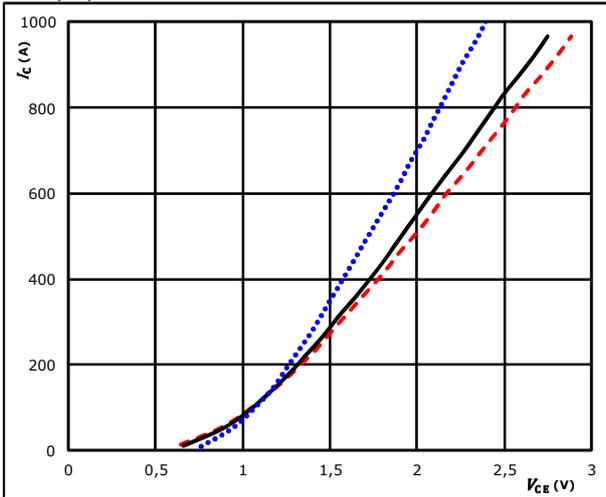


Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

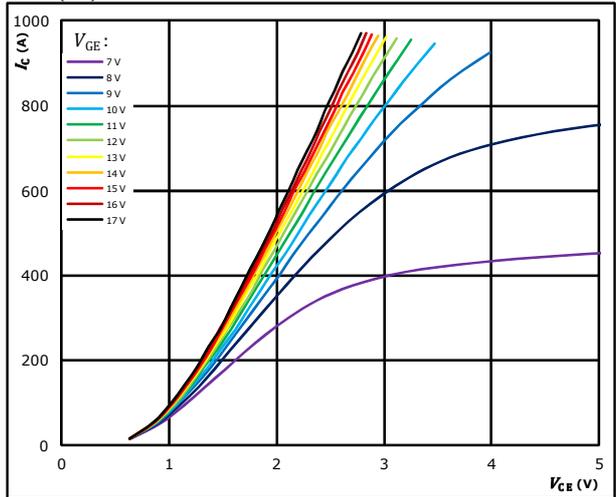


$t_p = 250 \mu\text{s}$ $T_j: 25 \text{ }^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ\text{C}$ ———
 $T_j: 150 \text{ }^\circ\text{C}$ - - - - -

figure 2. IGBT

Typical output characteristics

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

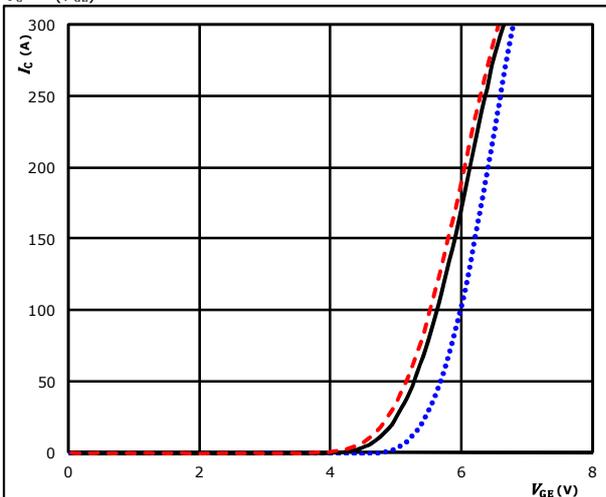


$t_p = 250 \mu\text{s}$
 $T_j = 150 \text{ }^\circ\text{C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

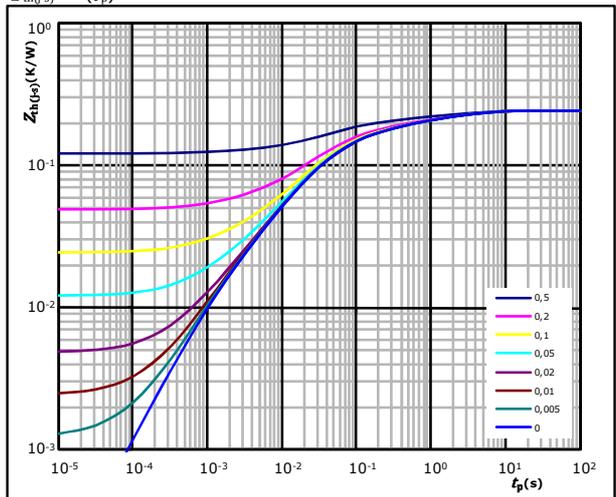


$t_p = 100 \mu\text{s}$ $T_j: 25 \text{ }^\circ\text{C}$
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ\text{C}$ ———
 $T_j: 150 \text{ }^\circ\text{C}$ - - - - -

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(\theta-s)} = 0,24 \text{ K/W}$

IGBT thermal model values

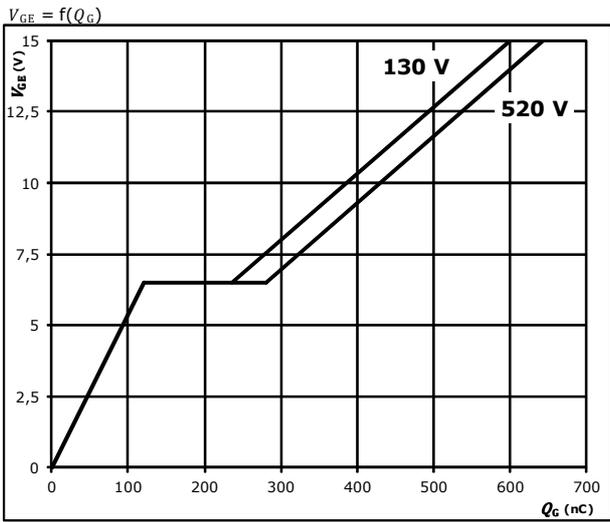
R (K/W)	τ (s)
3,19E-02	4,04E+00
3,56E-02	8,39E-01
5,47E-02	1,56E-01
9,39E-02	3,22E-02
2,10E-02	7,54E-03
7,41E-03	1,20E-03



Buck Switch Characteristics

figure 5. IGBT

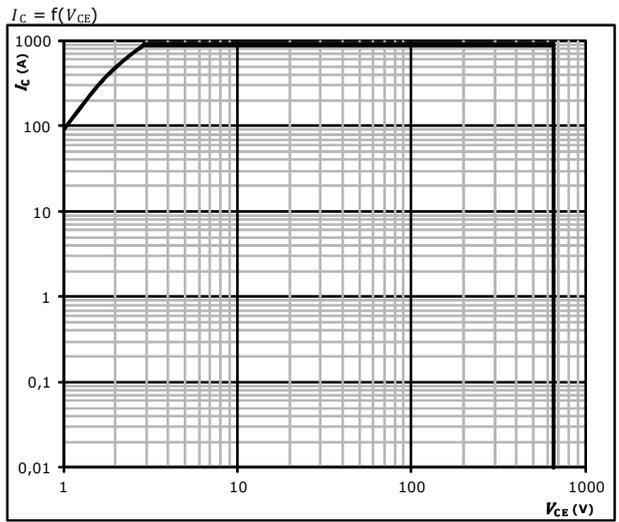
Gate voltage vs gate charge



$I_C = 300$ A

figure 6. IGBT

Safe operating area



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

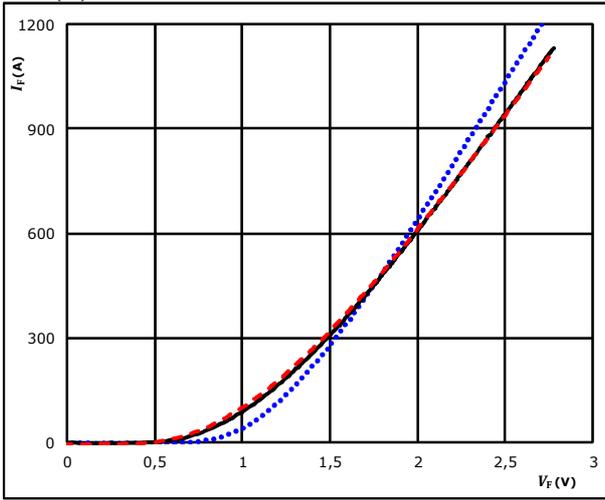


Buck Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

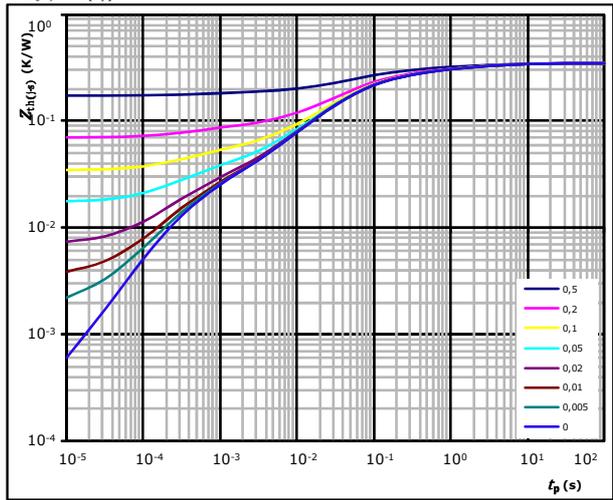


$t_p = 250 \mu s$
 T_j : 25 °C
 125 °C ———
 150 °C - - - -

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,35 \text{ K/W}$

FWD thermal model values

R (K/W)	τ (s)
2,86E-02	5,43E+00
5,04E-02	9,81E-01
7,36E-02	1,80E-01
1,26E-01	4,67E-02
4,07E-02	1,41E-02
1,25E-02	2,87E-03
1,67E-02	3,56E-04

