30-FT07NIB300S503-LH36F58
30-PT07NIB300S503-LH36F58Y
datasheet

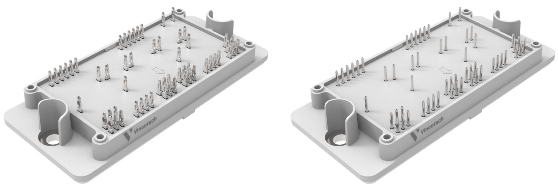
Vincotech

***flow*NPC 2** — **1200 V / 300 A**

Features

- Enhanced efficiency
- Enables high switching frequencies
- Low inductive package
- Allows four quadrant operation

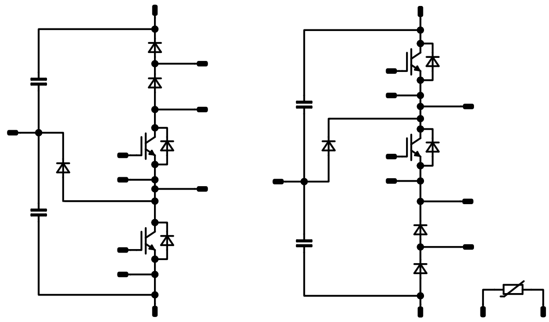
flow 2 13mm housing



Target applications

- Industrial Drives
- Solar Inverters
- UPS

Schematic



Types

- 30-FT07NIB300S503-LH36F58
- 30-PT07NIB300S503-LH36F58Y

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	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 °C	389	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	215	A
Repetitive peak forward current	I_{FRM}			600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °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	$T_j = T_{jmax}$	T_s = 80 °C	30	A
Repetitive peak forward current	I_{FRM}			60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °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 °C	255	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		675	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	291	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	215	A
Repetitive peak forward current	I_{FRM}			600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	273	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
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	215	A
Repetitive peak forward current	I_{FRM}			600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	273	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	30	A
Repetitive peak forward current	I_{FRM}			60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	59	W
Maximum junction temperature	T_{jmax}			175	°C
Capacitor (DC)					
Maximum DC voltage	V_{MAX}			630	V
Operation Temperature	T_{op}			-55…+150	°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 s	4000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance				min. 12,7	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,003	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}	f = 1 Mhz	0	25		25		18000		pF
Output capacitance	C_{oes}							520		
Reverse transfer capacitance	C_{res}							68		
Gate charge	Q_g		15	520	300	25		656		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,24		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	252	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}	Q_{rFWD} = 7,3 µC Q_{rFWD} = 14,9 µC Q_{rFWD} = 17,6 µC				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	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 Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,35		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 12198 A/µs di/dt = 11950 A/µs di/dt = 11550 A/µs	±15	350	252	25 125 150		211 298 328		A
Reverse recovery time	t_{rr}					25 125 150		56 77 86		ns
Recovered charge	Q_r					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	$(di_{rf}/dt)_{max}$					25 125 150		6515 6781 5496		A/µs
Buck Sw. Protection Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,61		K/W

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,003	25	4,2	5	5,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		225	25 125 150		1,10 1,08 1,09	1,45	V
Collector-emitter cut-off current	I_{CES}		0	650		25			120	µA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							34875		
Output capacitance	C_{oes}	f = 1 Mhz	0	25		25		450		pF
Reverse transfer capacitance	C_{res}							90		
Gate charge	Q_g		15	520	225	25		1308		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		187 188 188		
Rise time	t_r	R_{gon} = 2 Ω R_{goff} = 2 Ω				25 125 150		17 18 18		
Turn-off delay time	$t_{d(off)}$					25 125 150		225 253 261		ns
Fall time	t_f		±15	350	252	25 125 150		89 210 240		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 8,1 µC Q_{rFWD} = 16,2 µC Q_{rFWD} = 18,9 µC				25 125 150		1,986 2,250 2,337		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		11,100 16,009 16,789		

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]	Value Min	Value Typ	Value Max	Unit
Boost Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,35		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 12261 A/µs di/dt = 12850 A/µs di/dt = 12763 A/µs	±15	350	252	25 125 150		170 254 273		A
Reverse recovery time	t_{rr}					25 125 150		70 99 109		ns
Recovered charge	Q_r					25 125 150		8,076 16,202 18,915		µC
Reverse recovered energy	E_{rec}					25 125 150		1,923 3,759 4,384		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2039 2120 1892		A/µs
Boost Sw.Inv.Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,35		K/W

Characteristic Values

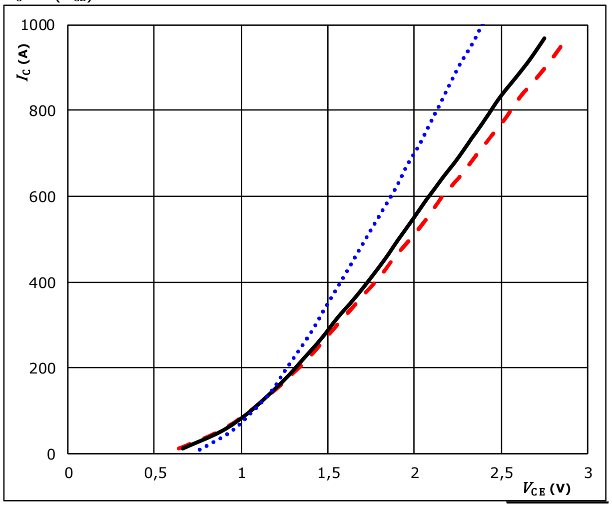
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				30	25 150		1,64 1,56	1,87	V
Reverse leakage current	I_R			650		25			0,36	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,61		K/W
Capacitor (DC)										
Capacitance	C							33		nF
Tolerance							-5		+5	%
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

$I_C = f(V_{CE})$

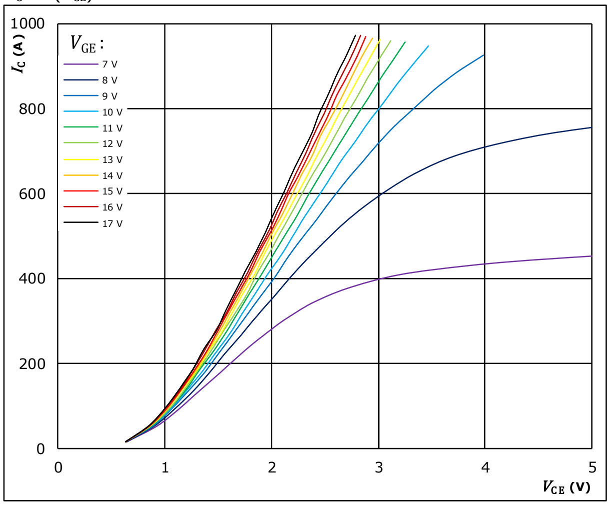


t_p =	250	µs		25 °C	············
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

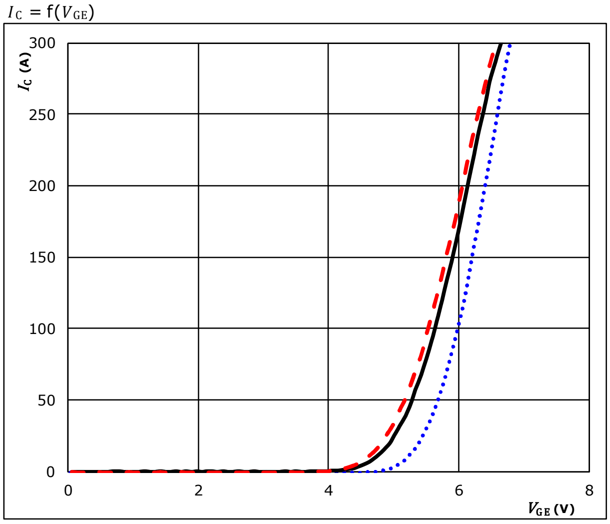


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

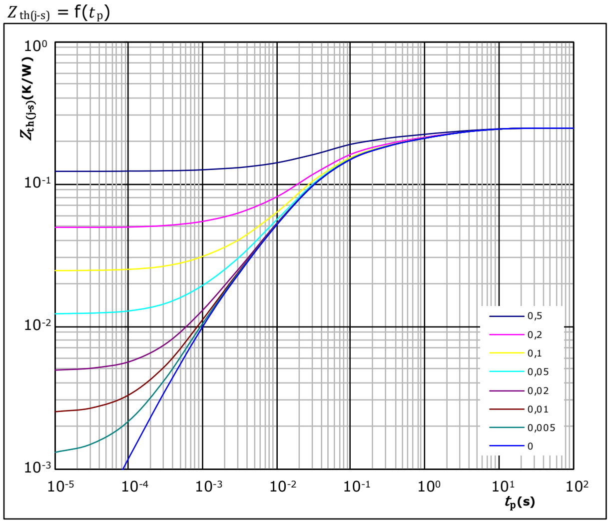


t_p =	100	µs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



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

IGBT thermal model values

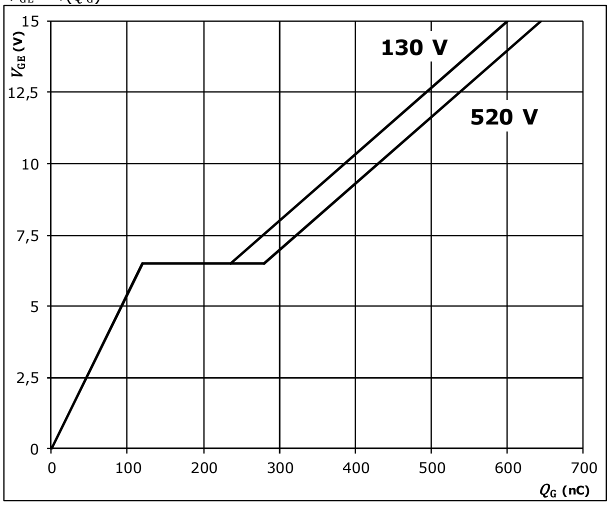
R (K/W)	τ (s)
3,19E-02	4,04E+00
3,56E-02	8,39E-01
5,47E-02	1,56E-01
9,39E-02	3,22E-02
2,10E-02	7,54E-03
7,41E-03	1,20E-03

