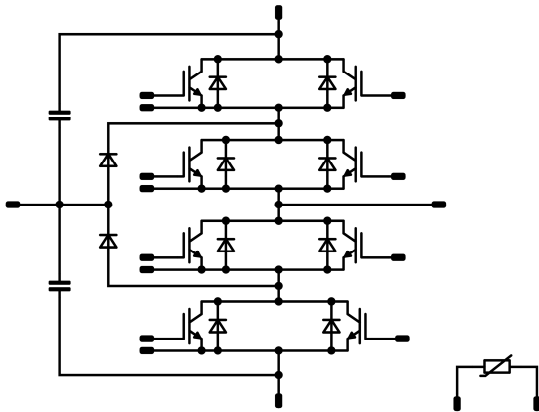




Vincotech

flowNPC 1		1200 V / 150 A
Features • High efficiency • Low inductive package • Ultra fast IGBTs • Four-quadrant operation	flow 1 12 mm housing 	
Target applications • Solar Inverters • UPS	Schematic 	
Types • 10-PY07NIA150S504-L365F54Y		

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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	105	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	145	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
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Buck Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	102	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	127	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Switch

Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	105	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	145	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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	102	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	127	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Sw.Inv.Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	104	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	140	W
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Capacitor (DC)				
Maximum DC voltage	V_{MAX}		630	V
Operation Temperature	T_{op}		-55...+125	°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* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			11,83	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



Vincotech

Characteristic Values

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

Buck Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0015	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,43 1,52 1,55	1,85	V
Collector-emitter cut-off current	I_{CES}		0	650		25			108	μA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	$f = 1 \text{ Mhz}$	0	25	25			9000		pF
Output capacitance	C_{oes}							260		
Reverse transfer capacitance	C_{res}							34		
Gate charge	Q_g		15	520	150	25		328		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK (PSX)}$						0,65		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-5 / 15	350	90	25 125 150		48 50 49		ns
Rise time	t_r					25 125 150		9 10 10		
Turn-off delay time	$t_{d(off)}$					25 125 150		147 170 176		
Fall time	t_f					25 125 150		11 19 22		
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 3,3 \mu C$ $Q_{tFWD} = 6,8 \mu C$ $Q_{tFWD} = 7,8 \mu C$				25 125 150		0,346 0,608 0,705		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,066 1,561 1,737		



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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				150	25 125 150	0,8	1,53 1,49 1,47	2,1	V
Reverse leakage current	I_R			650		25			7,6	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,75		K/W
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Dynamic

Peak recovery current	I_{RRM}	$di/dt = 7165$ A/μs $di/dt = 8521$ A/μs $di/dt = 7698$ A/μs	-5 / 15	350	90	25 125 150		124 158 167		A
Reverse recovery time	t_{rr}					25 125 150		44 74 85		ns
Recovered charge	Q_r					25 125 150		3,349 6,779 7,785		μC
Reverse recovered energy	E_{rec}					25 125 150		0,870 1,722 1,922		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		3889 3024 3127		A/μs



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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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0015	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,43 1,52 1,55	1,85	V
Collector-emitter cut-off current	I_{CES}		0	650		25			108	μA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	$f = 1 \text{ Mhz}$	0	25	25			9000		pF
Output capacitance	C_{oes}							260		
Reverse transfer capacitance	C_{res}							34		
Gate charge	Q_g		15	520	150	25		328		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK (PSX)}$						0,65		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-5 / 15	350	90	25 125 150		52 52 52		ns
Rise time	t_r					25 125 150		10 11 11		
Turn-off delay time	$t_{d(off)}$					25 125 150		131 153 160		
Fall time	t_f					25 125 150		13 19 22		
Turn-on energy (per pulse)	E_{on}					25 125 150		0,666 1,225 1,391		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,140 1,685 1,855		



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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				150	25 125 150	0,8	1,53 1,49 1,47	2	V
Reverse leakage current	I_R			650		25			7,6	µA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,75		K/W
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Dynamic

Peak recovery current	I_{RRM}	$di/dt = 9576$ A/µs $di/dt = 6720$ A/µs $di/dt = 7333$ A/µs	-5 / 15	350	90	25 125 150		101 127 133		A
Reverse recovery time	t_{rr}					25 125 150		54 88 101		ns
Recovered charge	Q_r					25 125 150		3,474 6,778 7,836		µC
Reverse recovered energy	E_{rec}					25 125 150		0,807 1,467 1,668		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		2283 1335 1270		A/µs

Boost Sw.Inv.Diode

Static

Forward voltage	V_F				150	25 125 150	1,2	1,66 1,61 1,59	2	V
Reverse leakage current	I_R			650		25			1,8	µA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,68		K/W
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Capacitor (DC)

Capacitance	C							200		nF
Tolerance							-10		+10	%
Dissipation factor		$f = 1$ kHz				25			2,5	%



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10-PY07NIA150S504-L365F54Y

datasheet

Characteristic Values

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

Thermistor

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				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	



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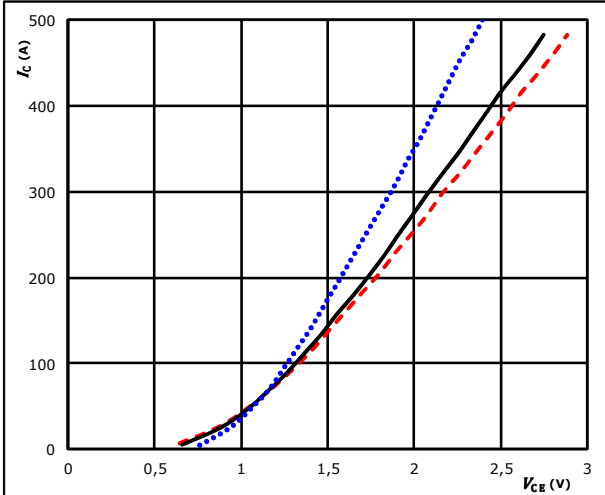
10-PY07NIA150S504-L365F54Y datasheet

Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

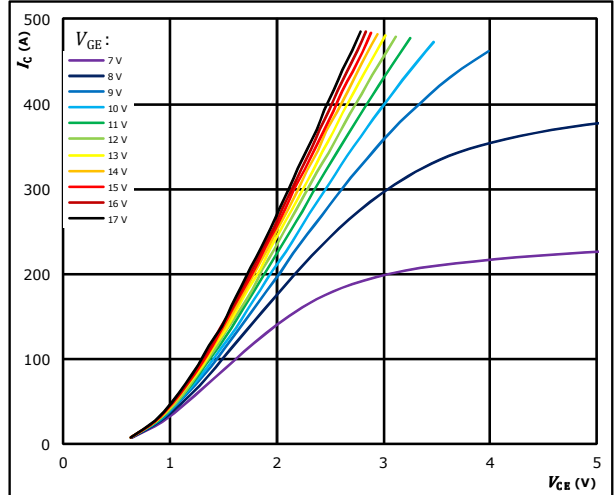


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted line)
 $125 \text{ } ^\circ C$ (black solid line)
 $150 \text{ } ^\circ C$ (red dashed line)

figure 2. IGBT

Typical output characteristics

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

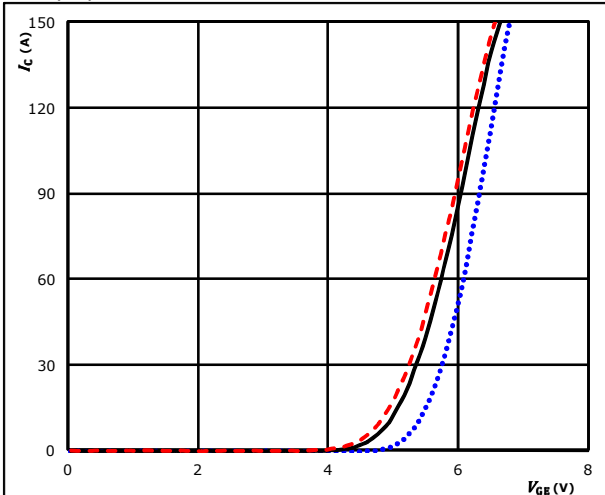


$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

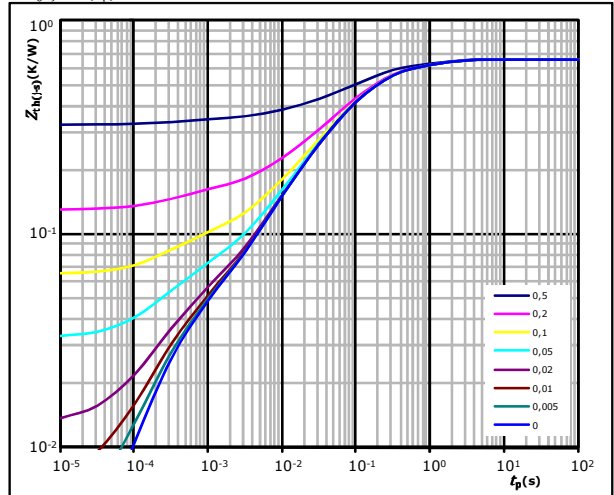


$t_p = 100 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted line)
 $125 \text{ } ^\circ C$ (black solid line)
 $150 \text{ } ^\circ C$ (red dashed line)

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 0,65 \text{ K/W}$
 IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
1,13E-01	8,46E-01
2,91E-01	1,23E-01
1,38E-01	3,33E-02
6,68E-02	8,32E-03
1,32E-02	2,63E-03
3,21E-02	3,23E-04