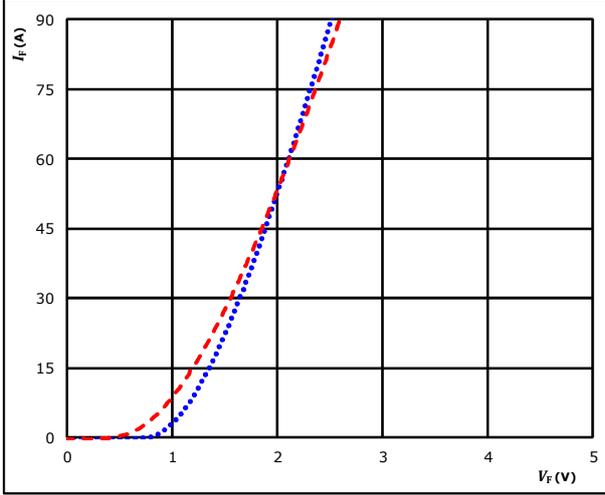


Buck Sw. Protection Diode Characteristics

figure 1. Prot. Diode

Typical forward characteristics

$$I_F = f(V_F)$$

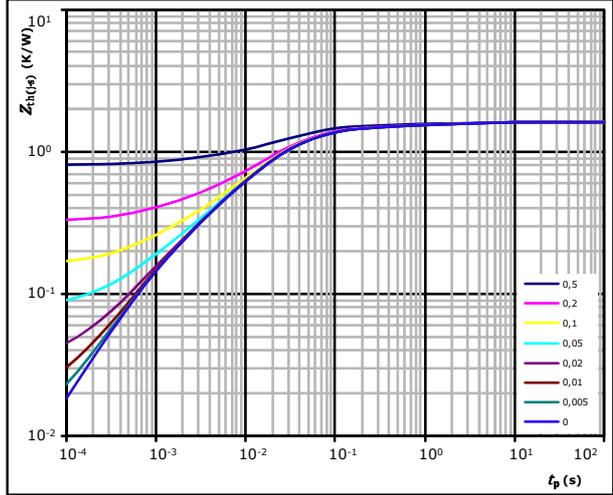


$t_p = 250 \mu s$
 T_j : $25 \text{ }^\circ\text{C}$ (blue dotted line)
 $150 \text{ }^\circ\text{C}$ (red dashed line)

figure 2. Prot. Diode

Transient thermal impedance as a function of pulse width

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



$$D = \frac{t_p}{T}$$

$$R_{th(\theta-s)} = 1,61 \text{ K/W}$$

Prot. Diode thermal model values

R (K/W)	τ (s)
$1,05E-01$	$3,05E+00$
$1,86E-01$	$2,04E-01$
$8,60E-01$	$3,00E-02$
$3,40E-01$	$8,15E-03$
$1,24E-01$	$1,07E-03$



Boost Switch Characteristics

figure 1. IGBT

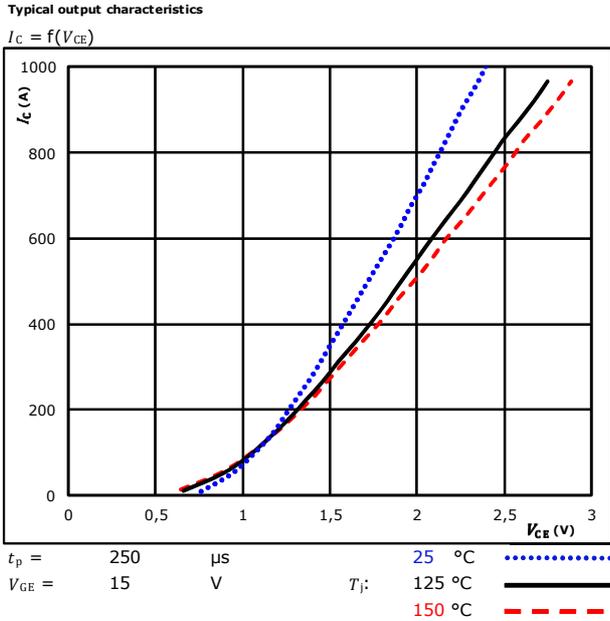


figure 2. IGBT

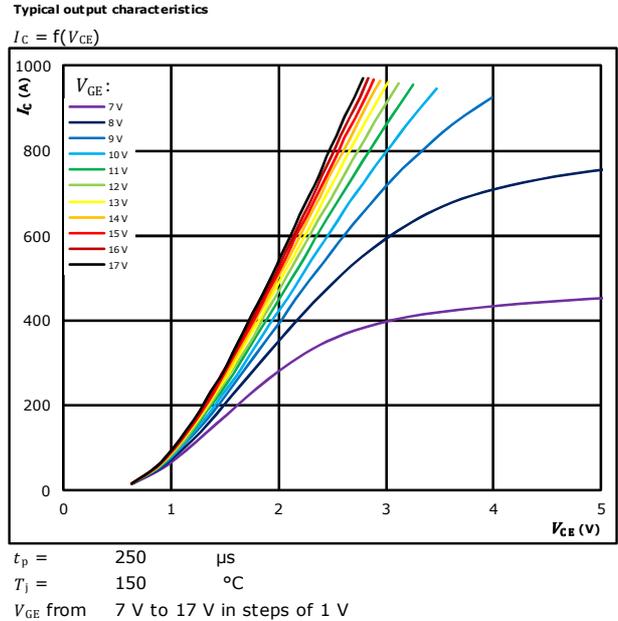


figure 3. IGBT

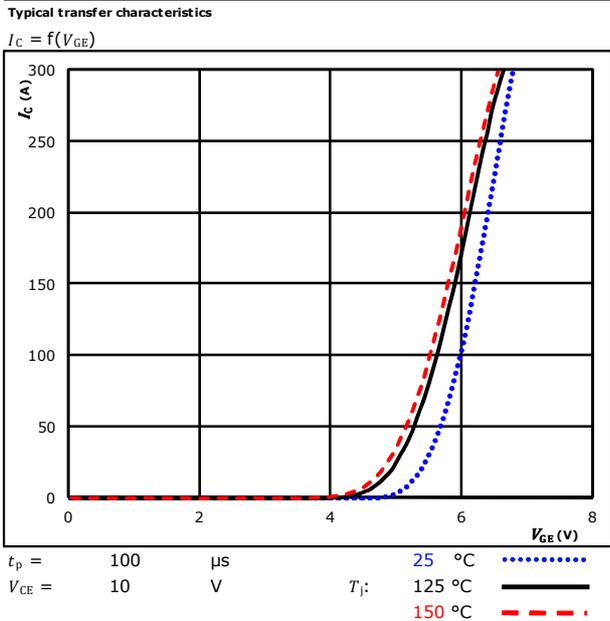
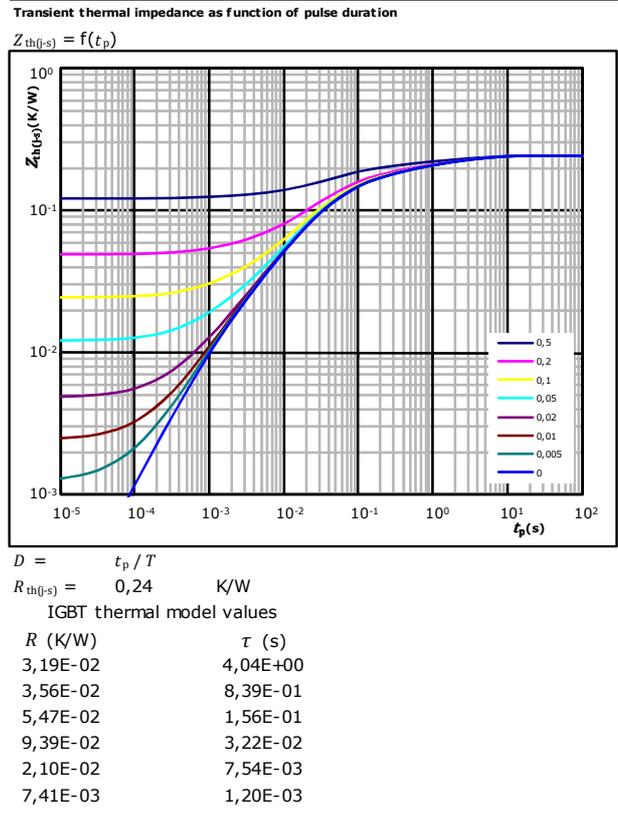