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

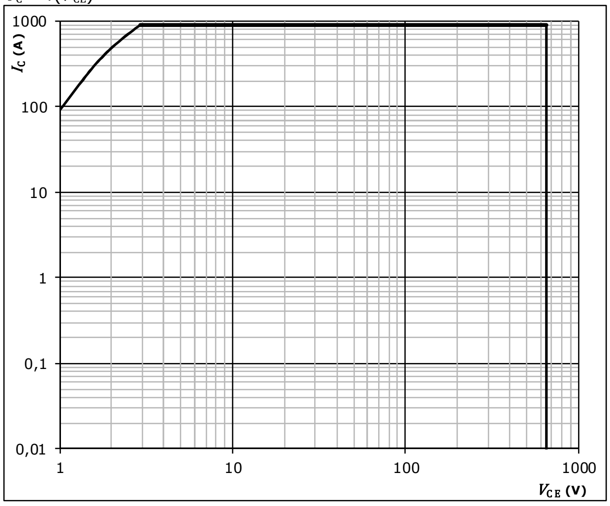


I_C = 300 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



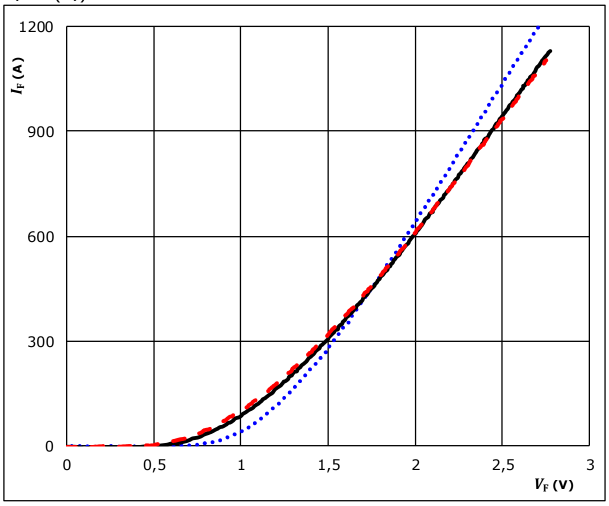
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



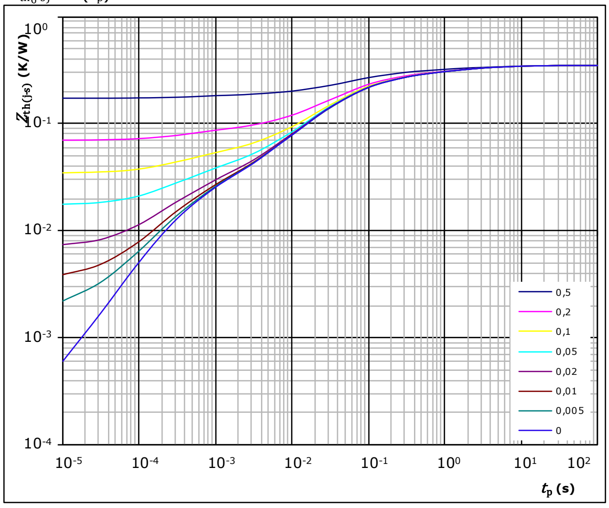
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,35 K/W

FWD thermal model values

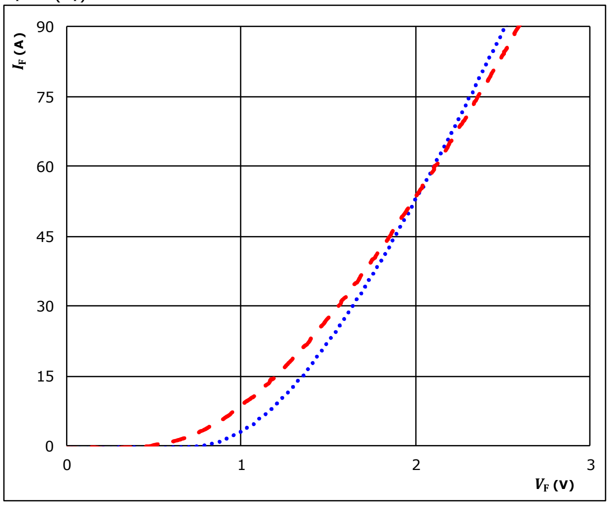
R (K/W)	τ (s)
2,86E-02	5,43E+00
5,04E-02	9,81E-01
7,36E-02	1,80E-01
1,26E-01	4,67E-02
4,07E-02	1,41E-02
1,25E-02	2,87E-03
1,67E-02	3,56E-04

Buck Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



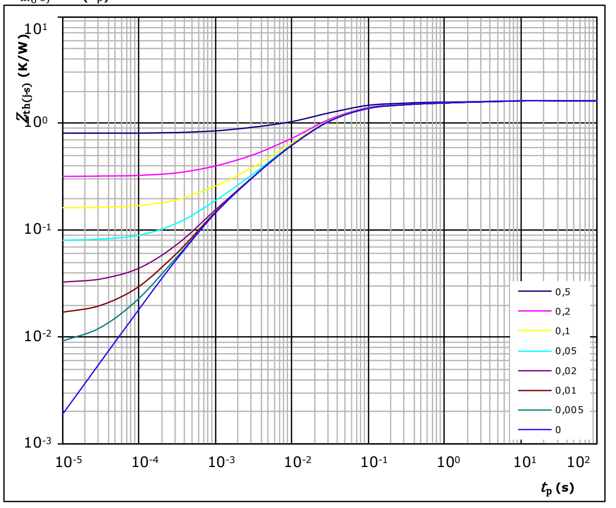
t_p = 250 µs

T_j: 25 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

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

FWD thermal model values

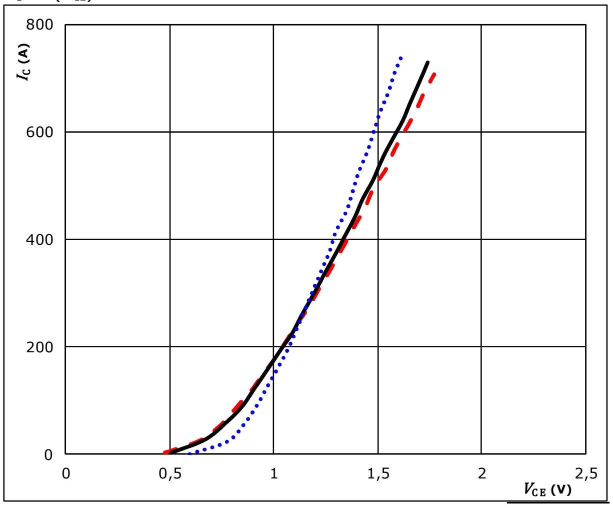
R (K/W)	τ (s)
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

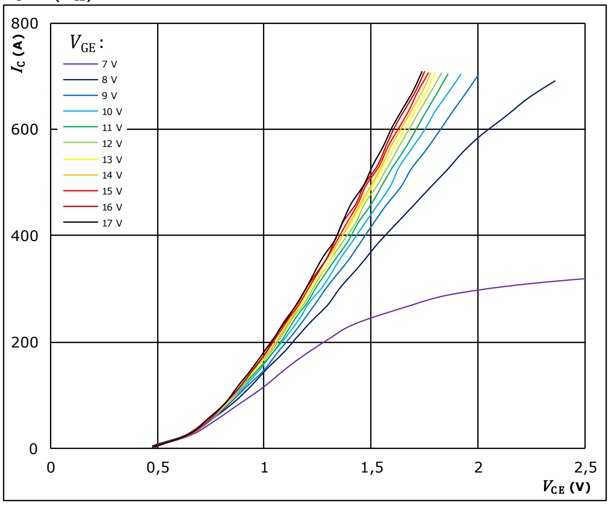


t_p =	250	µs		25	°C	············
V_{GE} =	15	V	T_j:	125	°C	———
				150	°C	– – – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

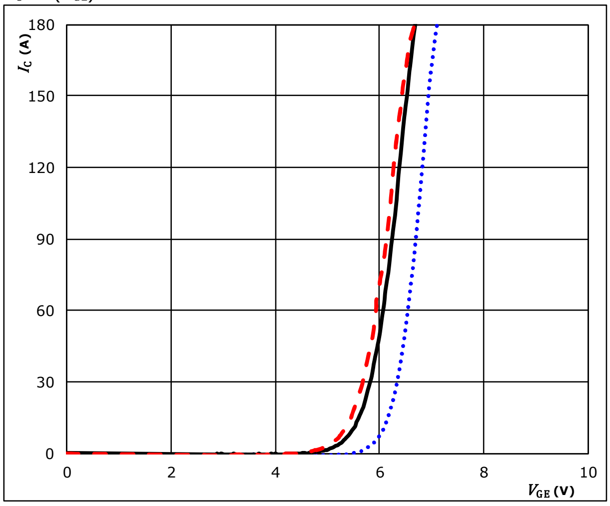


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

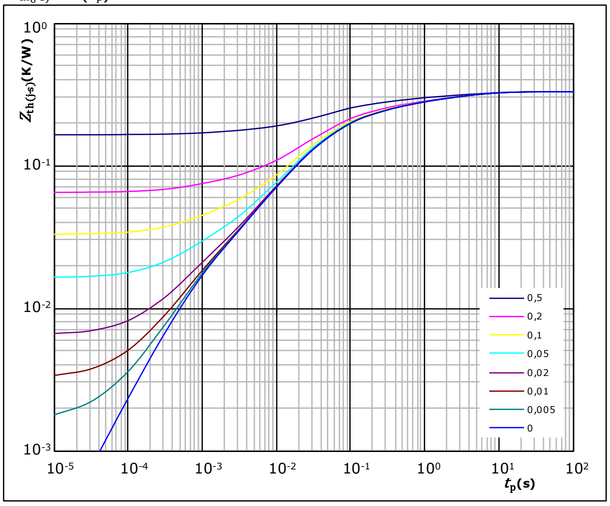


t_p =	100	µs		25	°C	············
V_{CE} =	10	V	T_j:	125	°C	———
				150	°C	– – – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T
$R_{th(j\text{-}s)}$ = 0,33 K/W