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Buck Switch Characteristics

figure 5. IGBT
Gate voltage vs gate charge

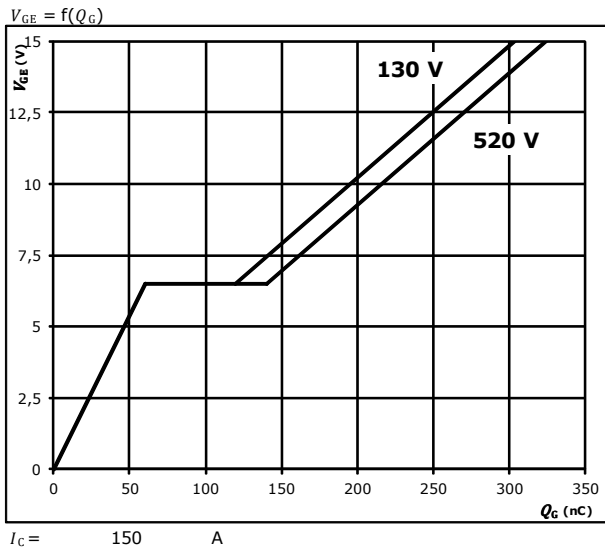
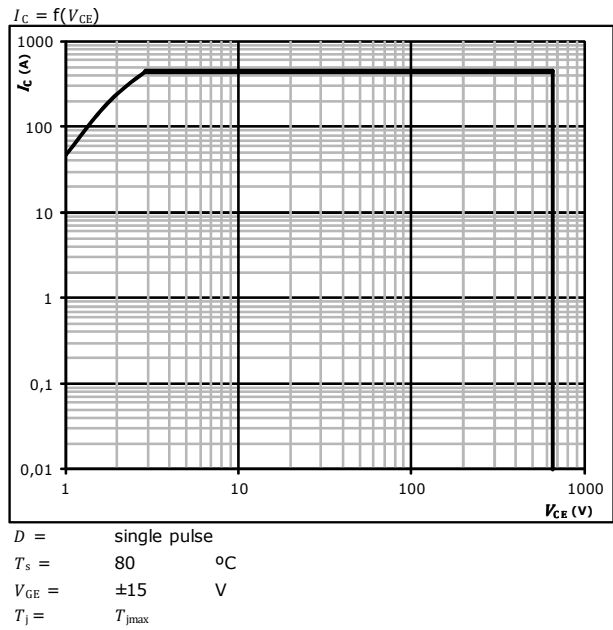


figure 6. IGBT
Safe operating area





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Buck Diode Characteristics

figure 1. FWD

Typical forward characteristics

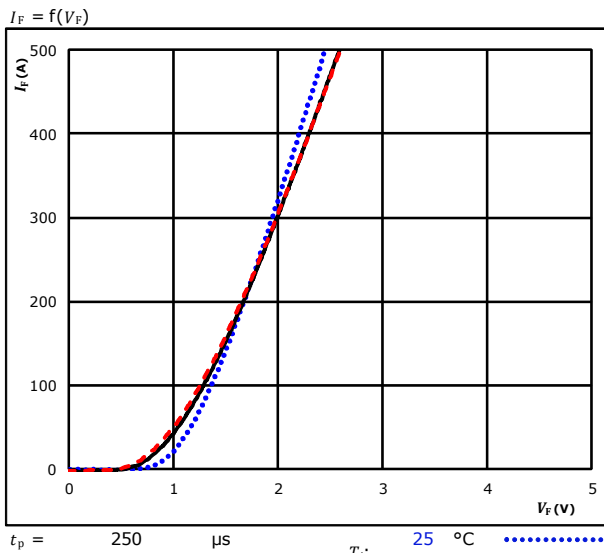
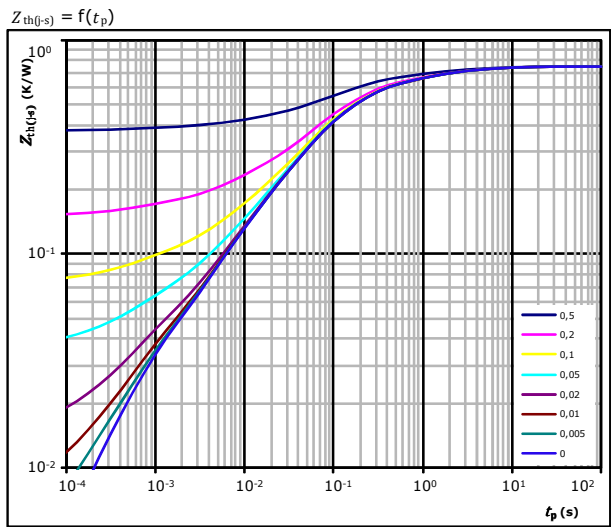


figure 2. FWD

Transient thermal impedance as a function of pulse width



FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
6,17E-02	3,94E+00
1,22E-01	7,76E-01
2,77E-01	1,35E-01
2,01E-01	4,18E-02
6,55E-02	6,15E-03
2,23E-02	5,19E-04



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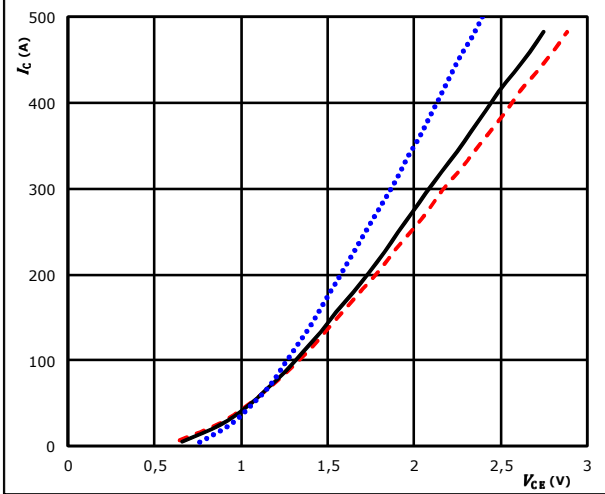
10-PY07NIA150S504-L365F54Y datasheet

Boost Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

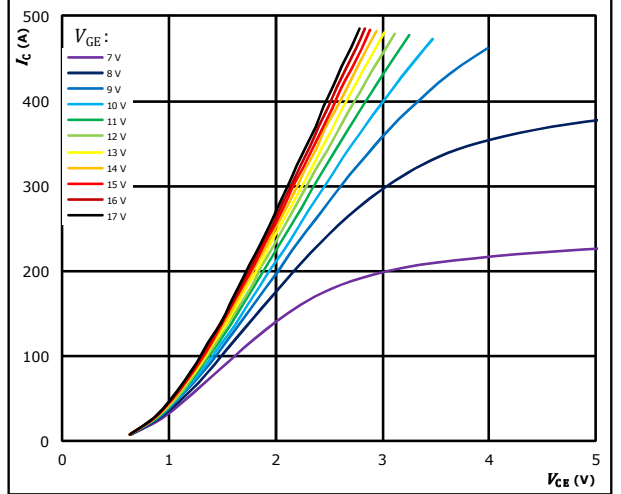


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted line)
 $125 \text{ } ^\circ C$ (black solid line)
 $150 \text{ } ^\circ C$ (red dashed line)

figure 2. IGBT

Typical output characteristics

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

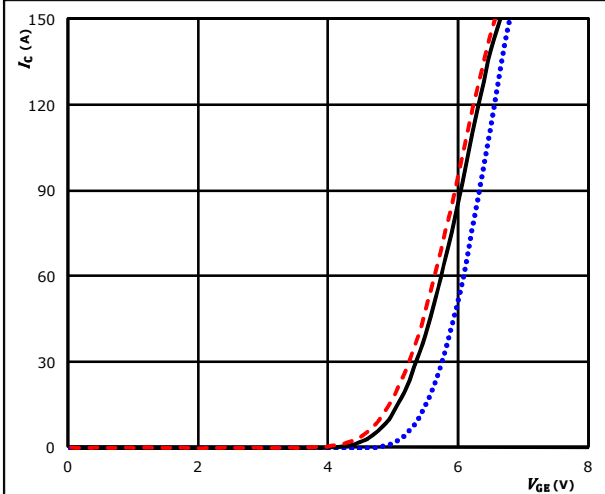


$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

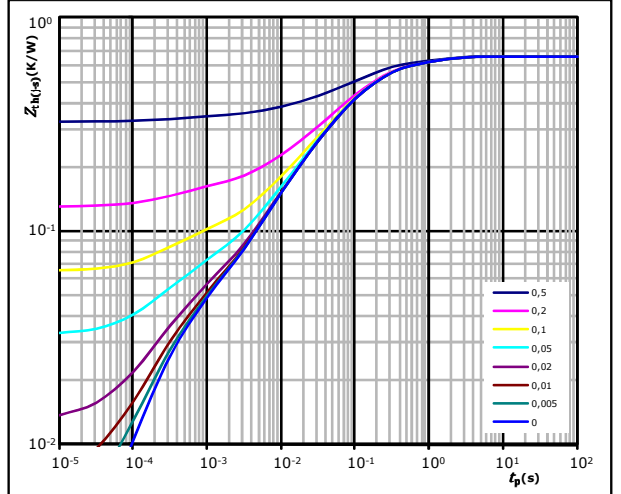


$t_p = 100 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted line)
 $125 \text{ } ^\circ C$ (black solid line)
 $150 \text{ } ^\circ C$ (red dashed line)