figure 4. IGBT

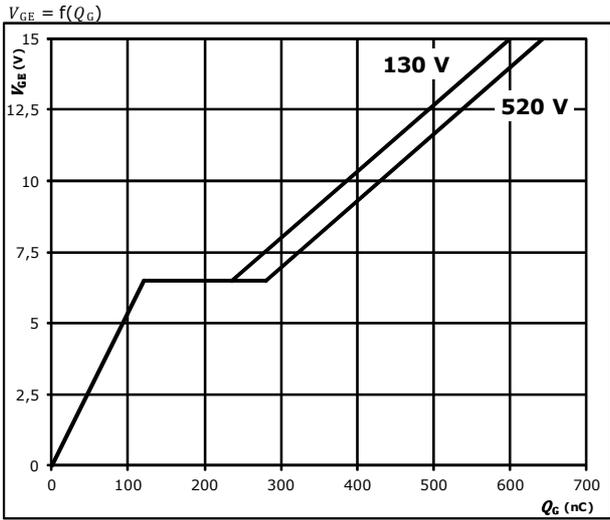




Boost Switch Characteristics

figure 5. IGBT

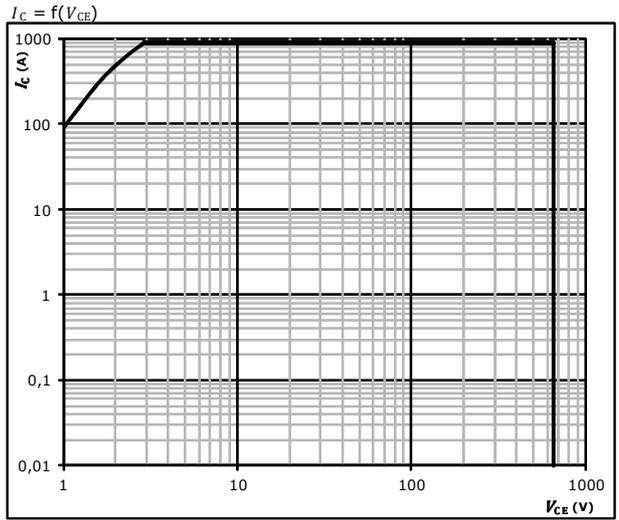
Gate voltage vs gate charge



$I_C = 300$ A

figure 6. IGBT

Safe operating area



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

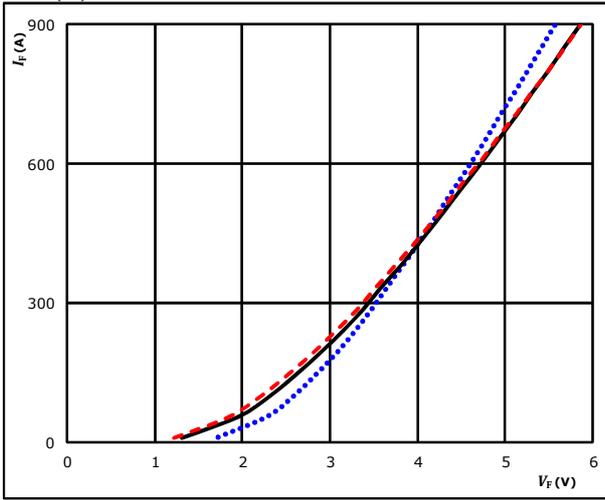


Boost Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

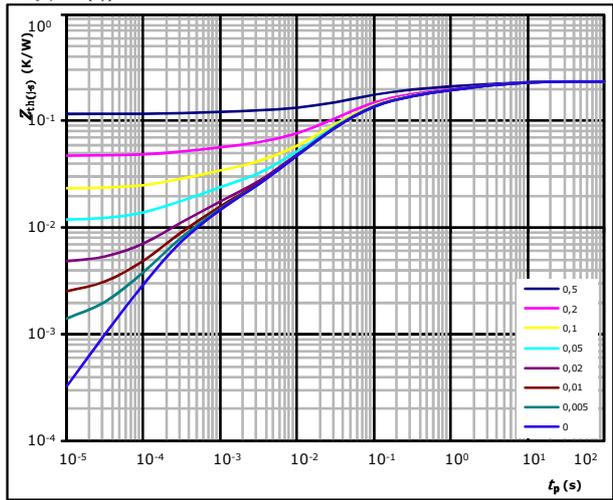


$t_p = 250 \mu s$
 T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,23 \text{ K/W}$

FWD thermal model values

R (K/W)	τ (s)
2,58E-02	5,76E+00
3,62E-02	1,33E+00
4,50E-02	2,11E-01
8,39E-02	4,97E-02
2,61E-02	1,56E-02
8,14E-03	2,89E-03
9,33E-03	3,52E-04

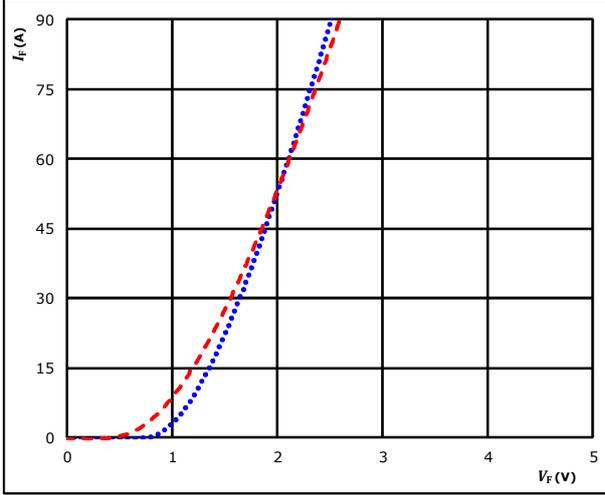


Boost Sw. Protection Diode Characteristics

figure 1. Prot. Diode

Typical forward characteristics

$$I_F = f(V_F)$$

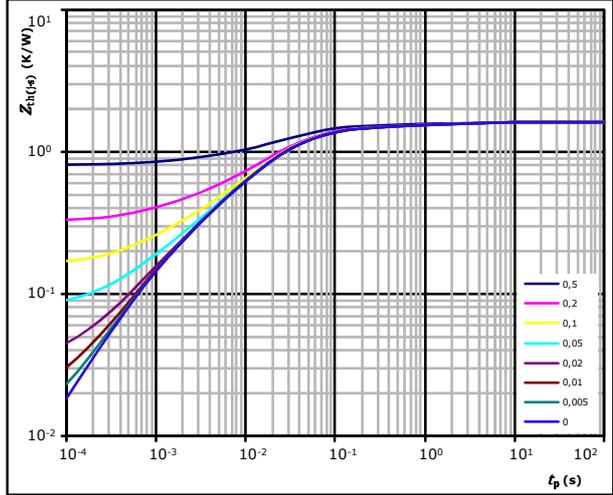


$t_p = 250 \mu s$
 $T_j: 25 \text{ } ^\circ\text{C}$ (dotted blue line)
 $150 \text{ } ^\circ\text{C}$ (dashed red line)