IGBT thermal model values

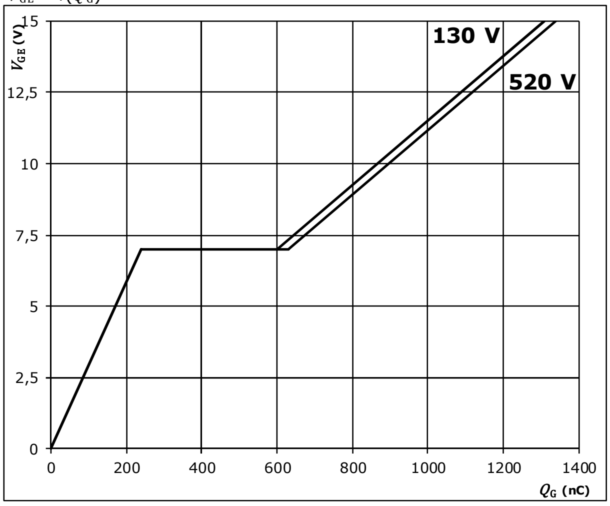
R (K/W)	τ (s)
3,76E-02	5,13E+00
4,38E-02	1,11E+00
7,93E-02	1,80E-01
1,25E-01	3,35E-02
2,76E-02	6,84E-03
1,27E-02	7,61E-04

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

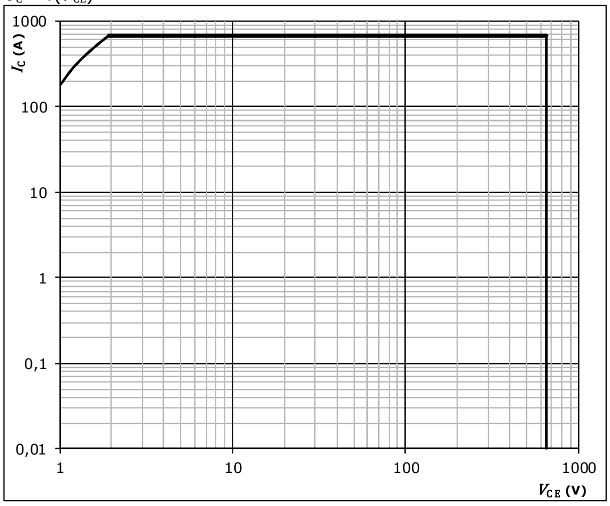


I_C = 225 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



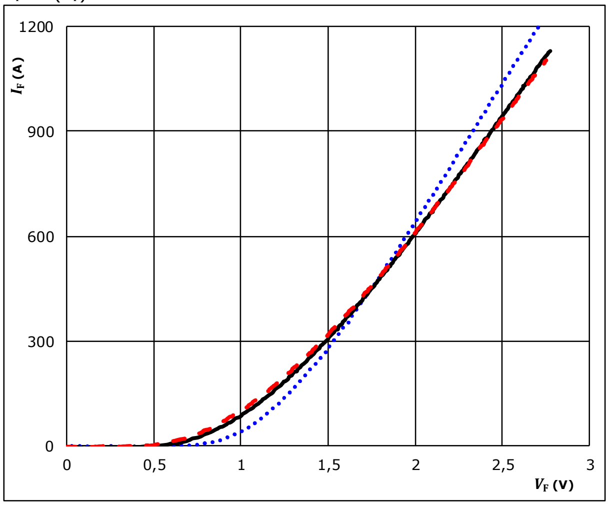
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



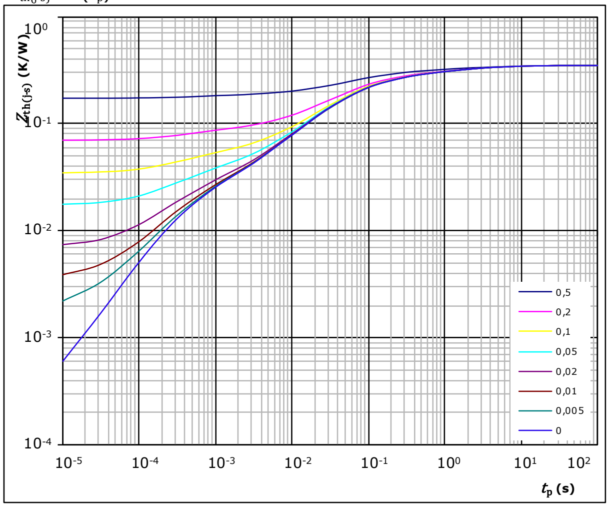
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,35 K/W

FWD thermal model values

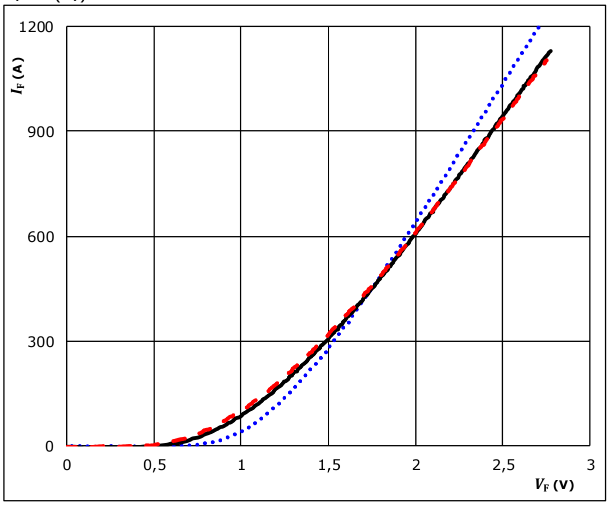
R (K/W)	τ (s)
2,86E-02	5,43E+00
5,04E-02	9,81E-01
7,36E-02	1,80E-01
1,26E-01	4,67E-02
4,07E-02	1,41E-02
1,25E-02	2,87E-03
1,67E-02	3,56E-04

Boost Sw.Inv.Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



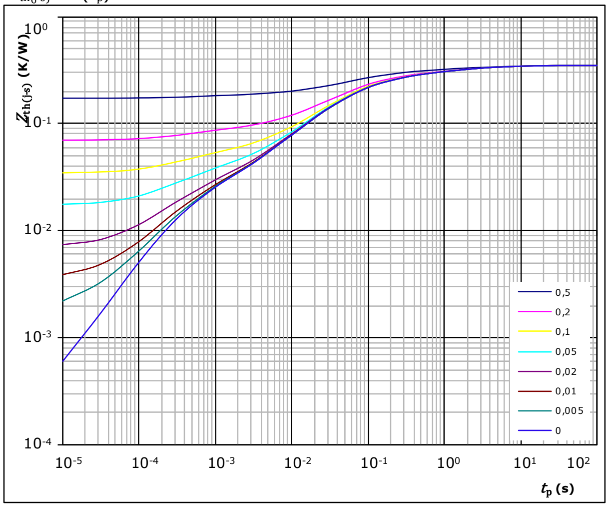
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,35 K/W

FWD thermal model values

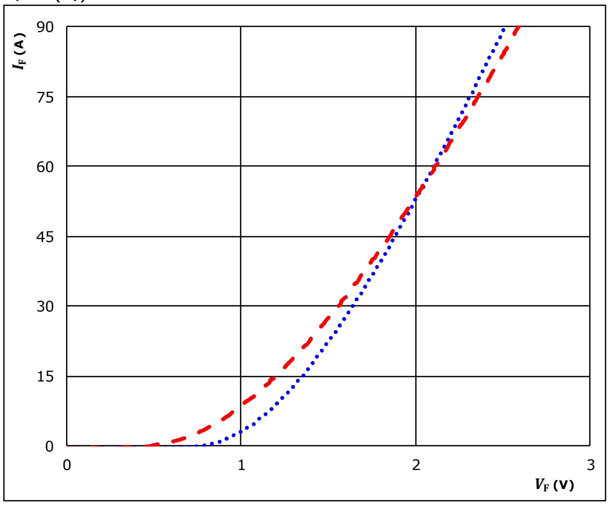
R (K/W)	τ (s)
2,86E-02	5,43E+00
5,04E-02	9,81E-01
7,36E-02	1,80E-01
1,26E-01	4,67E-02
4,07E-02	1,41E-02
1,25E-02	2,87E-03
1,67E-02	3,56E-04

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$

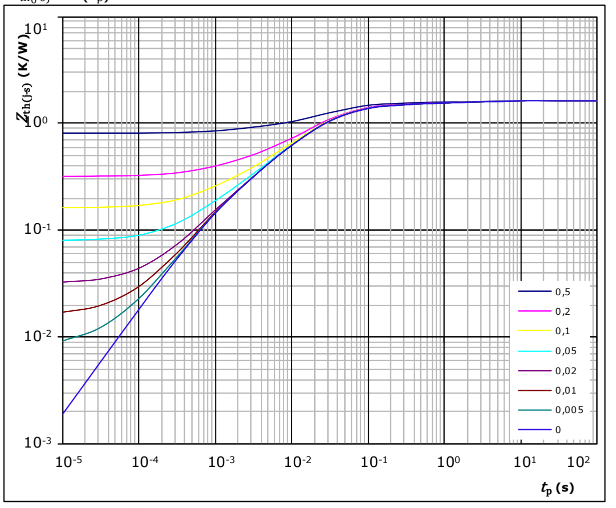


t_p =	250	µs	T_j:	25 °C	············
				150 °C	— — —

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

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

FWD thermal model values

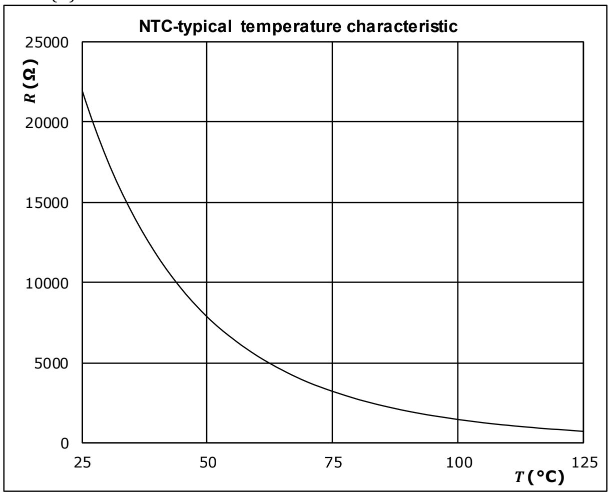
R (K/W)	τ (s)
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