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 0,65 \text{ K/W}$
IGBT thermal model values

R (K/W)	τ (s)
1,13E-01	8,46E-01
2,91E-01	1,23E-01
1,38E-01	3,33E-02
6,68E-02	8,32E-03
1,32E-02	2,63E-03
3,21E-02	3,23E-04



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Boost Switch Characteristics

figure 5. IGBT

Gate voltage vs gate charge

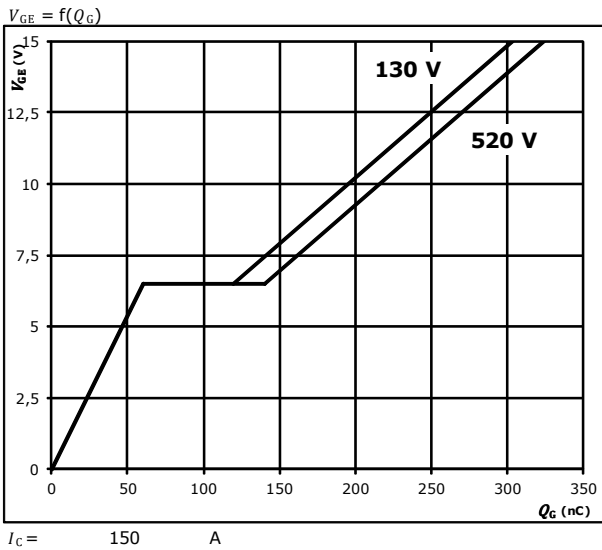
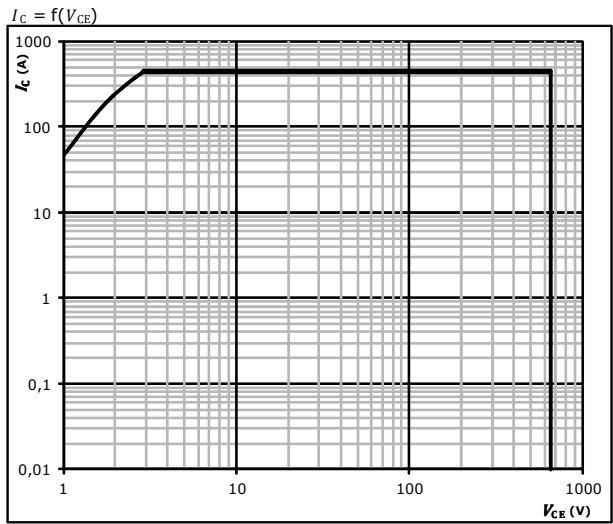


figure 6. IGBT

Safe operating area



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



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Boost Diode Characteristics

figure 1. FWD

Typical forward characteristics

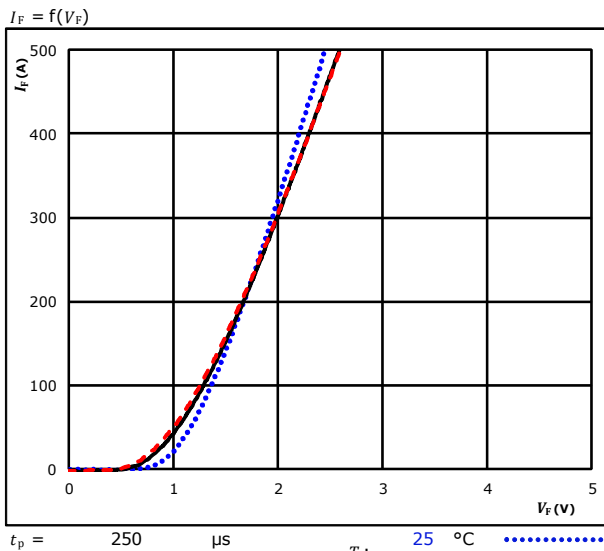
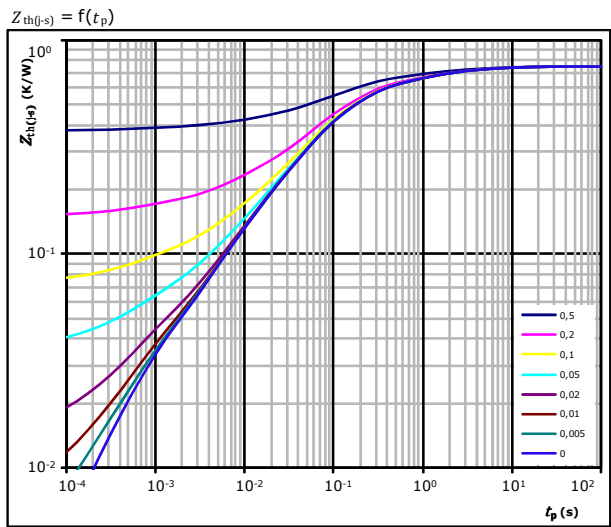


figure 2. FWD

Transient thermal impedance as a function of pulse width



$D = t_p / T$
 $R_{th(j-s)} = 0,75 \text{ K/W}$

FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
6,17E-02	3,94E+00
1,22E-01	7,76E-01
2,77E-01	1,35E-01
2,01E-01	4,18E-02
6,55E-02	6,15E-03
2,23E-02	5,19E-04



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Boost Sw.Inv.Diode Characteristics

figure 1. FWD

Typical forward characteristics

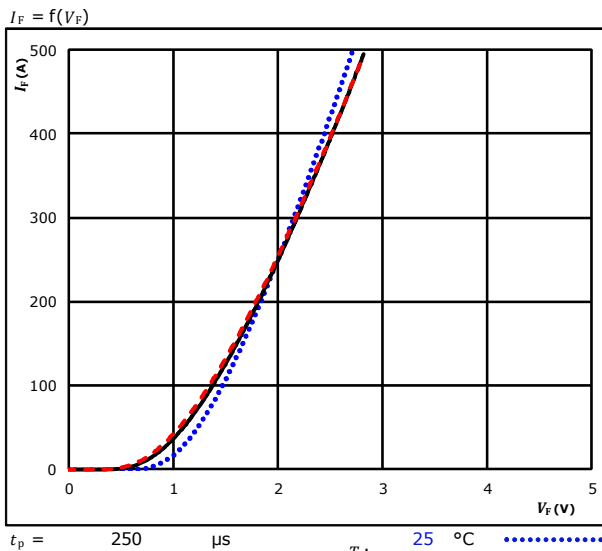
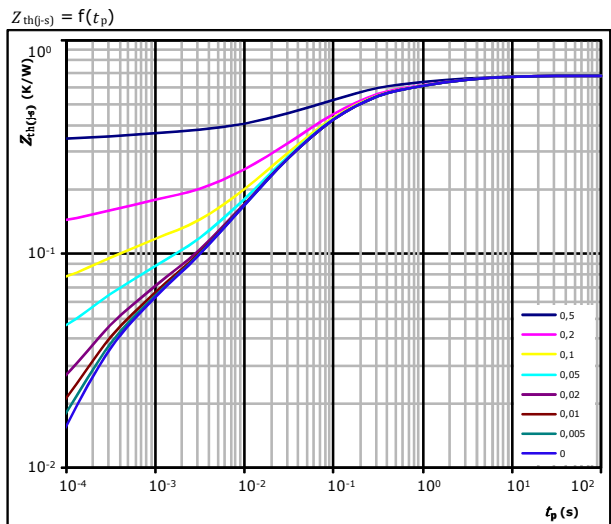


figure 2. FWD

Transient thermal impedance as a function of pulse width



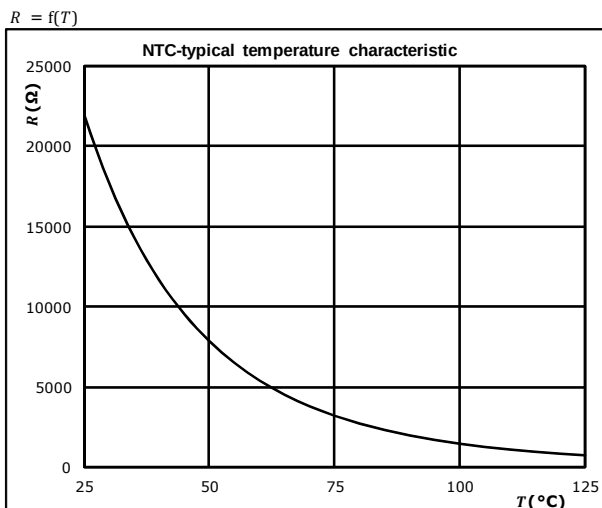
FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
3,35E-02	6,14E+00
8,81E-02	1,29E+00
1,97E-01	1,75E-01
2,05E-01	5,20E-02
1,00E-01	9,79E-03
2,23E-02	1,08E-03
3,48E-02	2,37E-04