figure 2. Prot. Diode

Transient thermal impedance as a function of pulse width

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



$$D = \frac{t_p}{T}$$

$$R_{th(\theta-s)} = 1,61 \text{ K/W}$$

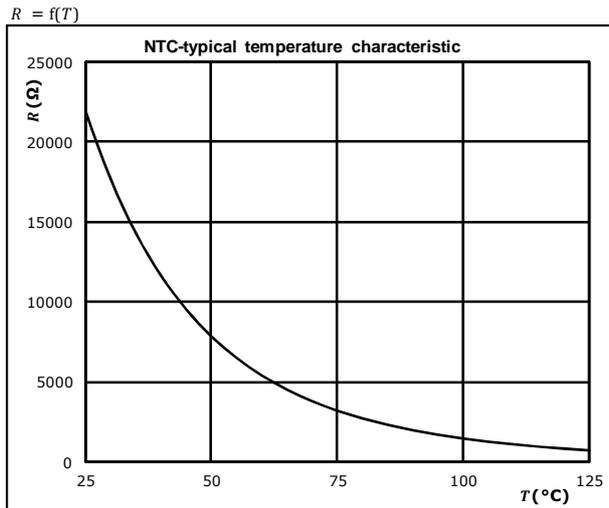
Prot. Diode thermal model values

R (K/W)	τ (s)
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03



Thermistor Characteristics

figure 1. Thermistor
Typical NTC characteristic as a function of temperature





Buck Switching Characteristics

figure 1. IGBT

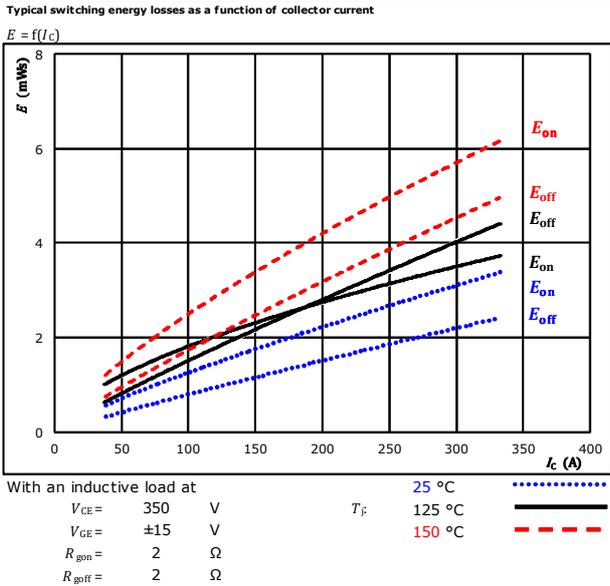


figure 2. IGBT

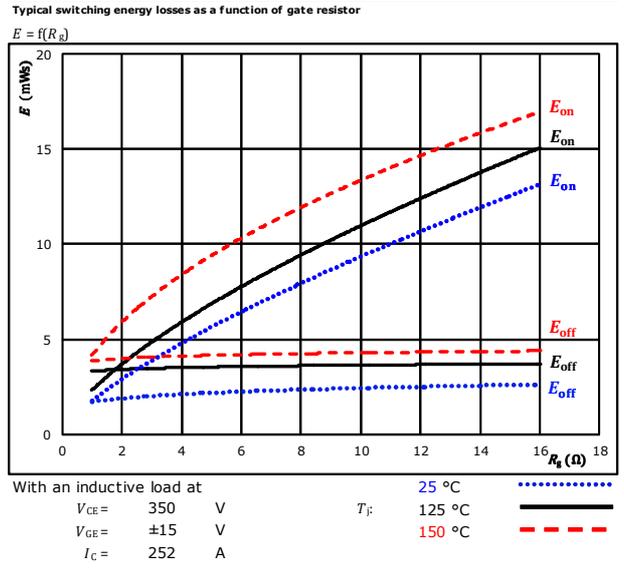


figure 3. FWD

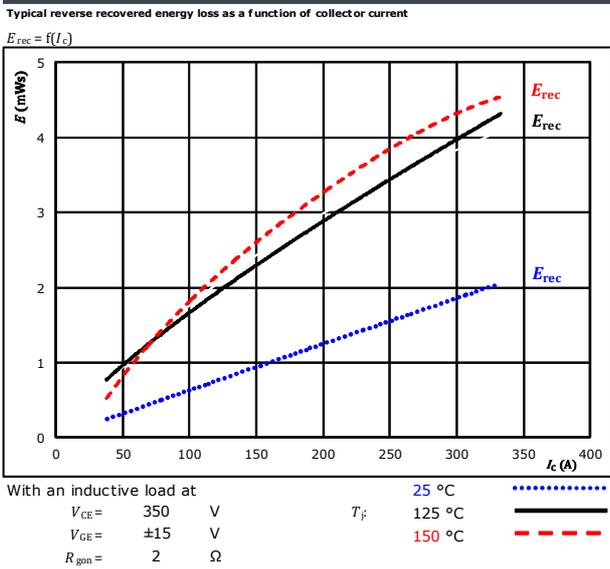
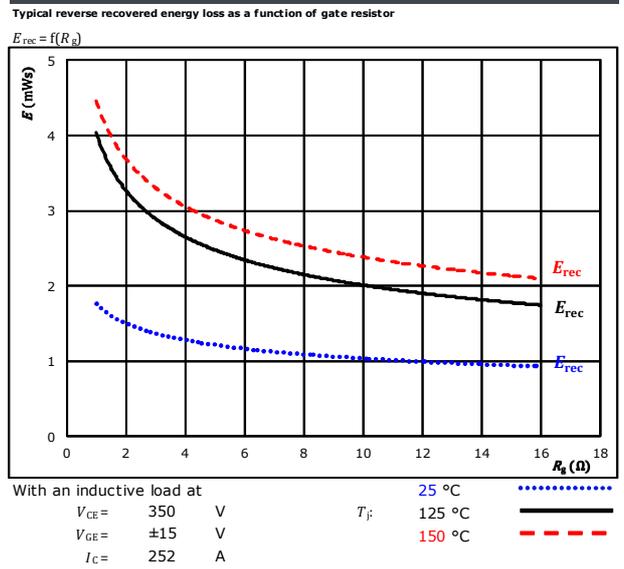


figure 4. FWD



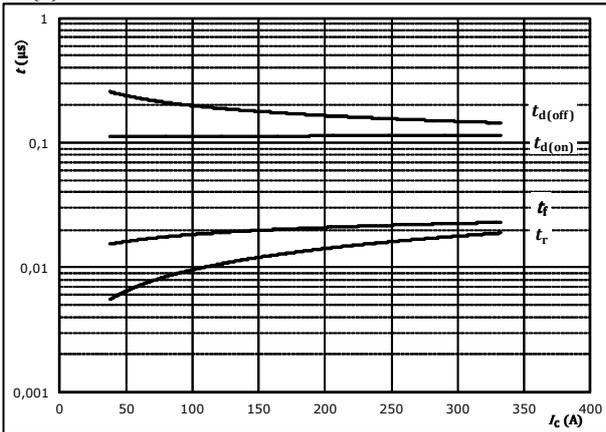


Buck Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_c)$$



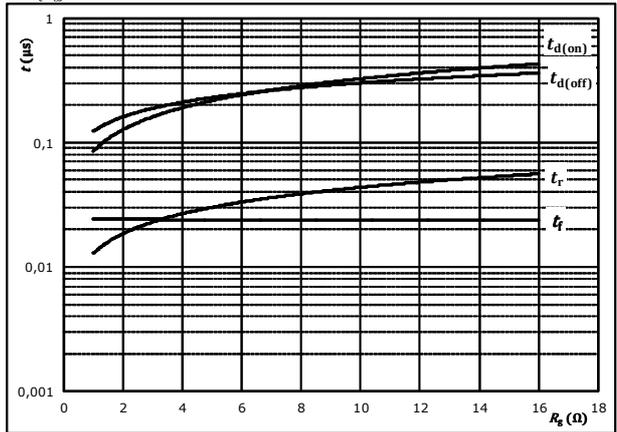
With an inductive load at

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

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



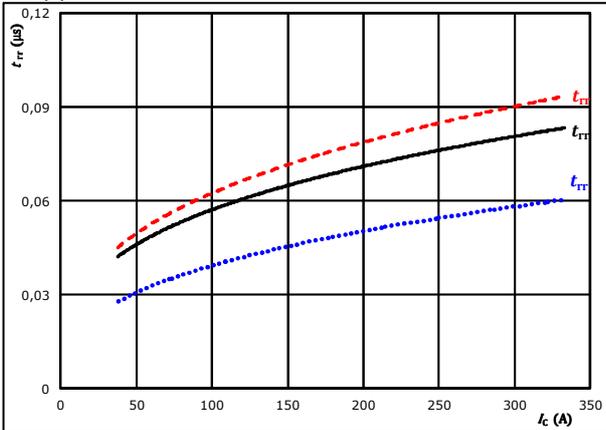
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	±15	V
$I_c =$	252	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_c)$$

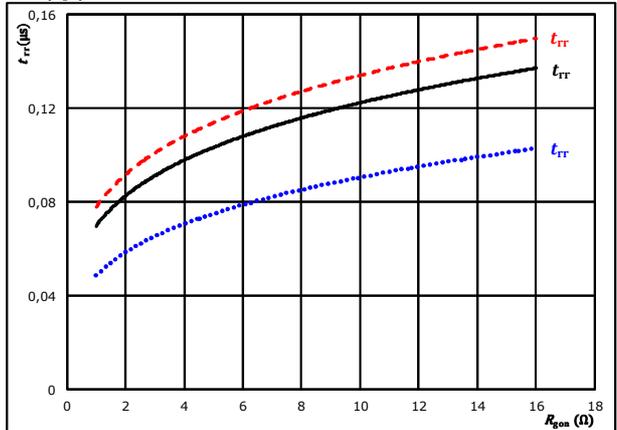


At	$V_{CE} =$	350	V	$T_j:$	25 °C
	$V_{GE} =$	±15	V		125 °C	————
	$R_{gon} =$	2	Ω		150 °C	- - - -

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	$T_j:$	25 °C
	$V_{GE} =$	±15	V		125 °C	————
	$I_c =$	252	A		150 °C	- - - -

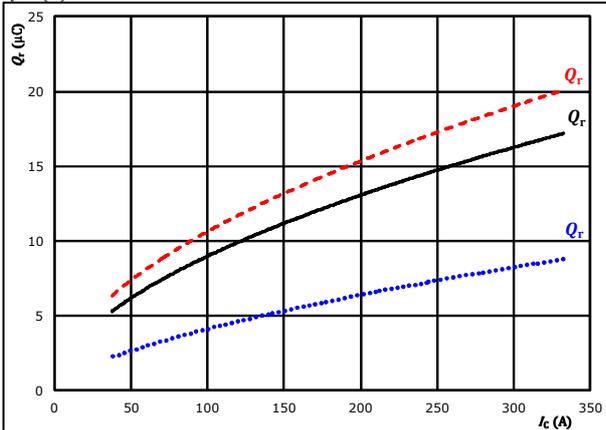


Buck Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

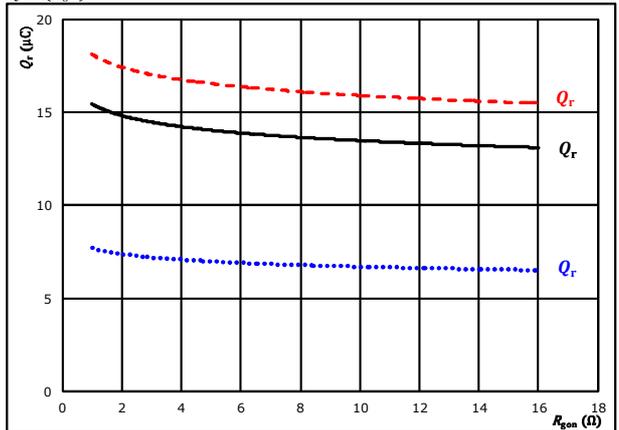


At $V_{CE} = 350$ V $T_j = 25$ °C $R_{gpn} = 2$ Ω $V_{GE} = \pm 15$ V $T_j = 125$ °C $I_c = 252$ A $T_j = 150$ °C

figure 10. FWD

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

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

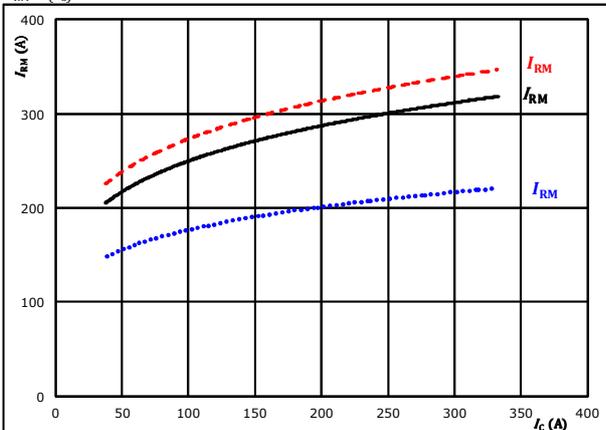


At $V_{CE} = 350$ V $T_j = 25$ °C $V_{GE} = \pm 15$ V $T_j = 125$ °C $I_c = 252$ A $T_j = 150$ °C