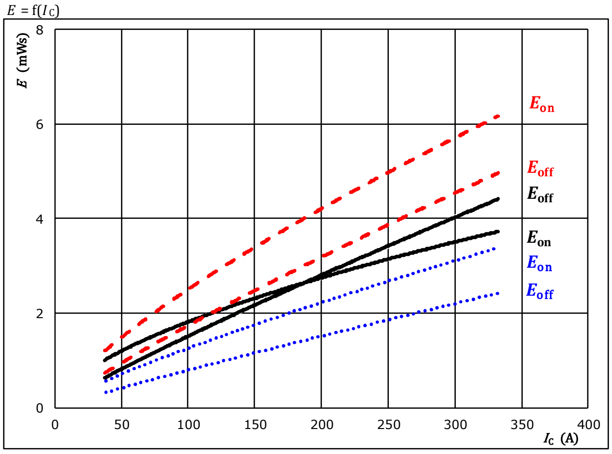


Buck Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



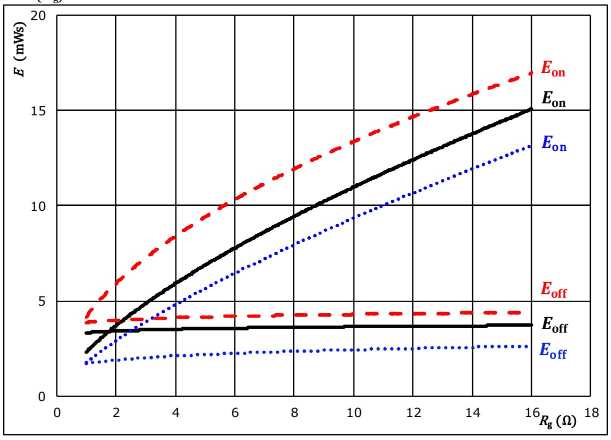
With an inductive load at

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

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



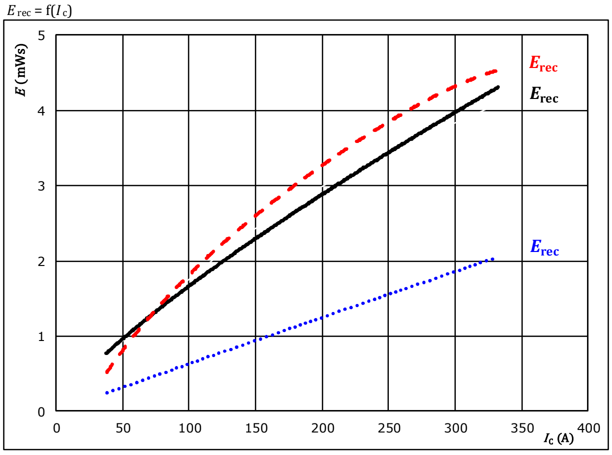
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	252	A		150 °C

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



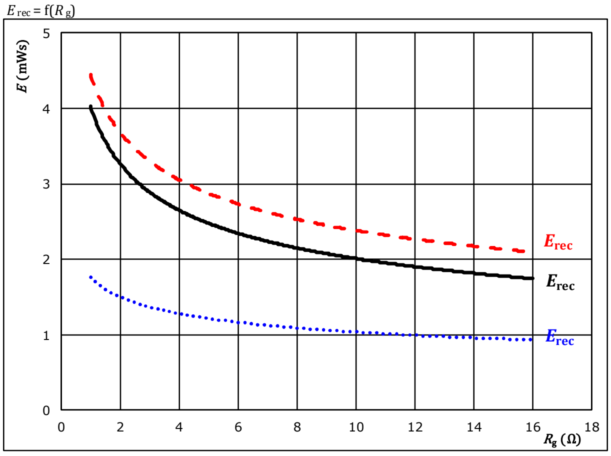
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	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

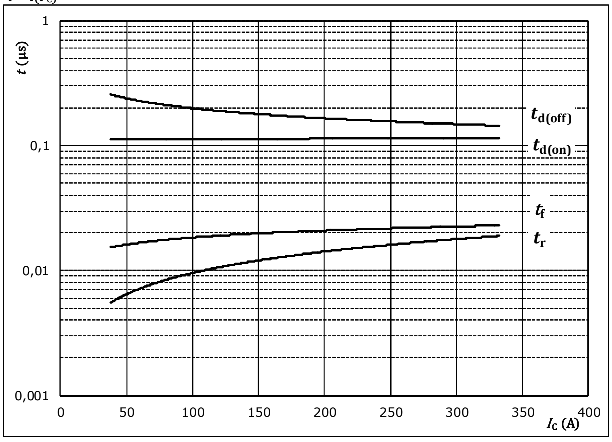
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	252	A		150 °C

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



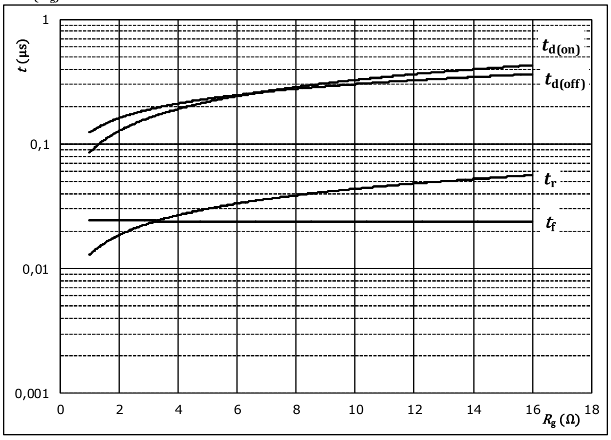
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



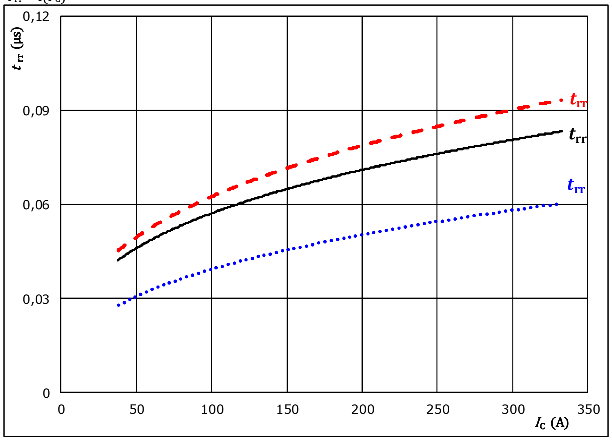
With an inductive load at

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

$t_{rr} = f(I_C)$

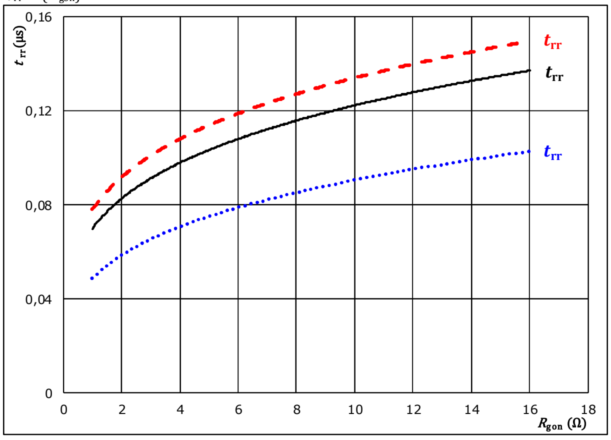


At						
V_{CE} =	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	2	Ω		150 °C	– – –

figure 8. **FWD**

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

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



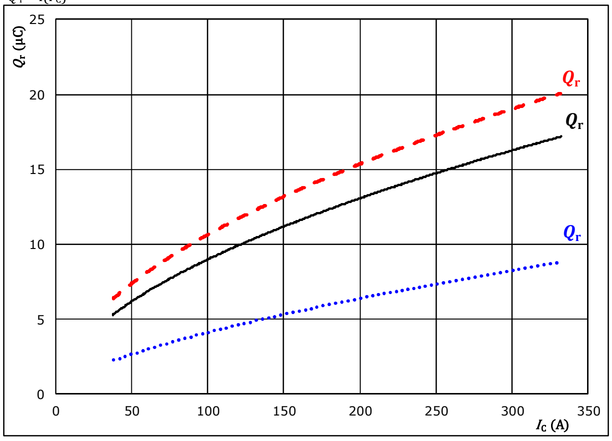
At						
V_{CE} =	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	252	A		150 °C	– – –