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature



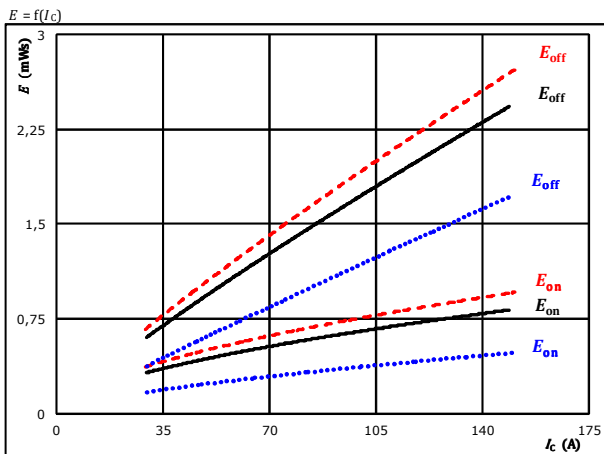


Vincotech

Buck Switching Characteristics

figure 1. IGBT

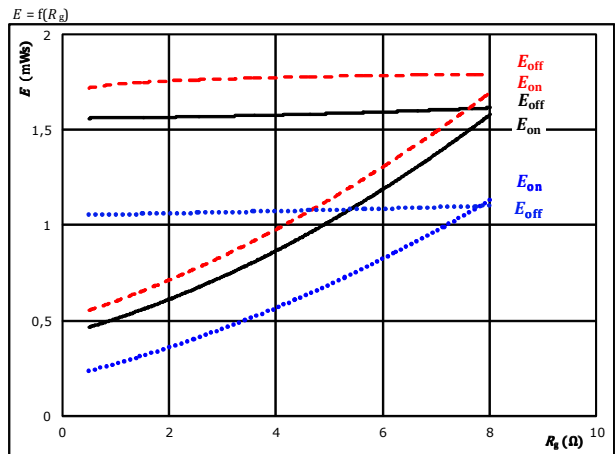
Typical switching energy losses as a function of collector current



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 2. IGBT

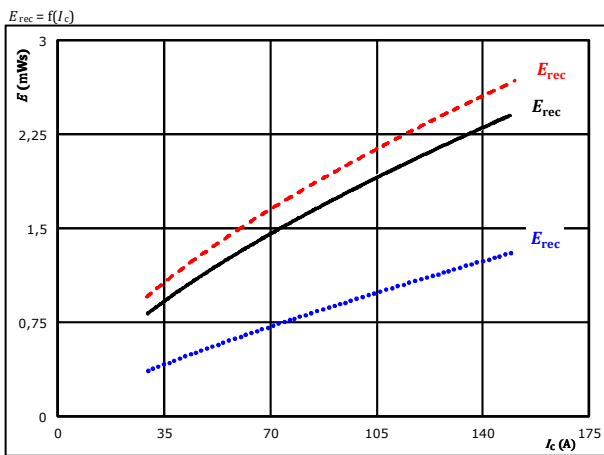
Typical switching energy losses as a function of gate resistor



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 3. FWD

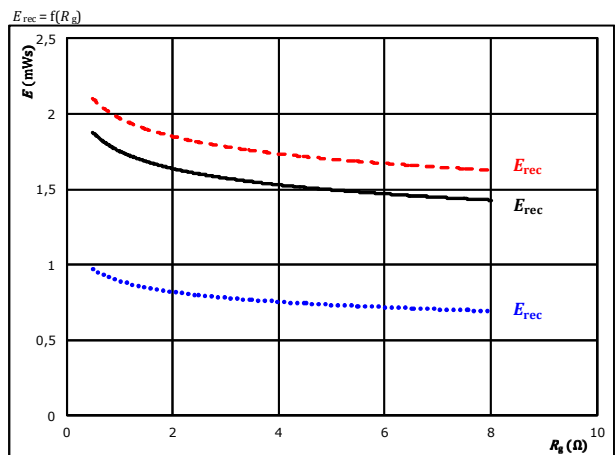
Typical reverse recovered energy loss as a function of collector current



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gon} = 2$ Ω
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)



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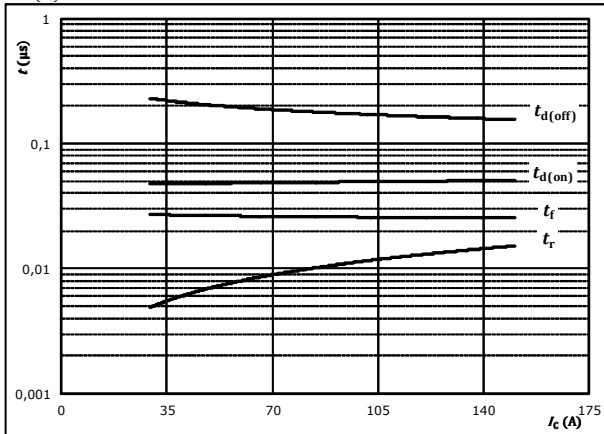
datasheet

Buck Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



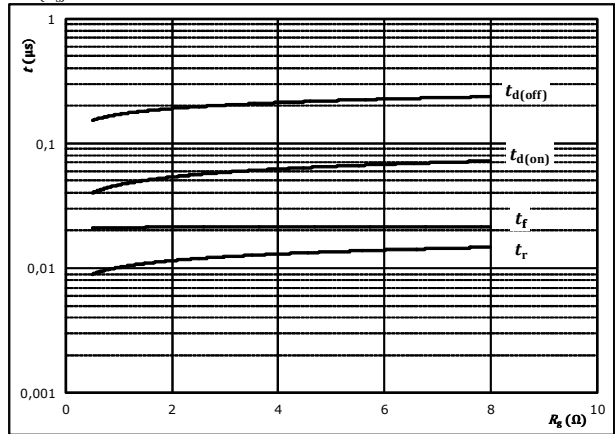
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	-5 / 15	V
$R_{gon} =$	2	Ω
$R_{goff} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



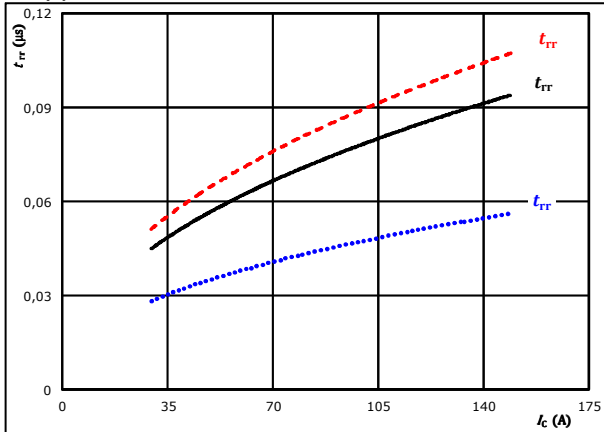
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	-5 / 15	V
$I_C =$	90	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

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

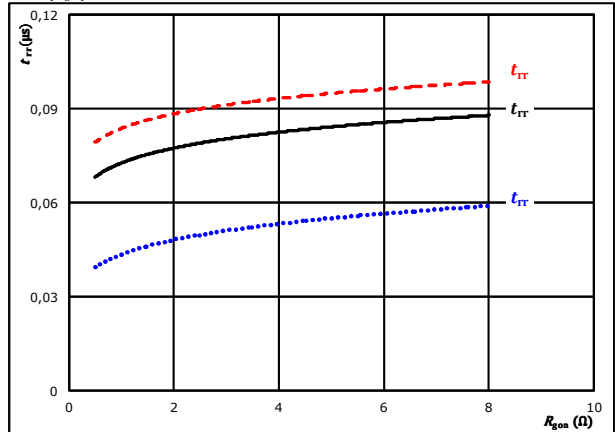


At	$V_{CE} =$	350	V	$T_j:$	25 °C	
	$V_{GE} =$	-5 / 15	V		125 °C	————
	$R_{gon} =$	2	Ω		150 °C	-----

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	
	$V_{GE} =$	-5 / 15	V		125 °C	————
	$I_C =$	90	A		150 °C	-----



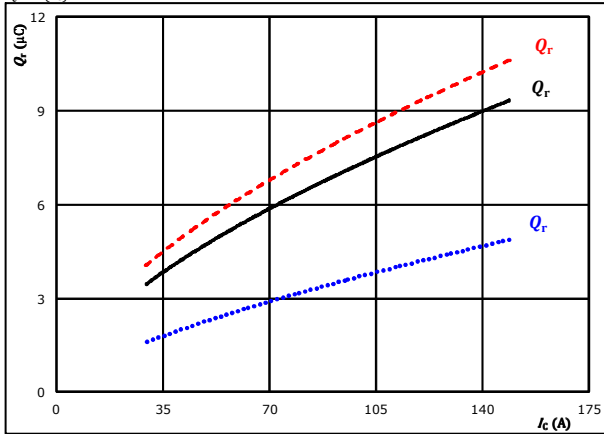
Vincotech

Buck Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

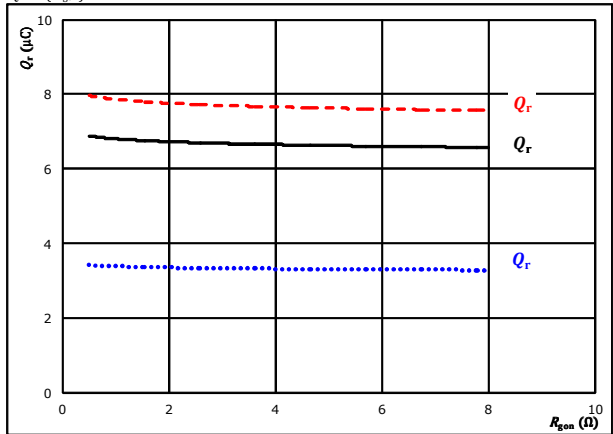


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gdn} = 2$ Ω
 $T_j: 25$ °C
125 °C
150 °C