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

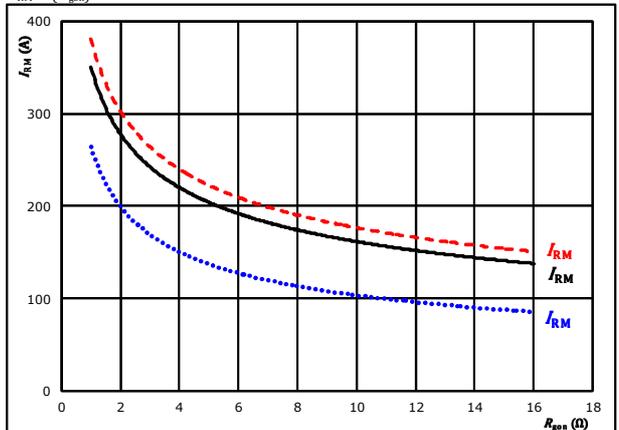


At $V_{CE} = 350$ V $T_j = 25$ °C $R_{gpn} = 2$ Ω $V_{GE} = \pm 15$ V $T_j = 125$ °C $I_c = 252$ A $T_j = 150$ °C

figure 12. FWD

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

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



At $V_{CE} = 350$ V $T_j = 25$ °C $V_{GE} = \pm 15$ V $T_j = 125$ °C $I_c = 252$ A $T_j = 150$ °C



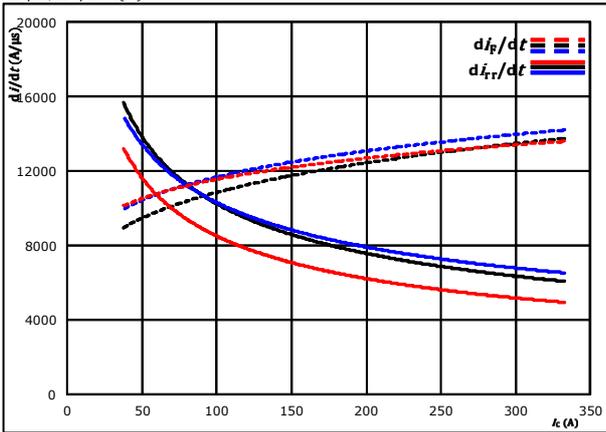
Vincotech

30-FT07NIB300S502-LE06F58
30-PT07NIB300S502-LE06F58Y
 datasheet

Buck Switching Characteristics

figure 13. FWD

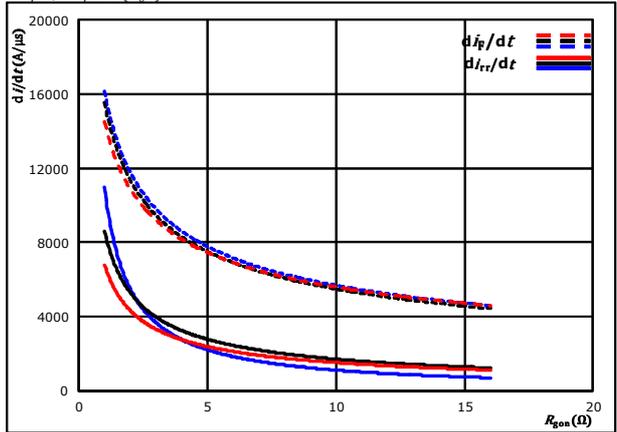
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $R_{g(on)} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

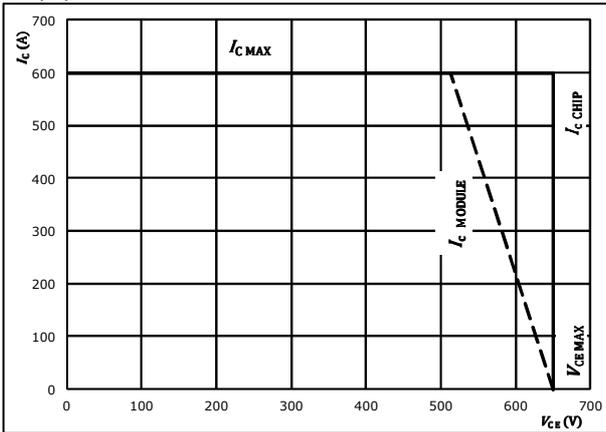
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $I_C = 252$ A $T_j = 150$ °C

figure 15. IGBT

Reverse bias safe operating area
 $I_C = f(V_{CE})$



At $T_j = 125$ °C
 $R_{g(on)} = 2$ Ω
 $R_{g(off)} = 2$ Ω

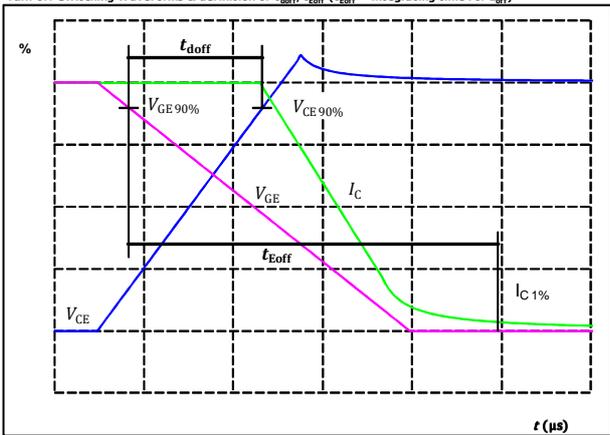


Buck Switching Definitions

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

figure 1. IGBT

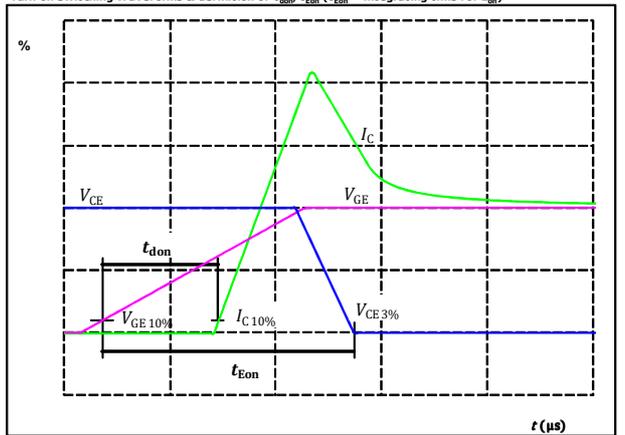
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{doff} =$	148	ns

figure 2. IGBT

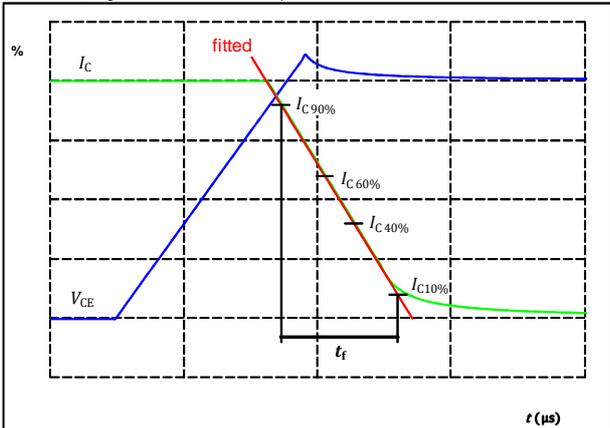
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{don} =$	116	ns

figure 3. IGBT

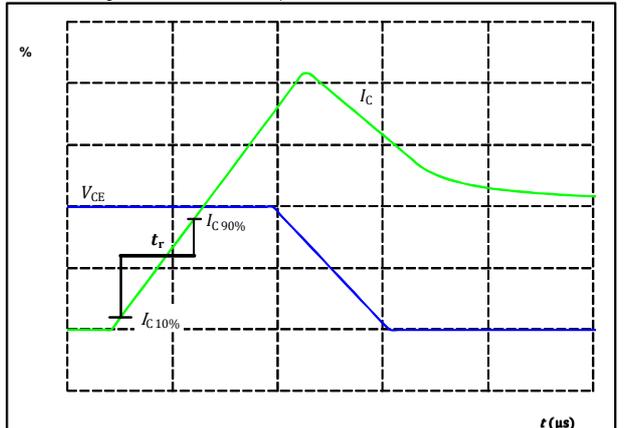
Turn-off Switching Waveforms & definition of t_r



$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	21	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

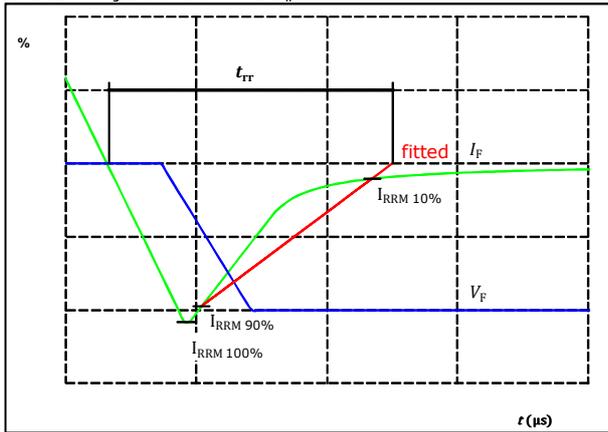


$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	18	ns



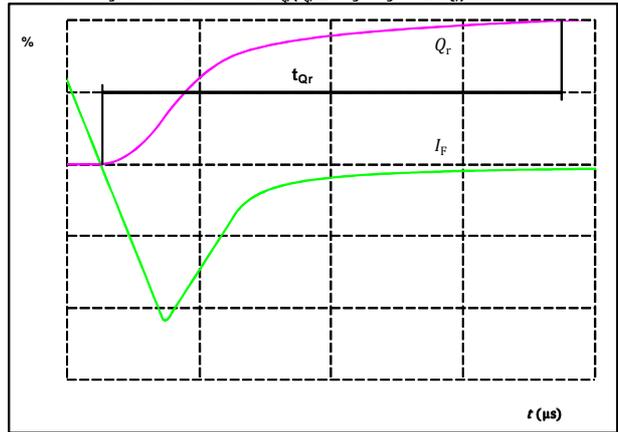
Buck Switching Characteristics

figure 5. FWD
 Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%) =$	350	V
$I_F(100\%) =$	252	A
$I_{RRM}(100\%) =$	298	A
$t_{rr} =$	77	ns

figure 6. FWD
 Turn-on Switching Waveforms & definition of t_{qr} (t_{qr} = integrating time for Q_r)