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

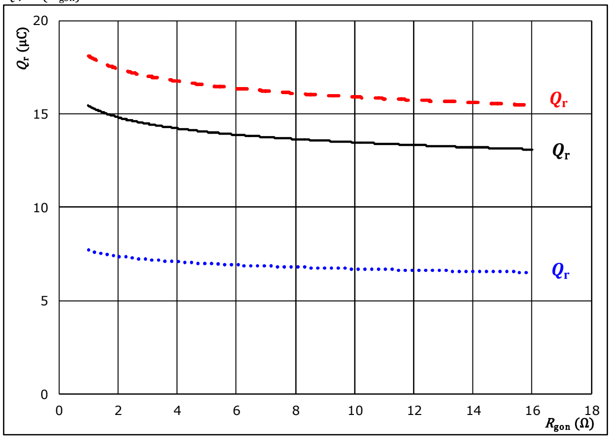


At	V_{CE} =	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	2	Ω		150 °C	

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

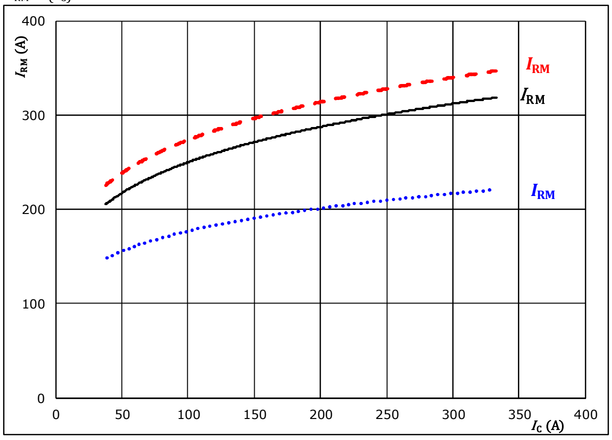


At	V_{CE}=	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	252	A		150 °C	

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

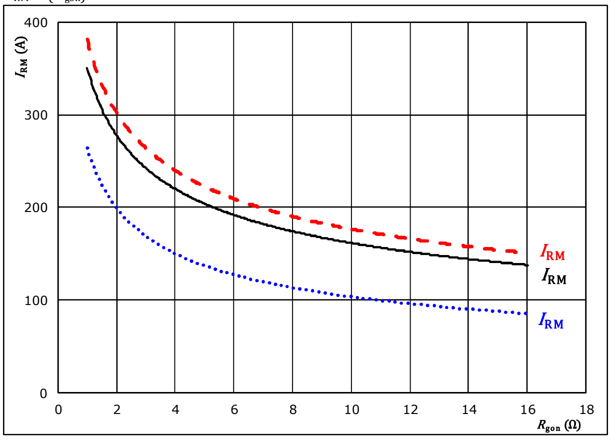


At	V_{CE}:	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	2	Ω		150 °C	

figure 12. **FWD**

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

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



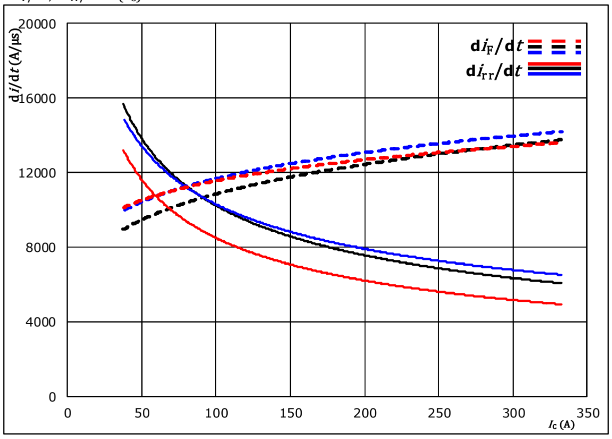
At	V_{CE} =	350	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C =	252	A		150 °C	

Buck Switching Characteristics

figure 13. **FWD**

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

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

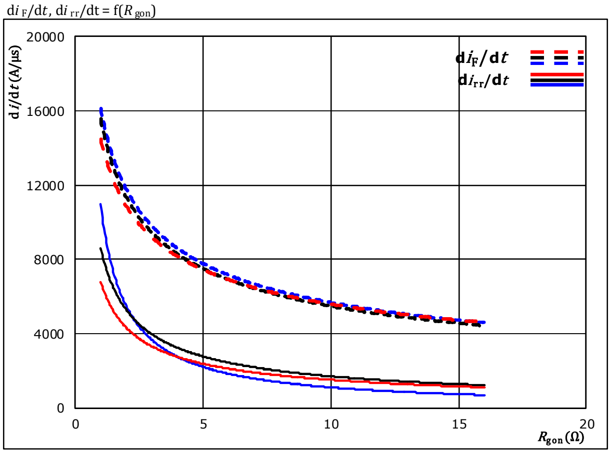


At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	2	Ω		150	°C

figure 14. **FWD**

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

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

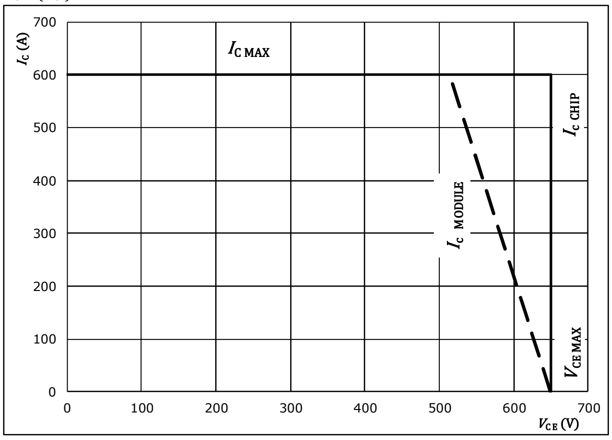


At					
V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C=	252	A		150	°C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

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

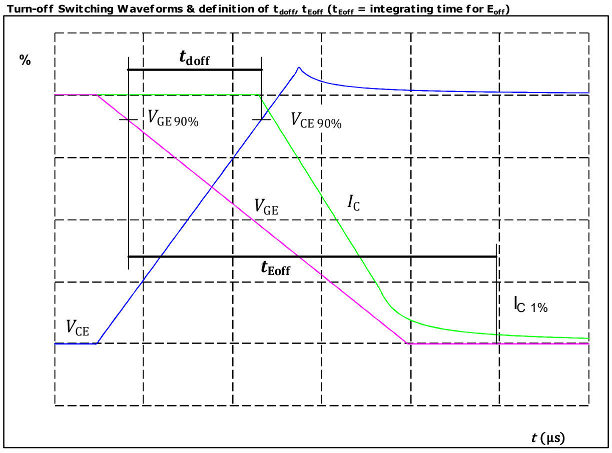
Buck Switching Definitions

General conditions

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

figure 1. **IGBT**

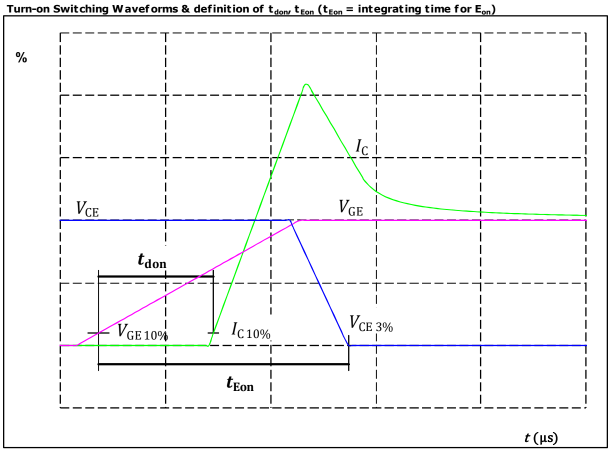
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



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

figure 2. **IGBT**

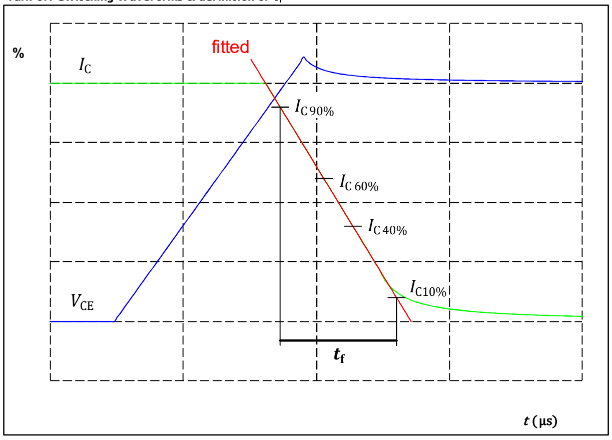
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



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

figure 3. **IGBT**

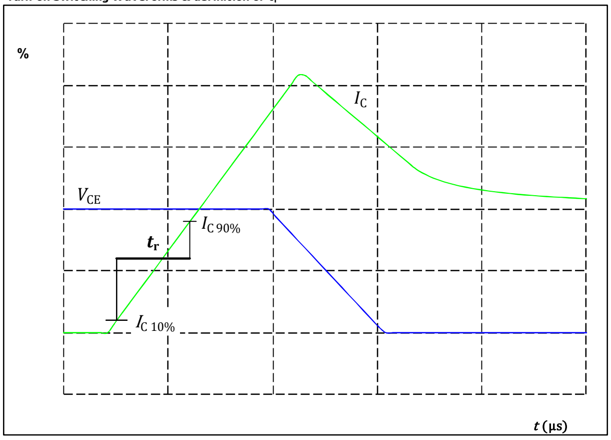
Turn-off Switching Waveforms & definition of t_f