figure 10. FWD

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

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

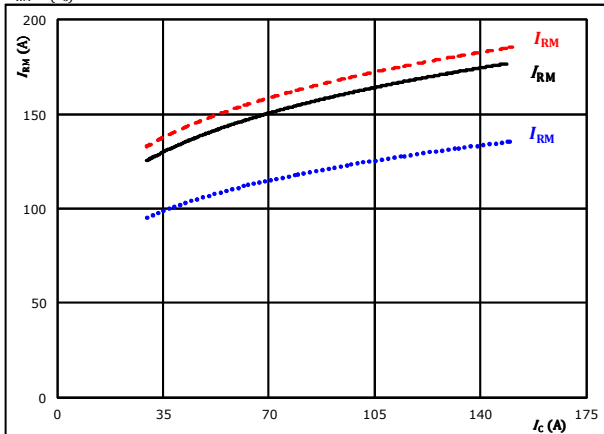


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 $T_j: 25$ °C
125 °C
150 °C

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

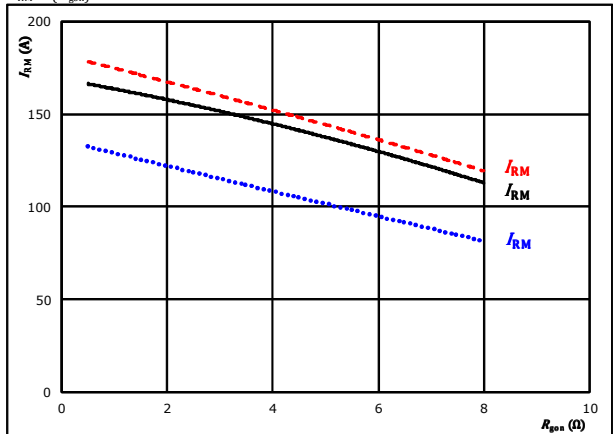


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gdn} = 2$ Ω
 $T_j: 25$ °C
125 °C
150 °C

figure 12. FWD

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

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



At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 $T_j: 25$ °C
125 °C
150 °C

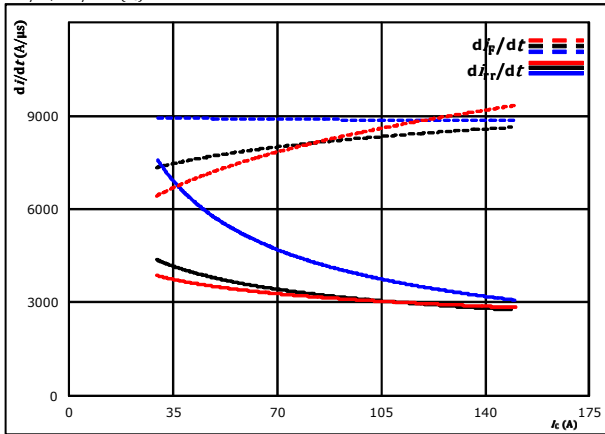


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Buck Switching Characteristics

figure 13. FWD

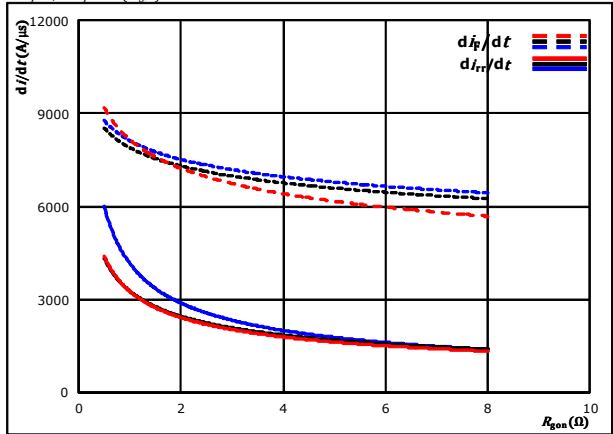
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_F/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{g(on)} = 2$ Ω
 $T_j = 25$ °C
125 °C
150 °C

figure 14. FWD

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

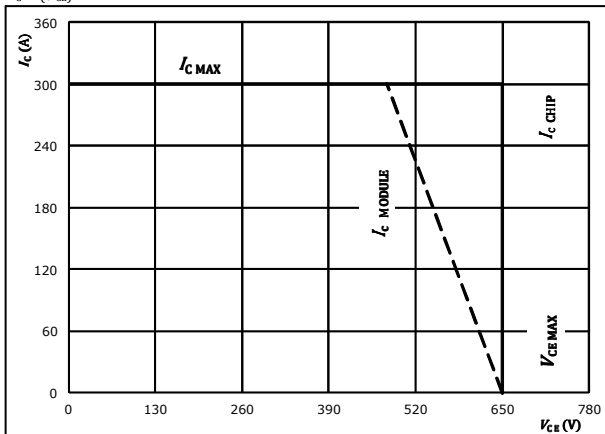


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 $T_j = 25$ °C
125 °C
150 °C

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



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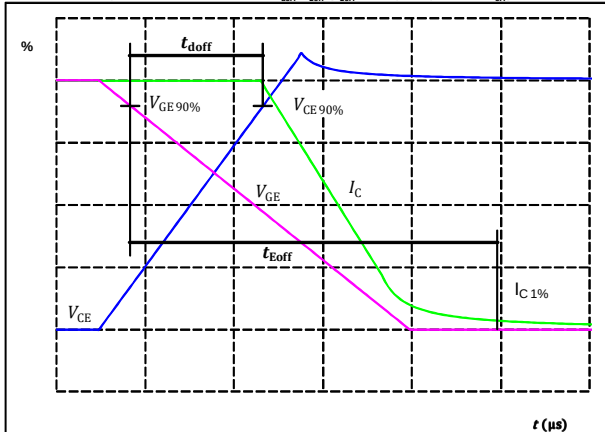
Buck Switching Definitions

General conditions

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

figure 1. IGBT

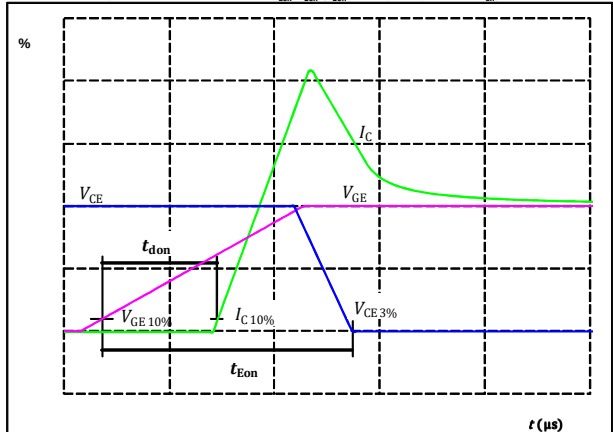
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%) =$	-5	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_{doff} =$	170	ns

figure 2. IGBT

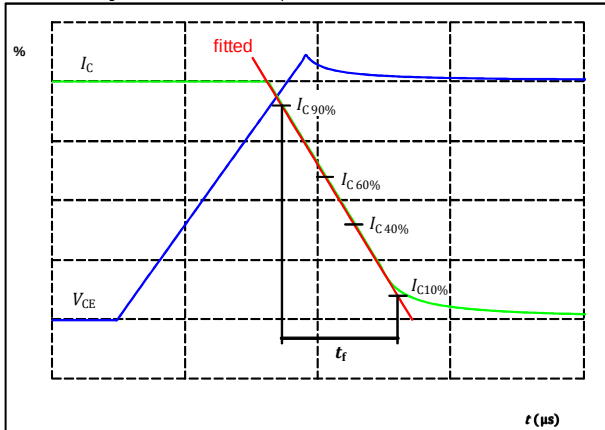
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%) =$	-5	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_{don} =$	50	ns

figure 3. IGBT

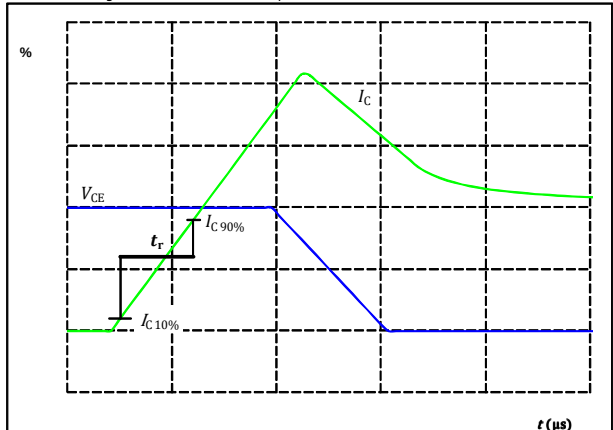
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_f =$	19	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_r =$	10	ns