$I_F(100\%) =$	252	A
$Q_r(100\%) =$	14,87	μC

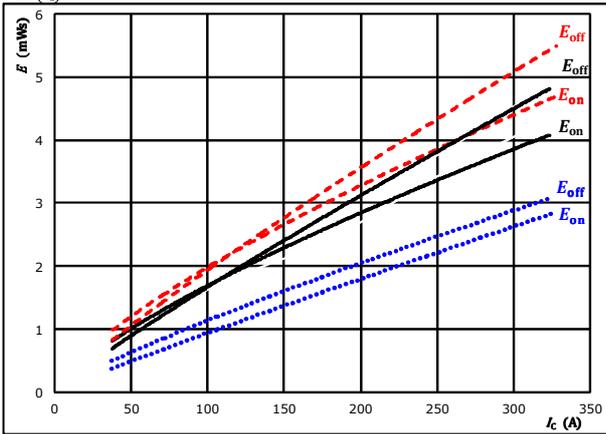


Boost Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



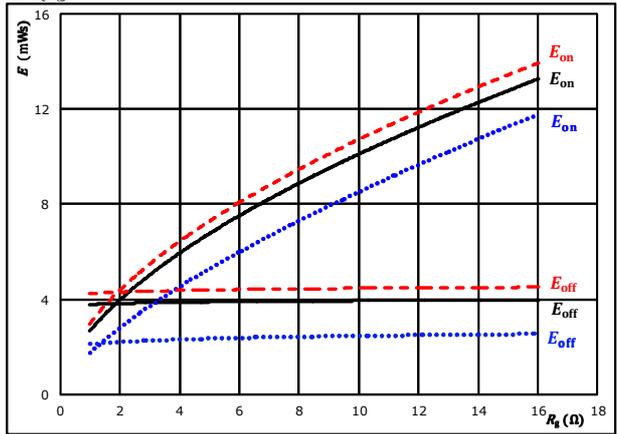
With an inductive load at

$V_{CE} = 350$ V	$T_j: 25$ °C
$V_{GE} = \pm 15$ V	$T_j: 125$ °C	————
$R_{g\text{on}} = 2$ Ω	$T_j: 150$ °C	-----
$R_{g\text{off}} = 2$ Ω		

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



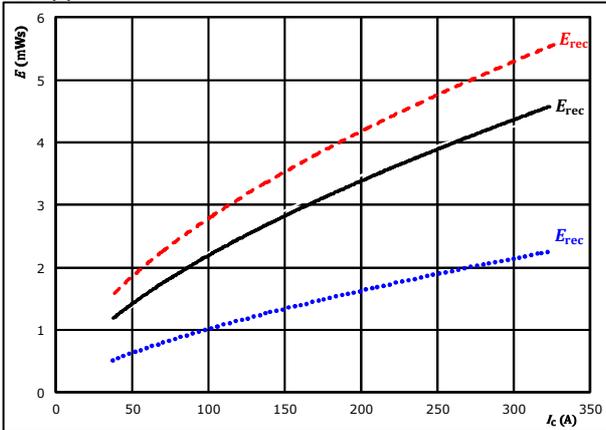
With an inductive load at

$V_{CE} = 350$ V	$T_j: 25$ °C
$V_{GE} = \pm 15$ V	$T_j: 125$ °C	————
$I_C = 252$ A	$T_j: 150$ °C	-----

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



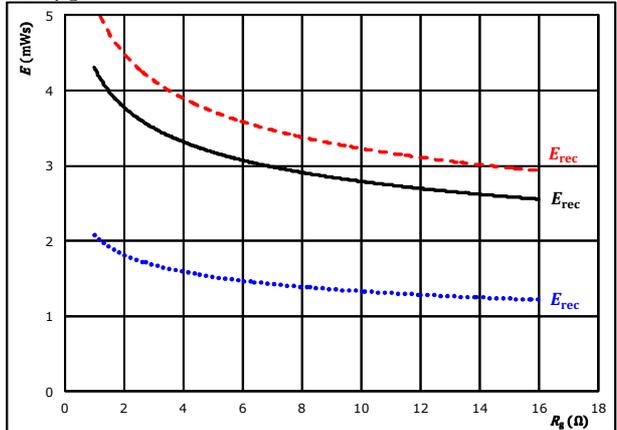
With an inductive load at

$V_{CE} = 350$ V	$T_j: 25$ °C
$V_{GE} = \pm 15$ V	$T_j: 125$ °C	————
$R_{g\text{on}} = 2$ Ω	$T_j: 150$ °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
$V_{GE} = \pm 15$ V	$T_j: 125$ °C	————
$I_C = 252$ A	$T_j: 150$ °C	-----

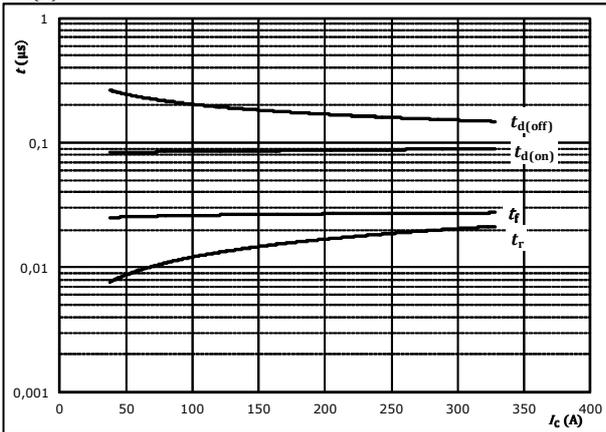


Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



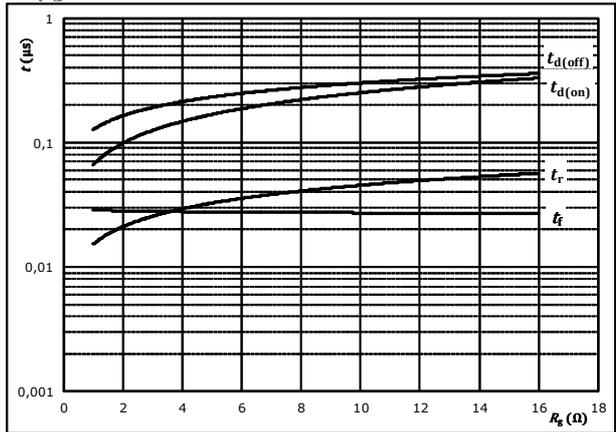
With an inductive load at

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

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



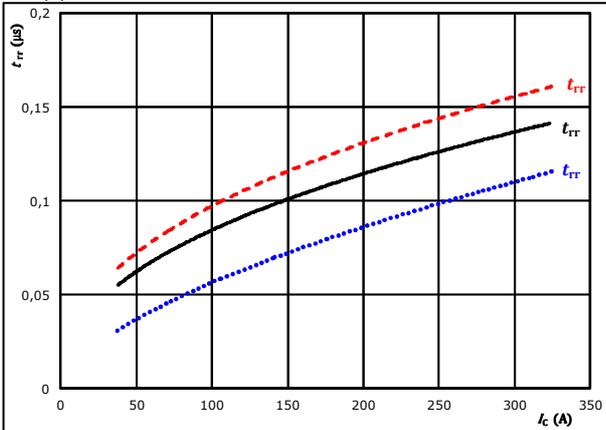
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	±15	V
$I_C =$	252	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

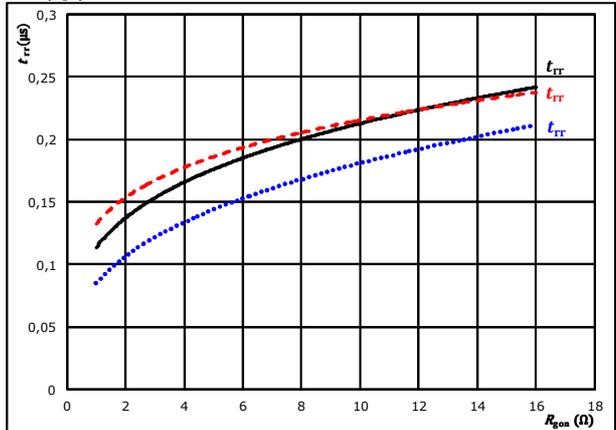


At	$V_{CE} =$	350	V	$T_j:$	25 °C
	$V_{GE} =$	±15	V		125 °C	————
	$R_{gon} =$	2	Ω		150 °C	-----

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	$T_j:$	25 °C
	$V_{GE} =$	±15	V		125 °C	————
	$I_C =$	252	A		150 °C	-----