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

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

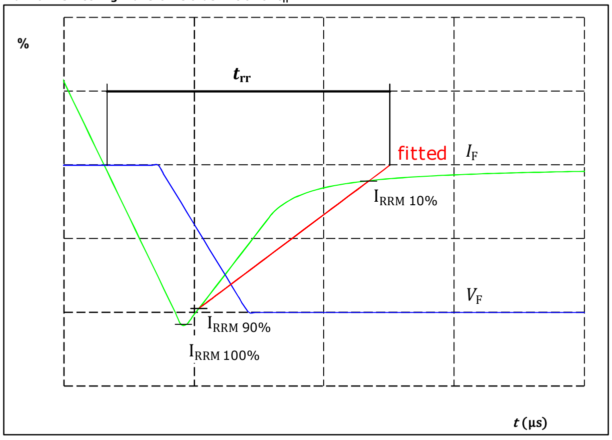


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	252	A
t_r =	18	ns

Buck Switching Characteristics

figure 5. **FWD**

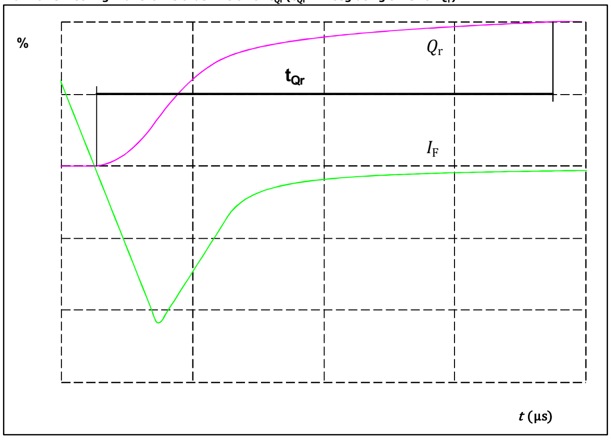
Turn-off Switching Waveforms & definition of t_{rr}



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)



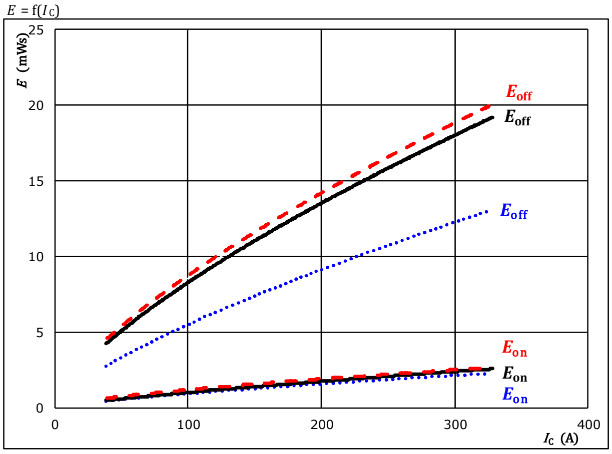
I_F (100%) =	252	A
Q_r (100%) =	14,87	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



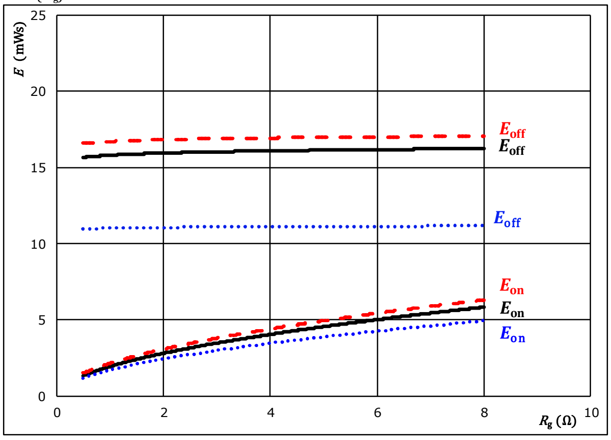
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



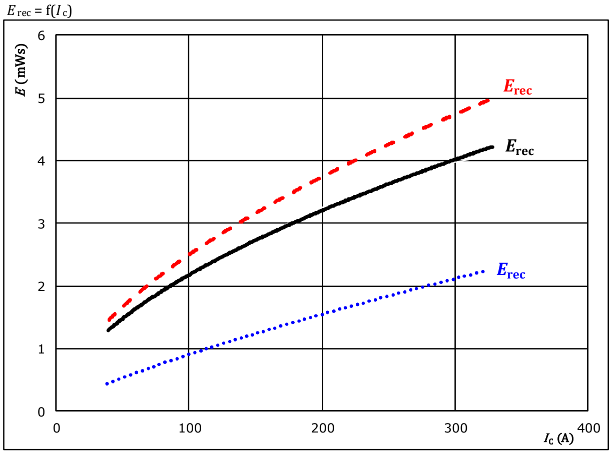
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	252	A		150 °C

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



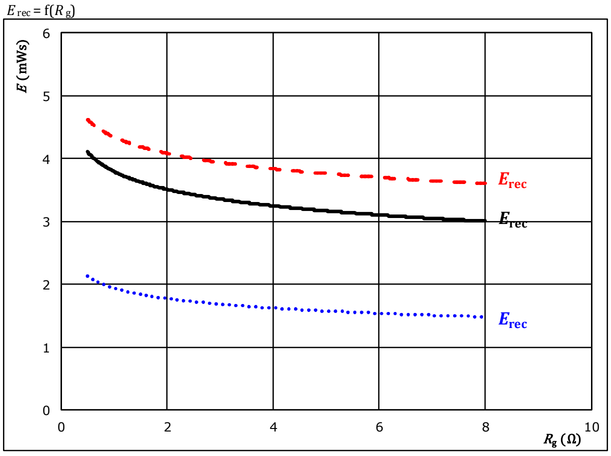
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	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

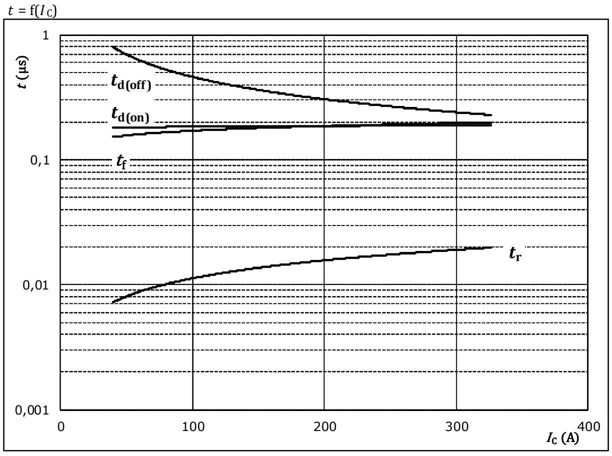
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	252	A		150 °C

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



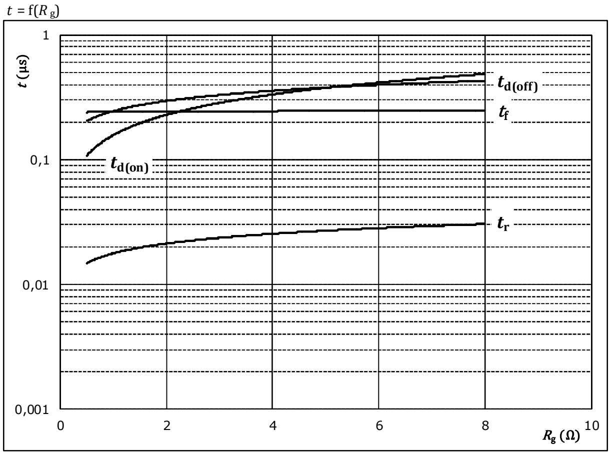
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



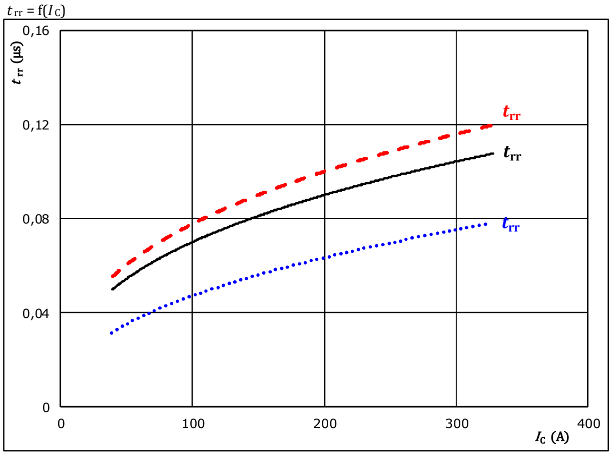
With an inductive load at

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

$t_{rr} = f(I_C)$



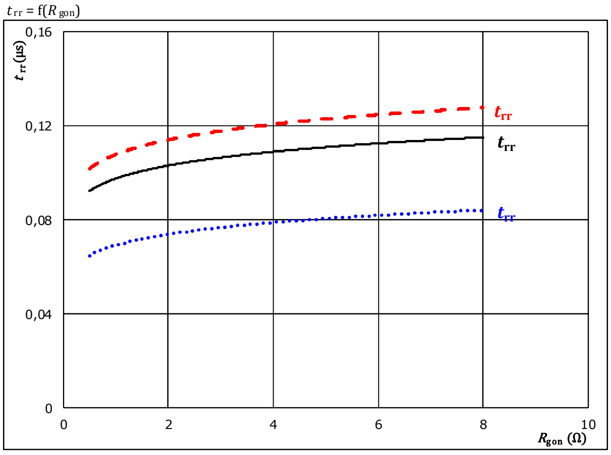
With an inductive load at

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

figure 8. **FWD**

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

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



With an inductive load at

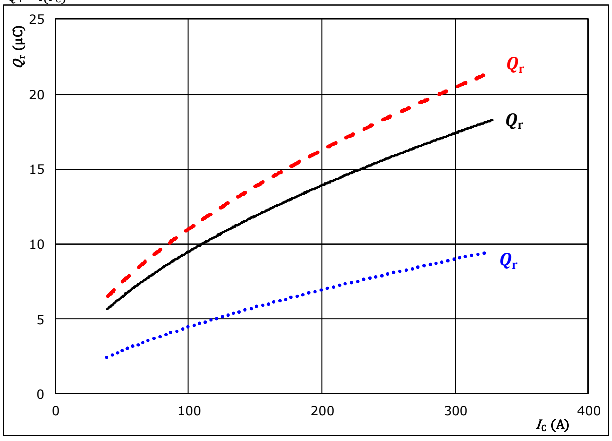
V_{CE} =	350	V		25 °C
V_{GE} =	±15	V	T_j:	125 °C
I_C =	252	A		150 °C