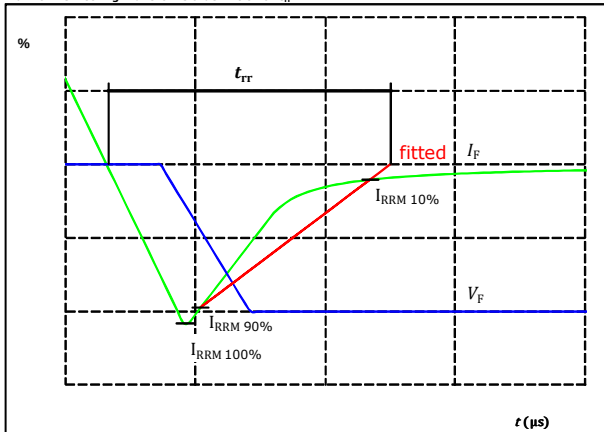


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Buck Switching Characteristics

figure 5. FWD

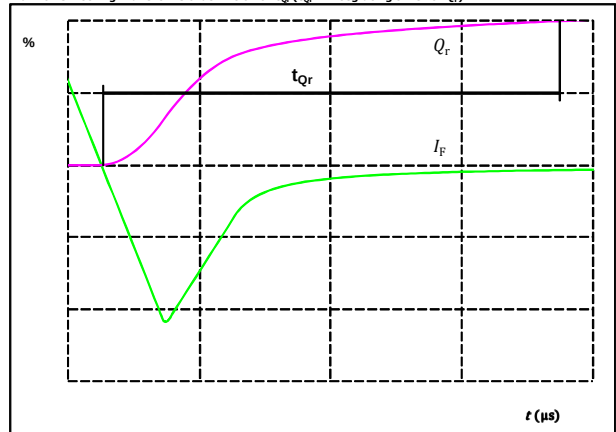
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%) =$	350	V
$I_F(100\%) =$	90	A
$I_{RRM}(100\%) =$	158	A
$t_{rr} =$	74	ns

figure 6. FWD

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



$I_F(100\%) =$	90	A
$Q_r(100\%) =$	6,78	μC



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Boost Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

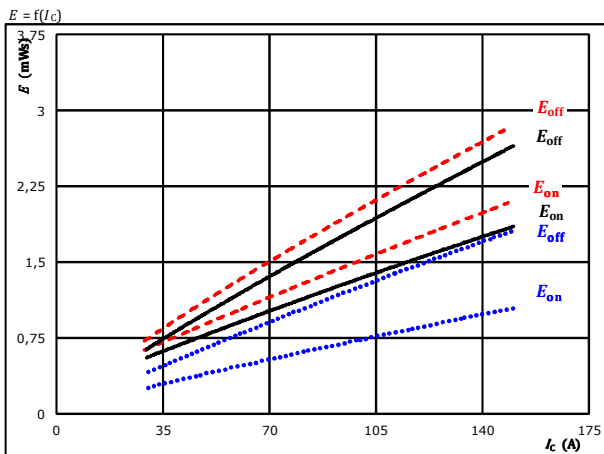


figure 2. IGBT

Typical switching energy losses as a function of gate resistor

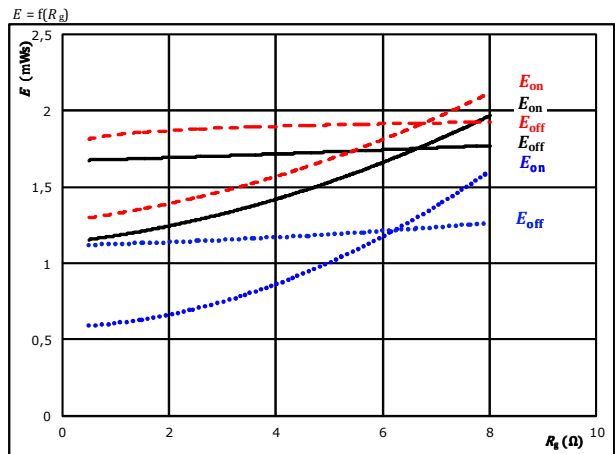


figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

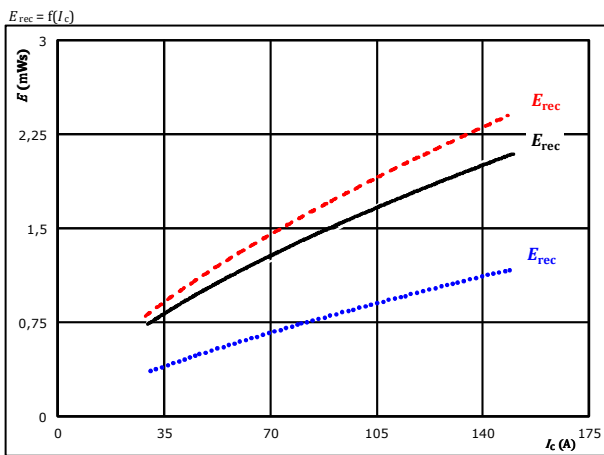
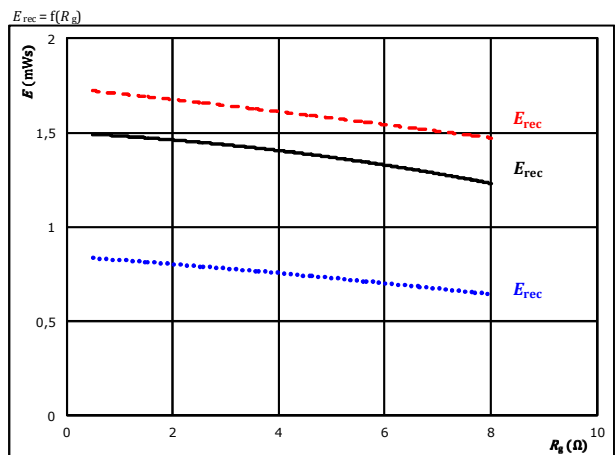


figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor





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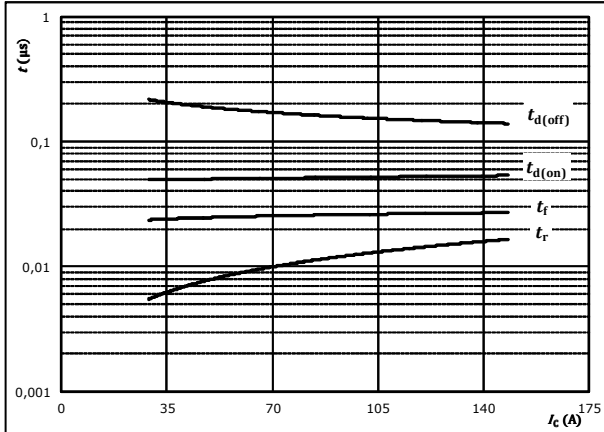
datasheet

Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



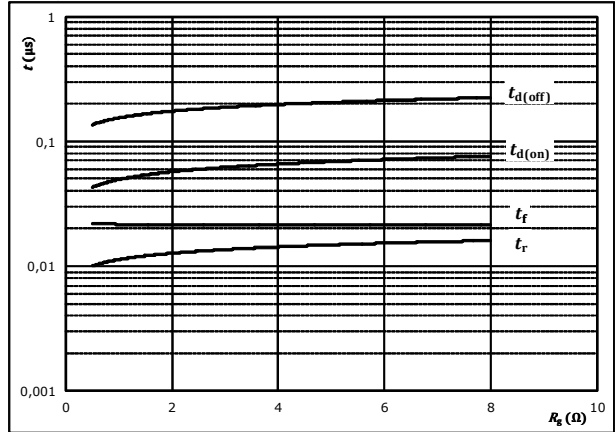
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	-5 / 15	V
$R_{gon} =$	2	Ω
$R_{goff} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



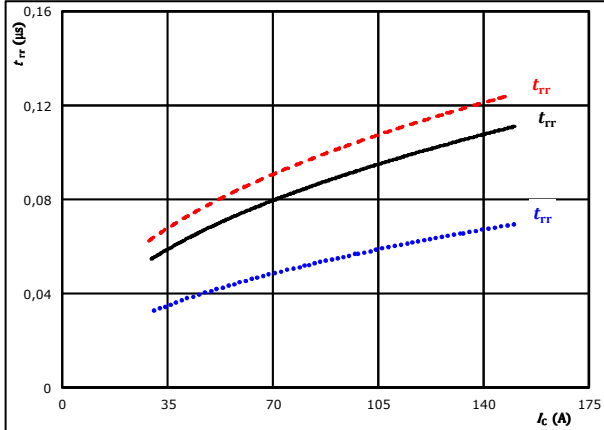
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	-5 / 15	V
$I_C =$	90	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

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

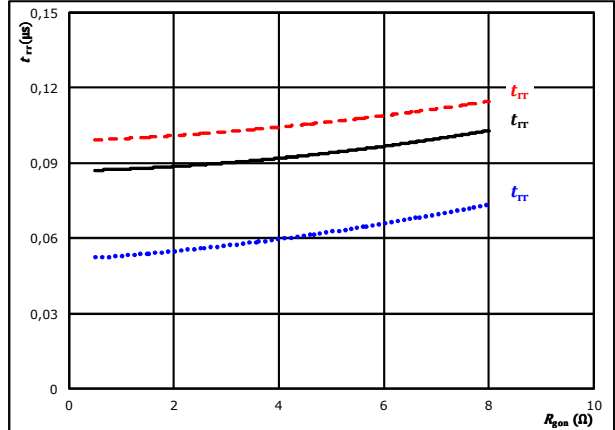


At	$V_{CE} =$	350	V	$T_j:$	25 °C	
	$V_{GE} =$	-5 / 15	V		125 °C	————
	$R_{gon} =$	2	Ω		150 °C	-----

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	
	$V_{GE} =$	-5 / 15	V		125 °C	————
	$I_C =$	90	A		150 °C	-----