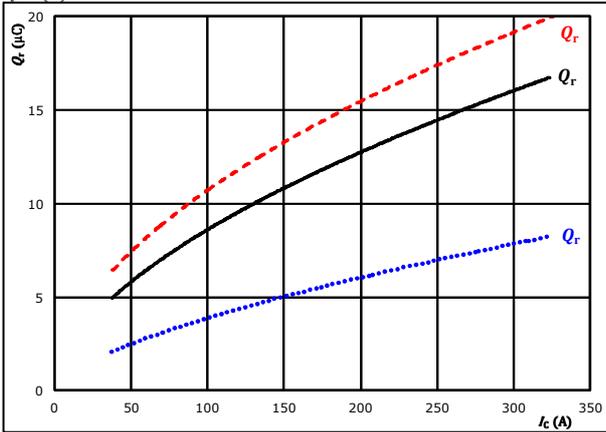


Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

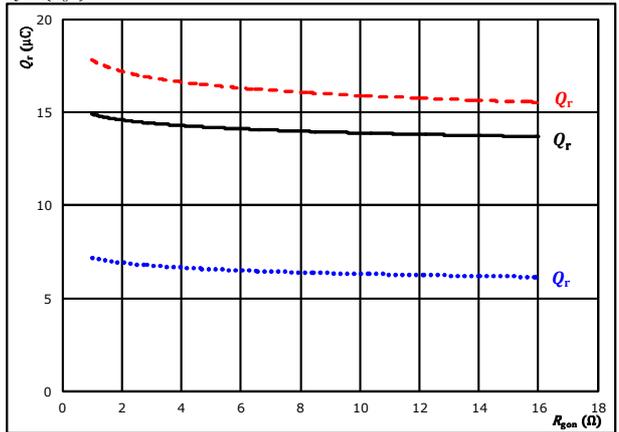


At $V_{CE} = 350$ V $T_j = 25$ °C $V_{GE} = \pm 15$ V $T_j = 125$ °C $R_{gpn} = 2$ Ω $T_j = 150$ °C

figure 10. FWD

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

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

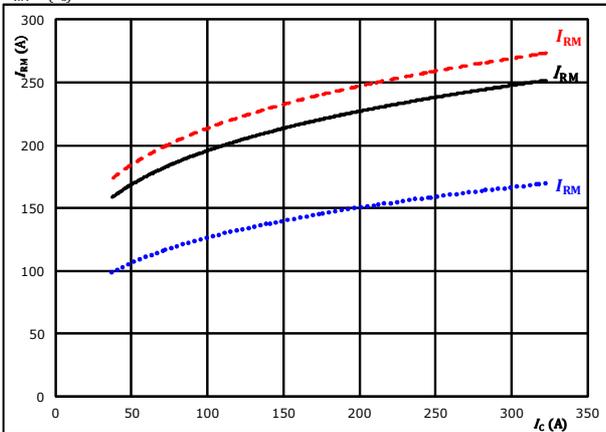


At $V_{CE} = 350$ V $T_j = 25$ °C $V_{GE} = \pm 15$ V $T_j = 125$ °C $I_c = 252$ A $T_j = 150$ °C

figure 11. FWD

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

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

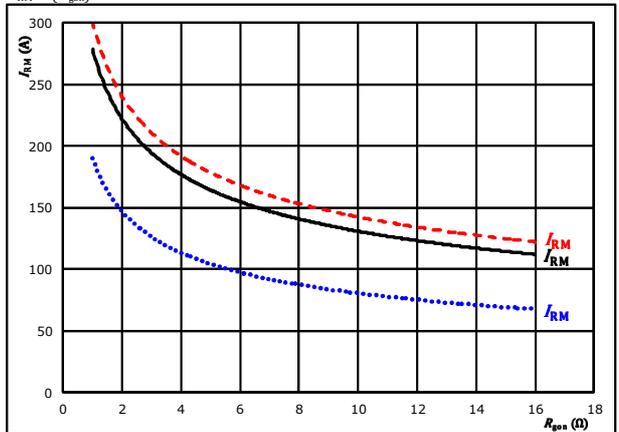


At $V_{CE} = 350$ V $T_j = 25$ °C $V_{GE} = \pm 15$ V $T_j = 125$ °C $R_{gpn} = 2$ Ω $T_j = 150$ °C

figure 12. FWD

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

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



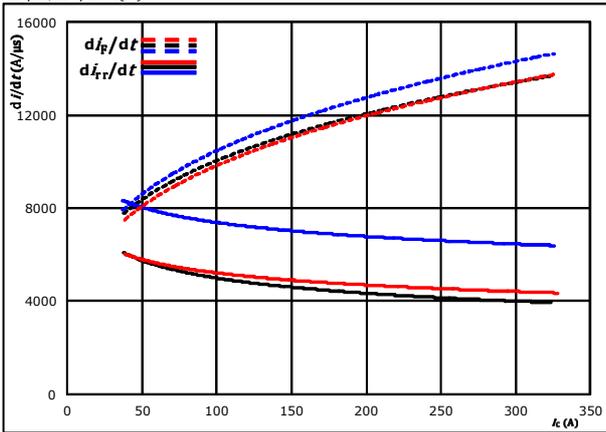
At $V_{CE} = 350$ V $T_j = 25$ °C $V_{GE} = \pm 15$ V $T_j = 125$ °C $I_c = 252$ A $T_j = 150$ °C



Boost Switching Characteristics

figure 13. FWD

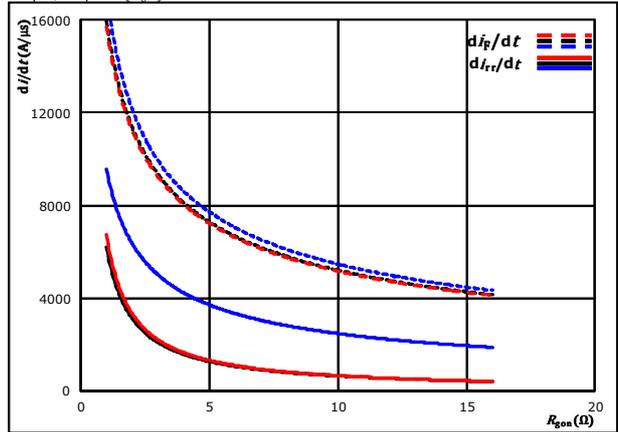
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $R_{g(on)} = 2$ Ω $T_j = 150$ °C

figure 14. FWD

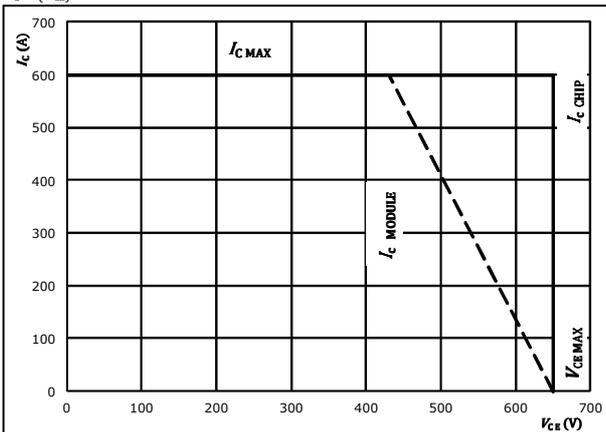
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C
 $I_c = 252$ A $T_j = 150$ °C

figure 15. IGBT

Reverse bias safe operating area
 $I_c = f(V_{CE})$



At $T_j = 175$ °C
 $R_{g(on)} = 2$ Ω
 $R_{g(off)} = 2$ Ω



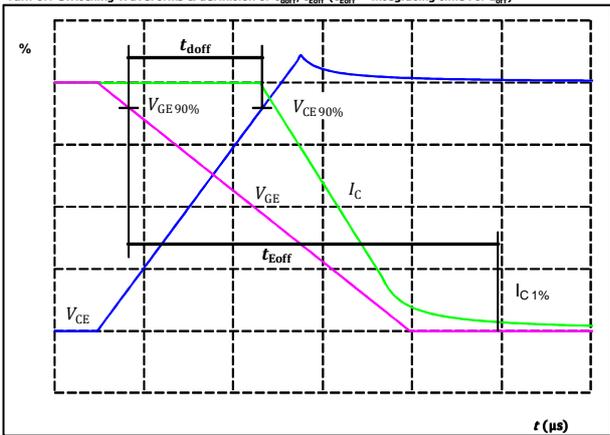
Boost Switching Definitions

General conditions

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

figure 1. IGBT

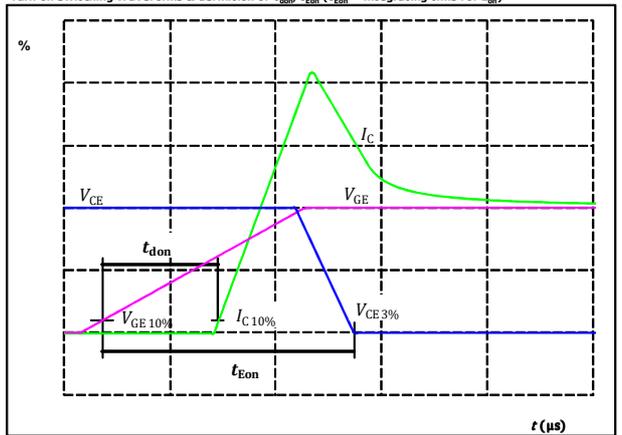
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{doff} =$	152	ns

figure 2. IGBT

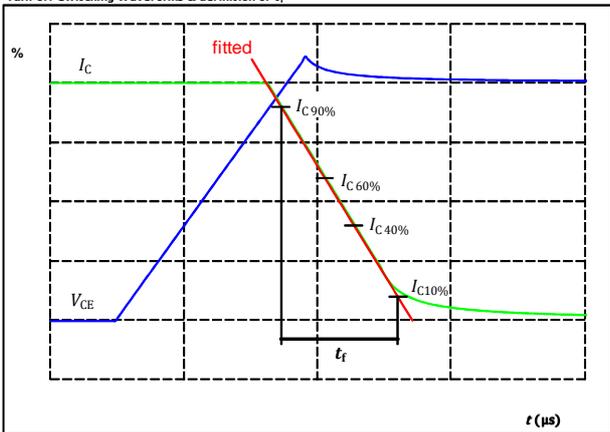
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{don} =$	88	ns

figure 3. IGBT

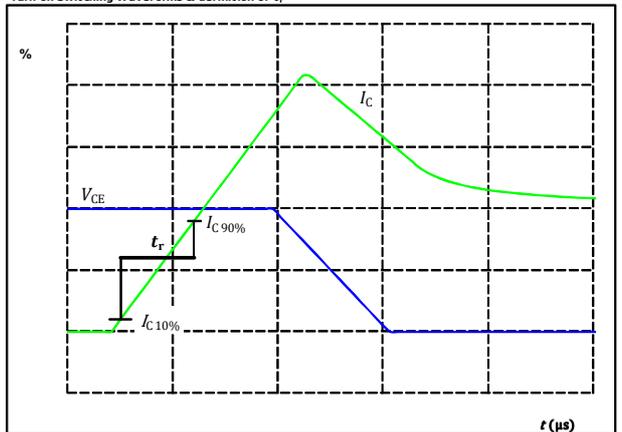
Turn-off Switching Waveforms & definition of t_r