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



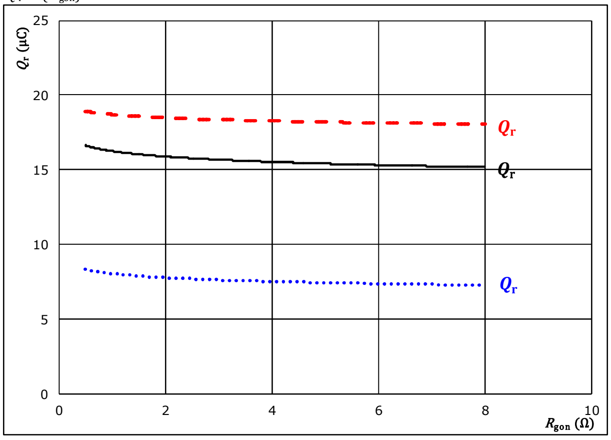
With an inductive load at

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

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



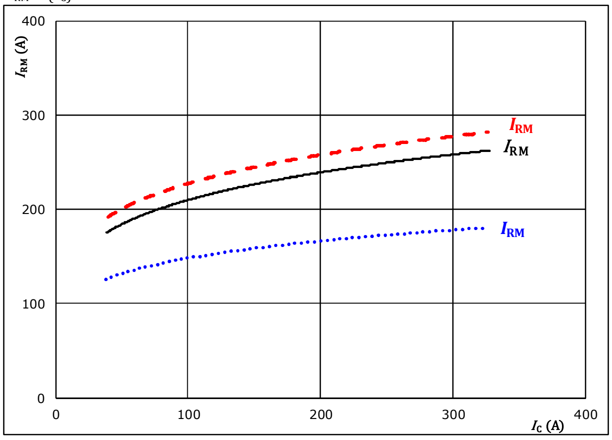
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	252	A		150 °C

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



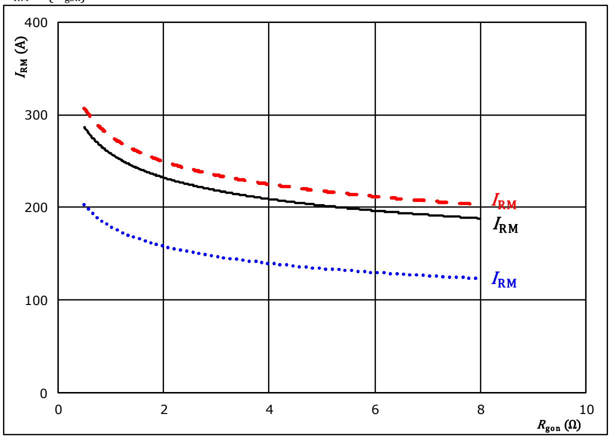
With an inductive load at

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

figure 12. **FWD**

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

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



With an inductive load at

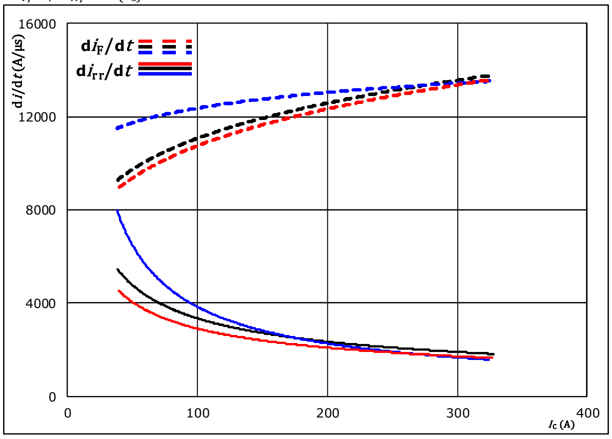
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	252	A		150 °C

Boost Switching Characteristics

figure 13. **FWD**

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

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



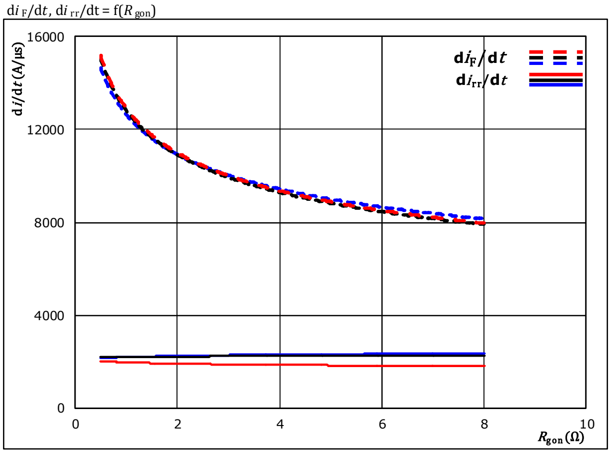
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	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, $di_{rr}/dt = f(R_{gon})$



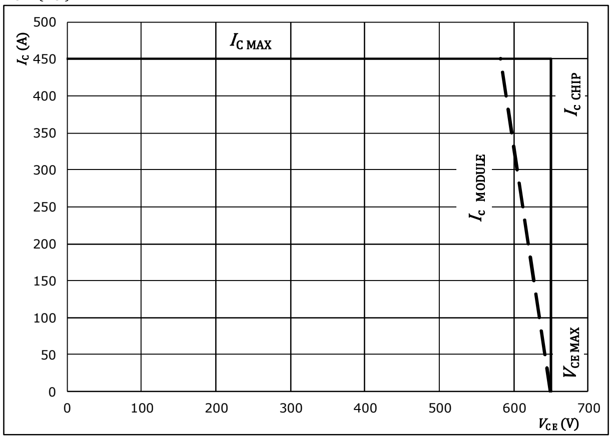
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	252	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

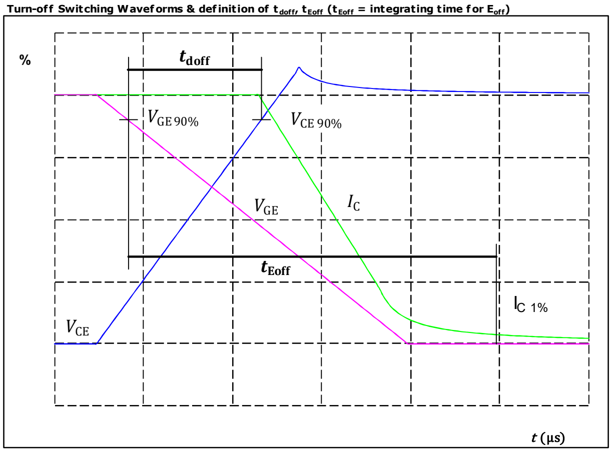
T_j =	125	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Boost Switching Definitions

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

figure 1. IGBT

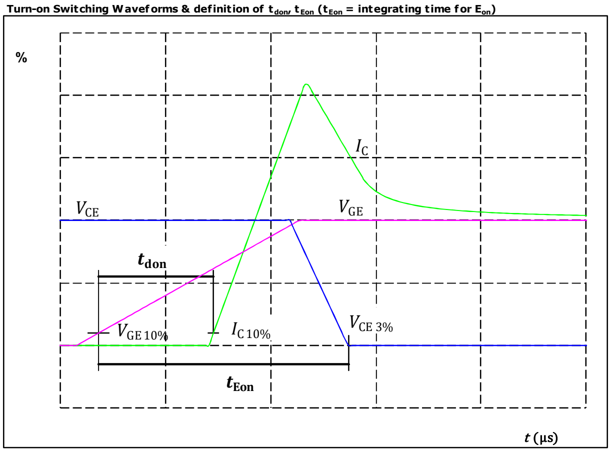
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	252	A
t_{doff} =	253	ns

figure 2. IGBT

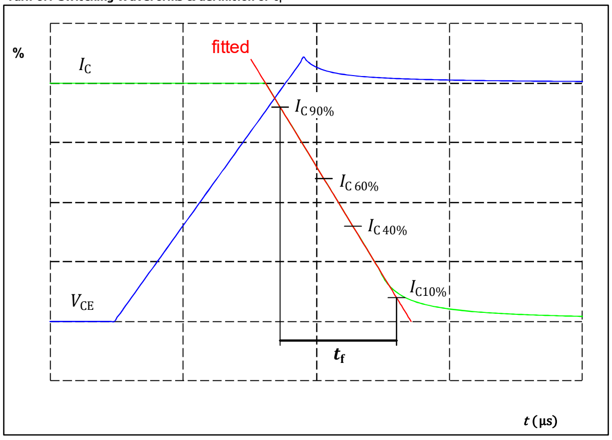
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	252	A
t_{don} =	188	ns

figure 3. IGBT

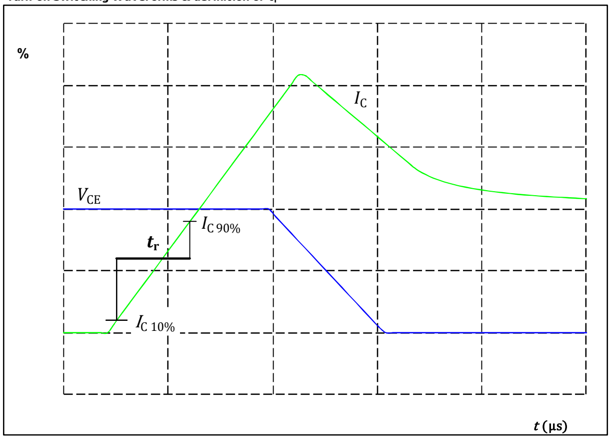
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	252	A
t_f =	210	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