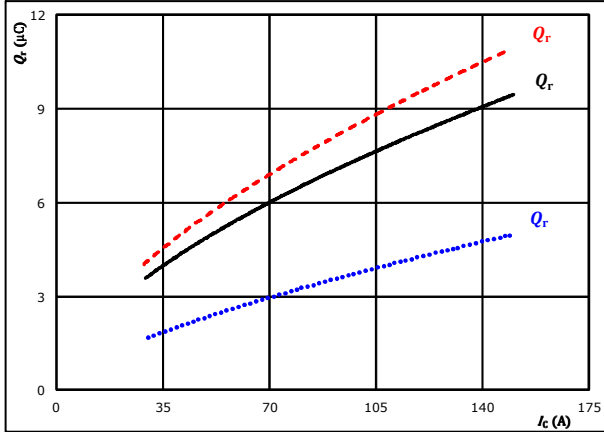
Vincotech

Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

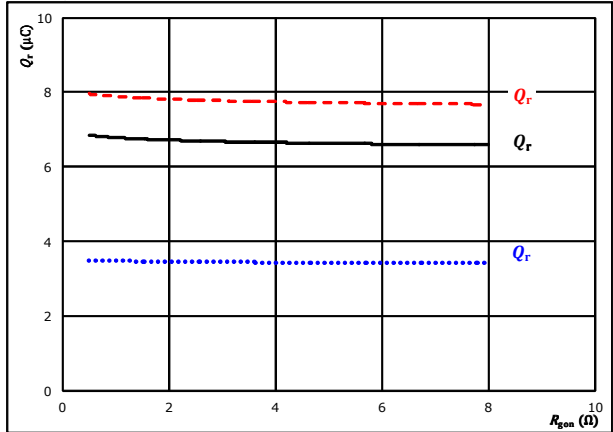


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gdn} = 2$ Ω
 $T_j: 25$ °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 10. FWD

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

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

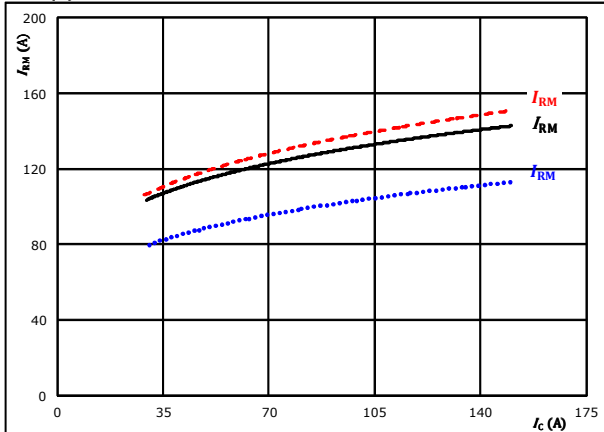


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 $T_j: 25$ °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

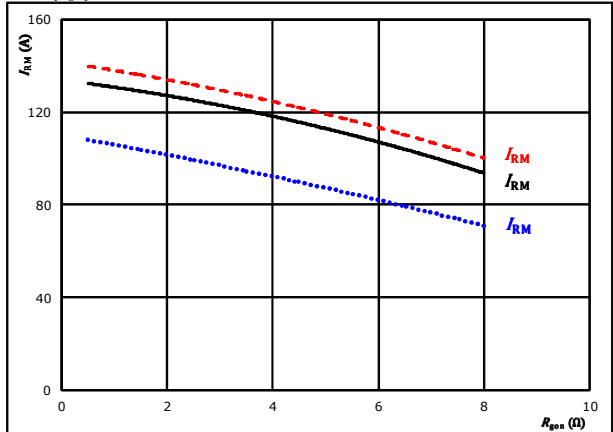


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gdn} = 2$ Ω
 $T_j: 25$ °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 12. FWD

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

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



At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 $T_j: 25$ °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)



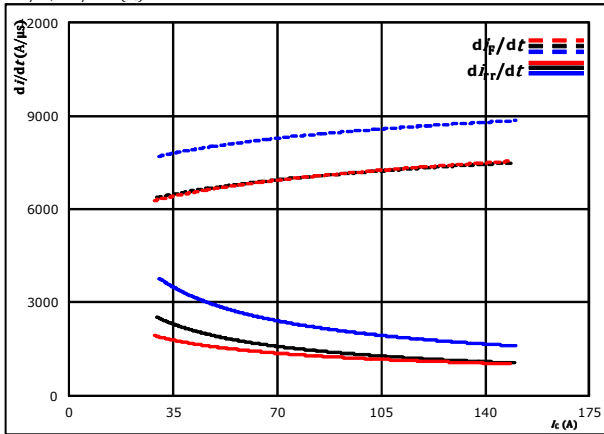
Vincotech

10-PY07NIA150S504-L365F54Y
datasheet

Boost Switching Characteristics

figure 13. FWD

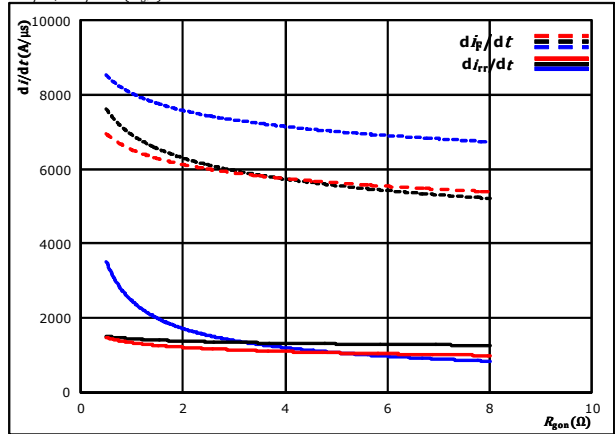
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_F/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{g0n} = 2$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

figure 14. FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_F/dt, di_{rr}/dt = f(R_{g0n})$

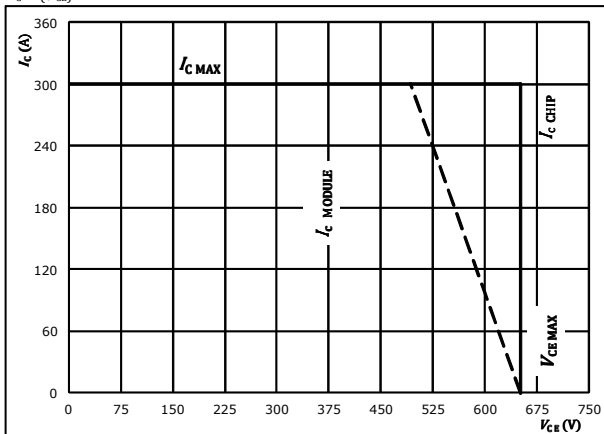


At $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_C = 90$ A
 $T_j = 25$ °C
 125 °C
 150 °C

figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At $T_j = 175$ °C
 $R_{g0n} = 2$ Ω
 $R_{g0ff} = 2$ Ω



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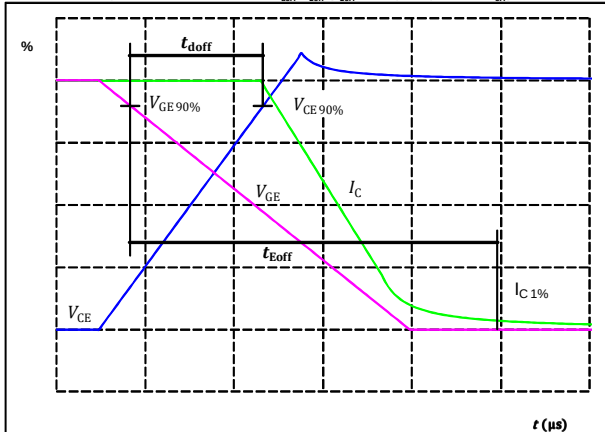
Boost Switching Definitions

General conditions

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

figure 1. IGBT

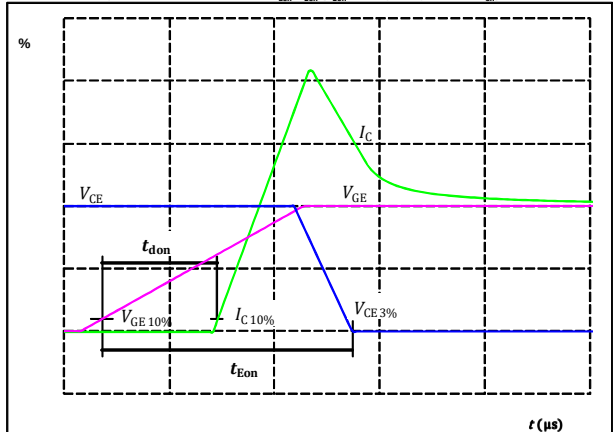
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%) =$	-5	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_{doff} =$	153	ns

figure 2. IGBT

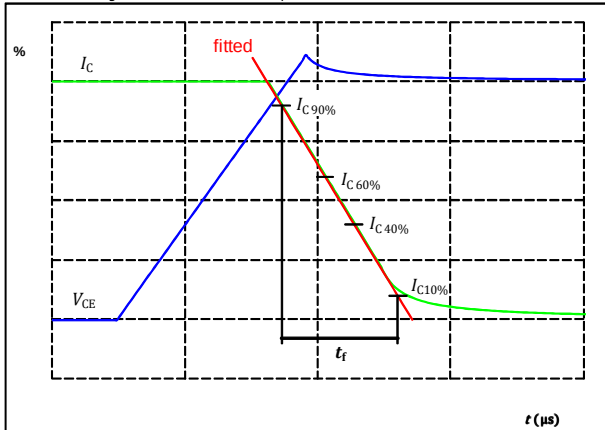
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%) =$	-5	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_{don} =$	52	ns

figure 3. IGBT

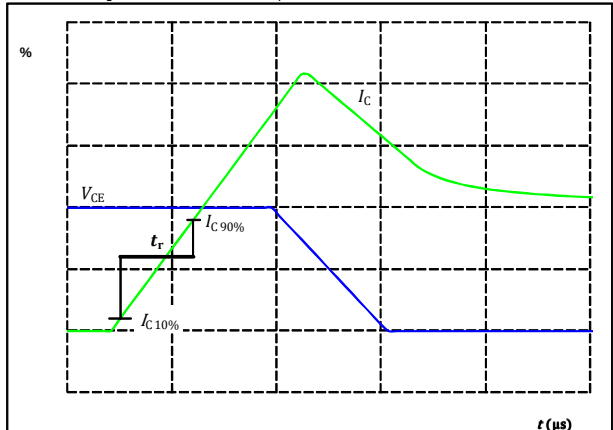
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_f =$	19	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