$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	25	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



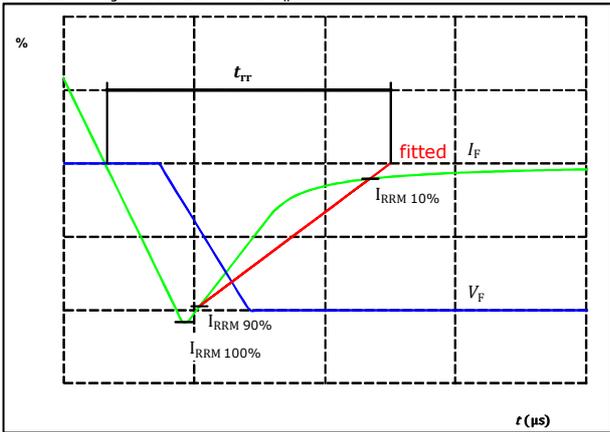
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	19	ns



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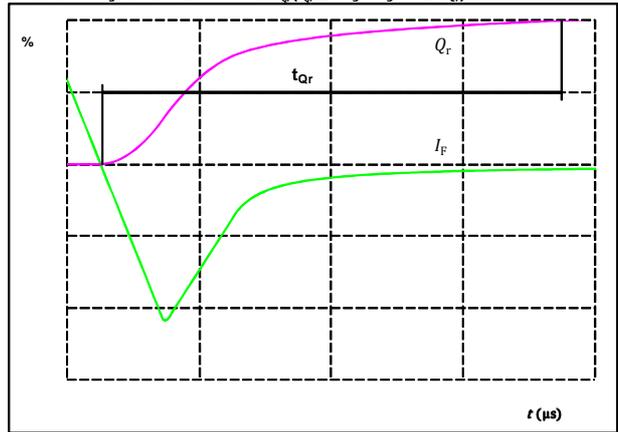
Boost Switching Characteristics

figure 5. FWD
 Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%) =$	350	V
$I_F(100\%) =$	252	A
$I_{RRM}(100\%) =$	241	A
$t_{rr} =$	126	ns

figure 6. FWD
 Turn-on Switching Waveforms & definition of t_{qr} (t_{qr} = integrating time for Q_r)



$I_F(100\%) =$	252	A
$Q_r(100\%) =$	14,75	μC



30-FT07NIB300S502-LE06F58 30-PT07NIB300S502-LE06F58Y

datasheet

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Ordering Code & Marking									
Version			Ordering Code						
without thermal paste 13 mm housing with solder pins			30-FT07NIB300S502-LE06F58						
without thermal paste 13 mm housing with press-fit pins			30-PT07NIB300S502-LE06F58Y						
with thermal paste 13 mm housing with solder pins			30-FT07NIB300S502-LE06F58-/3/						
with thermal paste 13 mm housing with press-fit pins			30-PT07NIB300S502-LE06F58Y-/3/						
NN-NNNNNNNNNNNN TTTTUVVWWYY UL VIN LLLLL SSSS			Text		Name	Date code	UL & VIN	Lot	Serial
					NN-NNNNNNNNNNNN-TTTTUVV	WWYY	UL VIN	LLLLL	SSSS
			Datamatrix	Type&Ver	Lot number	Serial	Date code		
			TTTTTUVV	LLLLL	SSSS	WWYY			

Outline							
Pin table				Pin table			
Pin	X	Y	Function	Pin	X	Y	Function
1	70	6	DC+2	52	48,7	24,05	G13
2	70	3	DC+2	53	59,2	22	S11
3	70	0	DC+2	54	62,2	22	G11
4	67,5	3	DC+2				
5	67,5	0	DC+2				
6	65	0	DC+2				
7	57,75	0	GND2				
8	55,25	0	GND2				
9	52,75	0	GND2				
10	50,25	0	GND2				
11	43	3	DC-2				
12	43	0	DC-2				
13	40,5	3	DC-2				
14	40,5	0	DC-2				
15	38	3	DC-2				
16	38	0	DC-2				
17	32	3	DC-1				
18	32	0	DC-1				
19	29,5	3	DC-1				
20	29,5	0	DC-1				
21	27	3	DC-1				
22	27	0	DC-1				
23	19,75	0	GND1				
24	17,25	0	GND1				
25	14,75	0	GND1				
26	12,25	0	GND1				
27	5	3	DC+1				
28	5	0	DC+1				
29	2,5	3	DC+1				
30	2,5	0	DC+1				
31	0	3	DC+1				
32	0	0	DC+1				
33	32,25	23,55	S12				
34	29,25	23,55	G12				
35	19,95	23,95	S14				
36	16,95	25,55	G14				
37	2	36	Ph1				
38	4,5	36	Ph1				
39	7	36	Ph1				
40	9,5	36	Ph1				
41	12	36	Ph1				
42	14,5	36	Ph1				
43	38	36	Ph2				
44	40,5	36	Ph2				
45	43	36	Ph2				
46	45,5	36	Ph2				
47	48	36	Ph2				
48	50,5	36	Ph2				
49	64,2	36,6	Therm1				
50	70,6	36,55	Therm2				
51	45,7	24,05	S13				

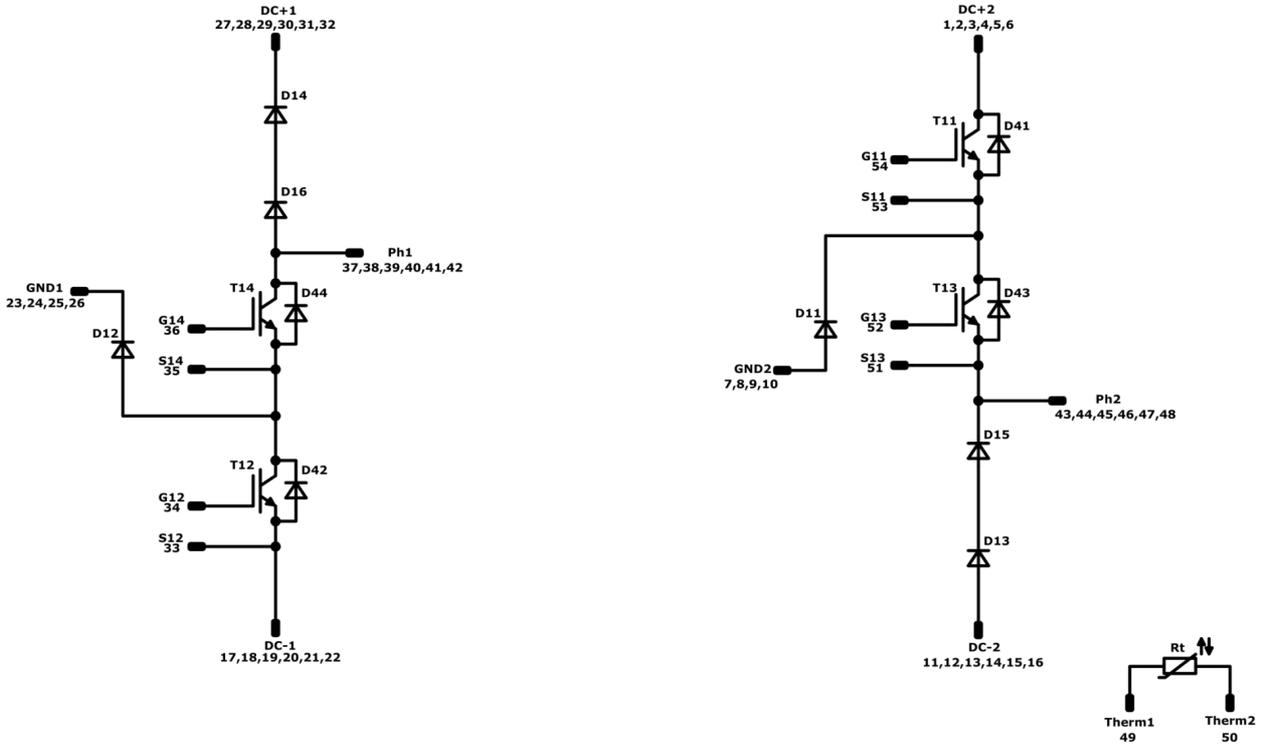
Technical drawings showing side views and a top view of the component. Dimensions include pin heights (e.g., 17,2 ±0,05, 16,08 ±0,21, 17,4 ±0,05) and a diameter of 1 ±0,05. The top view shows pin locations with X and Y coordinates and a 35mm width. A note indicates: "center of press-fit pinhead for connection parameter see the handling instruction".

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



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Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	650 V	300 A	Buck Switch	
D11, D12	FWD	650 V	300 A	Buck Diode	
D41, D42	FWD	650 V	30 A	Buck Sw. Protection Diode	
T13, T14	IGBT	650 V	300 A	Boost Switch	
D13, D14, D15, D16	FWD	1300 V	300 A	Boost Diode	Serial devices. Values apply to complete device.
D43, D44	FWD	650 V	30 A	Boost Sw. Protection Diode	
Rt	NTC			Thermistor	



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Packaging instruction			
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 2</i> packages see vincotech.com website.

Package data
Package data for <i>flow 2</i> packages see vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website. 

Document No.:	Date:	Modification:	Pages
30-xT07NIB300S502-LE06F58x-D2-14	04 May. 2018	New topology and updated components	All

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.