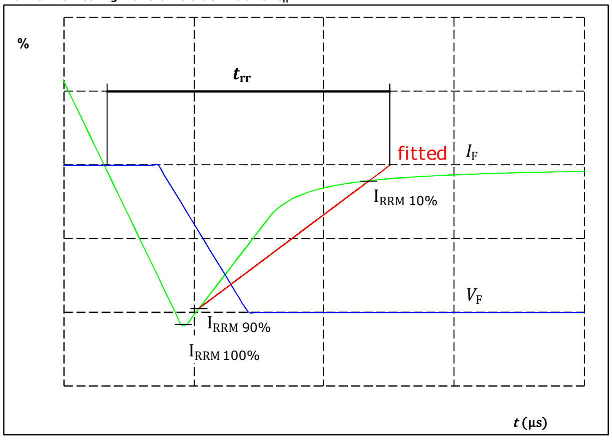


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	252	A
t_r =	18	ns

Boost Switching Characteristics

figure 5. **FWD**

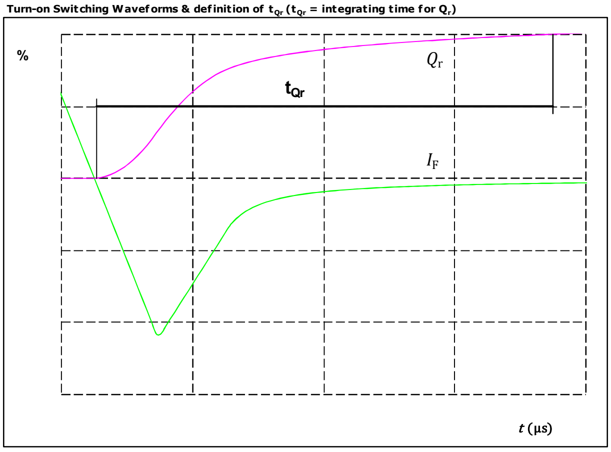
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	252	A
I_{RRM} (100%) =	254	A
t_{rr} =	99	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%) =	16,20	µC

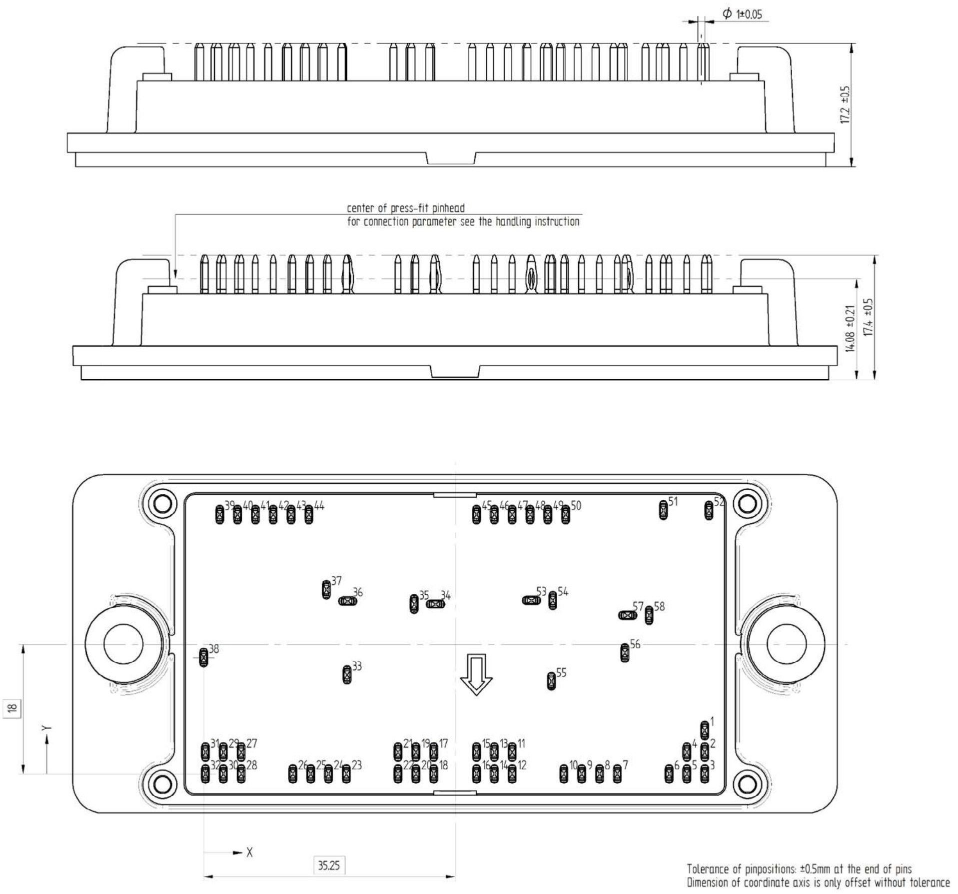
Ordering Code & Marking

Version	Ordering Code
without thermal paste with 13mm housing with Solder pins	30-FT07NIB300S503-LH36F58
without thermal paste with 13mm housing with Press-fit pins	30-PT07NIB300S503-LH36F58Y

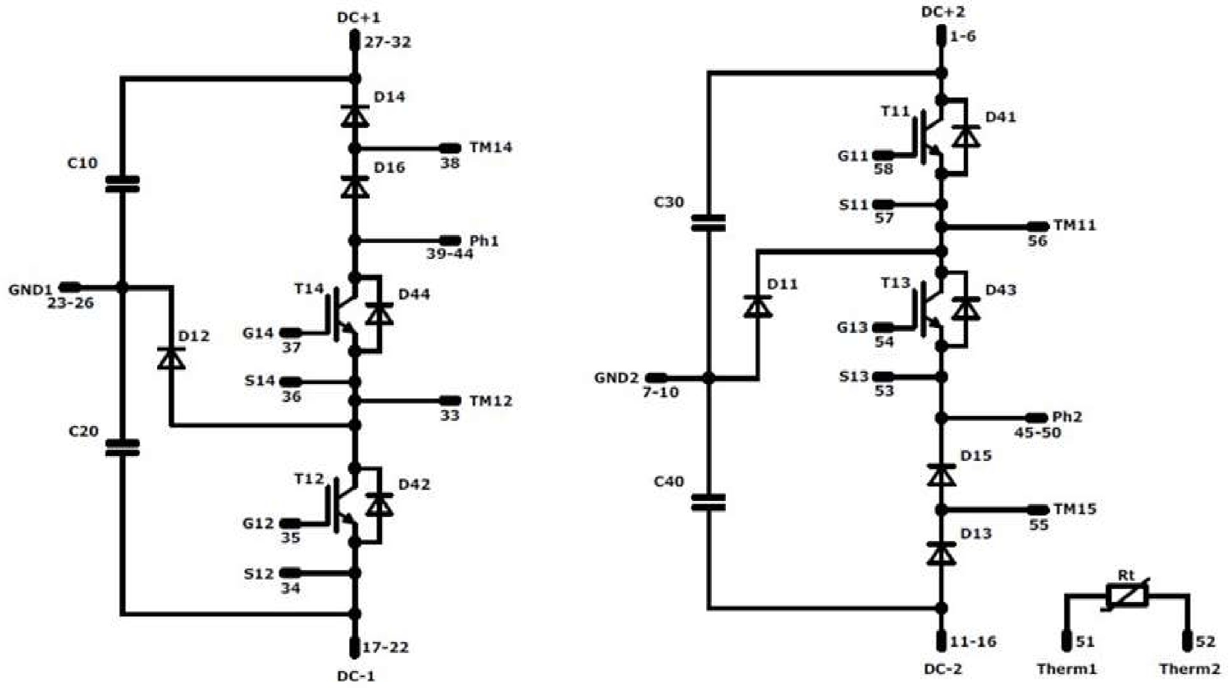
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin	X	Y	Function	Pin	X	Y	Function
1	70,25	6	DC+2	48	45,75	36	Ph2
2	70,25	3	DC+2	49	48,25	36	Ph2
3	70,25	0	DC+2	50	50,75	36	Ph2
4	67,75	3	DC+2	51	64,45	36,6	Therm1
5	67,75	0	DC+2	52	70,85	36,55	Therm2
6	65,25	0	DC+2	53	45,95	24,05	S13
7	58	0	GND2	54	48,95	24,05	G13
8	55,5	0	GND2	55	48,75	12,85	TM15
9	53	0	GND2	56	59,05	16,8	TM11
10	50,5	0	GND2	57	59,45	22	S11
11	43,25	3	DC-2	58	62,45	22	G11
12	43,25	0	DC-2				
13	40,75	3	DC-2				
14	40,75	0	DC-2				
15	38,25	3	DC-2				
16	38,25	0	DC-2				
17	32,25	3	DC-1				
18	32,25	0	DC-1				
19	29,75	3	DC-1				
20	29,75	0	DC-1				
21	27,25	3	DC-1				
22	27,25	0	DC-1				
23	20	0	GND1				
24	17,5	0	GND1				
25	15	0	GND1				
26	12,5	0	GND1				
27	5,25	3	DC+1				
28	5,25	0	DC+1				
29	2,75	3	DC+1				
30	2,75	0	DC+1				
31	0,25	3	DC+1				
32	0,25	0	DC+1				
33	20,1	13,75	TM12				
34	32,5	23,55	S12				
35	29,5	23,55	G12				
36	20,2	23,95	S14				
37	17,2	25,55	G14				
38	0	16,15	TM14				
39	2,25	36	Ph1				
40	4,75	36	Ph1				
41	7,25	36	Ph1				
42	9,75	36	Ph1				
43	12,25	36	Ph1				
44	14,75	36	Ph1				
45	38,25	36	Ph2				
46	40,75	36	Ph2				
47	43,25	36	Ph2				



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	225 A	Boost Switch	
D13, D14	FWD	650 V	300 A	Boost Diode	
D15, D16	FWD	650 V	300 A	Boost Sw.Inv.Diode	
D43, D44	FWD	650 V	30 A	Boost Sw. Protection Diode	
C10, C20, C30, C40	Capacitor	630 V		Capacitor (DC)	
Rt	NTC			Thermistor	

Vincotech

30-FT07NIB300S503-LH36F58
30-PT07NIB300S503-LH36F58Y
datasheet

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

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 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-xT07NIB300S503-LH36F58x-D3-14	17 Apr. 2019	Correction of I_c/I_f values	2,3