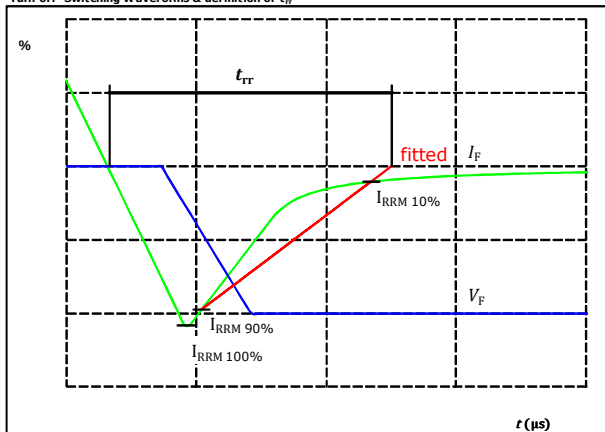
$V_C(100\%) =$	350	V
$I_C(100\%) =$	90	A
$t_r =$	11	ns



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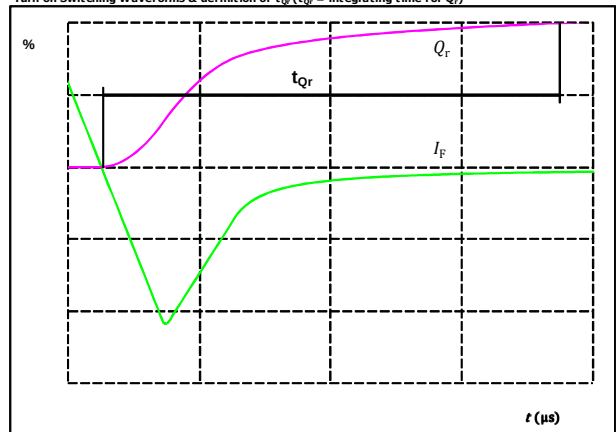
Boost Switching Characteristics

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



$V_F(100\%) =$	350	V
$I_F(100\%) =$	90	A
$I_{RRM}(100\%) =$	127	A
$t_{rr} =$	88	ns

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



$I_F(100\%) =$	90	A
$Q_r(100\%) =$	6,78	μC



Vincotech

Ordering Code & Marking							
Version				Ordering Code			
without thermal paste 12 mm housing with press-fit pins				10-PY07NIA150S504-L365F54Y			
with thermal paste 12 mm housing with press-fit pins				10-PY07NIA150S504-L365F54Y-/3/			
	Text	Name		Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNN-TTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

Pin table			
Pin	X	Y	Function
1	52,2	6,9	Therm1
2	52,2	0	Therm2
3	36,2	6,75	S4
4	33,2	7,9	G14
5	33,2	4,9	G18
6	9,2	5,75	S2
7	6,2	6,9	G12
8	6,2	3,9	G16
9	2,7	0	DC-
10	0	0	DC-
11	2,7	2,7	DC-
12	0	2,7	DC-
13	2,7	5,4	DC-
14	0	5,4	DC-
15	2,7	12,75	GND
16	0	12,75	GND
17	2,7	15,45	GND
18	0	15,45	GND
19	2,7	22,8	DC+
20	0	22,8	DC+
21	2,7	25,5	DC+
22	0	25,5	DC+
23	2,7	28,2	DC+
24	0	28,2	DC+
25	18,3	22,45	S1
26	21,3	21,3	G15
27	21,3	24,3	G11
28	43	22,15	S3
29	46	21	G17
30	46	24	G13
31	52,2	20,1	Ph
32	49,5	22,8	Ph
33	52,2	22,8	Ph
34	49,5	25,5	Ph
35	52,2	25,5	Ph

center of press-fit pinhead
for connection parameter see the handling instruction

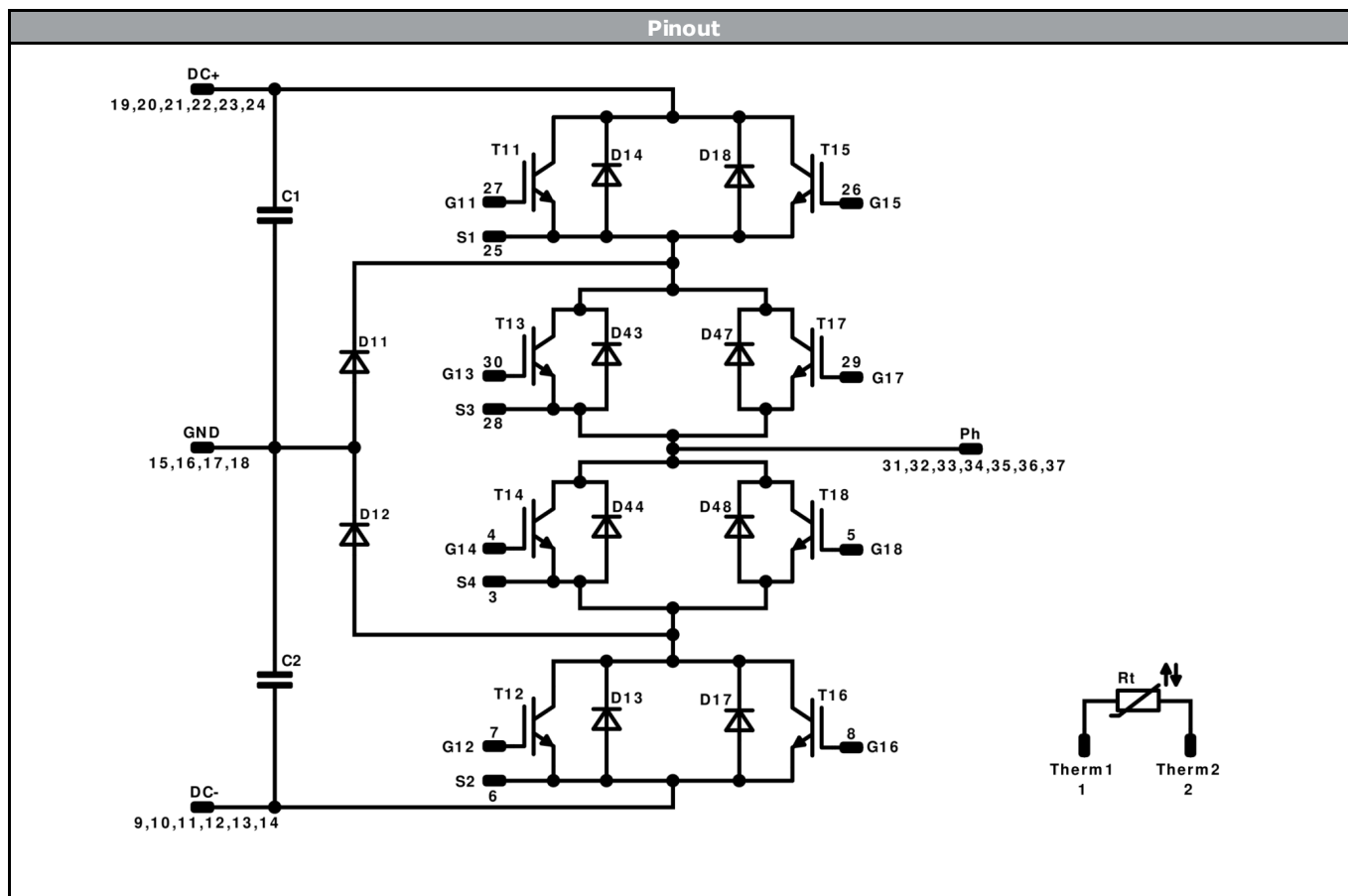
12.93 ±0.1
16.2 ±0.5

14.1
26.1

Tolerance of pinpositions ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T15, T16	IGBT	650 V	150 A	Buck Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12	FWD	650 V	150 A	Buck Diode	
T13, T14, T17, T18	IGBT	650 V	150 A	Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D14, D17, D18	FWD	650 V	150 A	Boost Diode	Parallel devices. Values apply to complete device.
D43, D44, D47, D48	FWD	650 V	150 A	Boost Sw.Inv.Diode	Parallel devices. Values apply to complete device.
C1, C2	Capacitor	630 V		Capacitor (DC)	
Rt	NTC			Thermistor	



Vincotech

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

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</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
10-PY07NIA150S504-L365F54Y-D1-14	26 Mar. 2018		

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.