Vincotech

B0-SP07NIA300S5-LM38F58T
datasheet

***flow*NPC S3** **650 V / 300 A**

Features

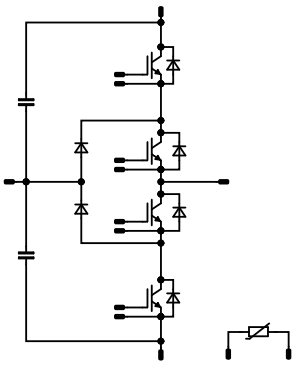
- Three-level high efficient topology
- Compact and low inductive design
- Integrated NTC
- High speed IGBT

flow S3 12 mm housing

Target applications

- UPS

Schematic



Types

- B0-SP07NIA300S5-LM38F58T

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Buck Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current (DC current)	I_C	T_j = T_{jmax} T_s = 80 °C	211	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	291	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C
Buck Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	T_j = T_{jmax} T_s = 80 °C	217	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	278	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current (DC current)	I_C	T_j = T_{jmax} T_s = 80 °C	211	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	291	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	Conditions	Value	Unit
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	T_j = T_{jmax} T_s = 80 °C	217	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	278	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Sw. Inv. Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	T_j = T_{jmax} T_s = 80 °C	217	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	278	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	6000	V
Isolation voltage	V_{isol}	AC Voltage t_p = 1 min	2500	V
Creepage distance			10,35	mm
Clearance			7,81	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Values			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_{CE} = V_{GE}			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(1)	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		pF
Reverse transfer capacitance	C_{res}							68		pF
Gate charge	Q_g	V_{CC} = 520 V	15		300	25		656		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	180	25 125 150		88,96 91,2 92,16		ns
Rise time	t_r					25 125 150		19,84 21,76 22,4		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		105,92 132,8 139,2		ns
Fall time	t_f					25 125 150		20,2 27,34 29,64		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=5,58 µC Q_{rFWD}=11,73 µC Q_{rFWD}=13,36 µC				25 125 150		0,893 1,34 1,43		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		2,48 3,86 4,42		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			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				300	25 125 150		1,53 1,49 1,46	1,92(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			15,2	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,34		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=7367 A/µs di/dt=7132 A/µs di/dt=6860 A/µs	±15	350	180	25 125 150		155,22 218,33 230,41		A
Reverse recovery time	t_{rr}					25 125 150		56,96 81,67 90,55		ns
Recovered charge	Q_r					25 125 150		5,58 11,73 13,36		µC
Reverse recovered energy	E_{rec}					25 125 150		1,73 3,43 3,83		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		12043 9166 7027		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			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_{CE} = V_{GE}			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(1)	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		pF
Reverse transfer capacitance	C_{res}							68		pF
Gate charge	Q_g	V_{CC} = 520 V	15		300	25		656		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	180	25 125 150		86,4 88,32 89,28		ns
Rise time	t_r					25 125 150		20,8 23,04 24,64		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		105,28 129,92 135,36		ns
Fall time	t_f					25 125 150		21,01 27,37 29,84		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=5,49 µC Q_{rFWD}=11,25 µC Q_{rFWD}=13,54 µC				25 125 150		0,679 1,14 1,23		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		2,58 3,82 4,37		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			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				300	25 125 150		1,53 1,49 1,46	1,92(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			15,2	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,34		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=6815 A/µs di/dt=6267 A/µs di/dt=6189 A/µs	±15	350	180	25 125 150		141,65 189,98 199,72		A
Reverse recovery time	t_{rr}					25 125 150		58,8 87,75 100,54		ns
Recovered charge	Q_r					25 125 150		5,49 11,25 13,54		µC
Reverse recovered energy	E_{rec}					25 125 150		1,42 2,73 3,21		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		12123 8097 5133		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			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. Inv. Diode										
Static										
Forward voltage	V_F				300	25 125 150		1,53 1,49 1,46	1,92(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			15,2	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 4,4 W/mK (PTM)						0,34		K/W
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		33		nF
Tolerance							-5		5	%
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P							5		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

(1) Value at chip level

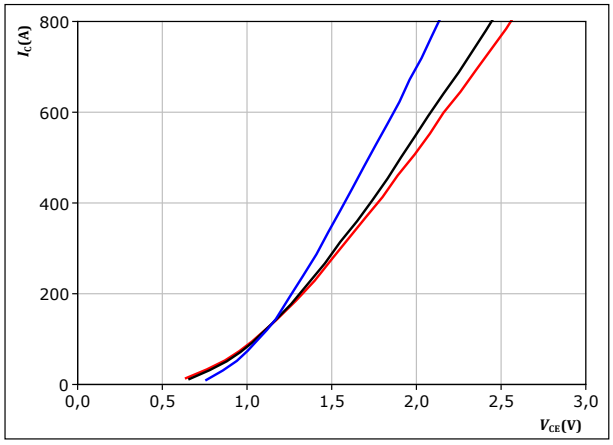
(2) Only valid with pre-applied Vincotech thermal interface material.

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

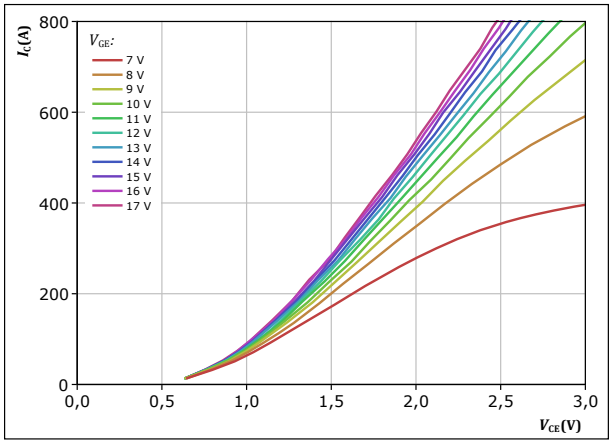


t_p =	250	µs		
V_{GE} =	15	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



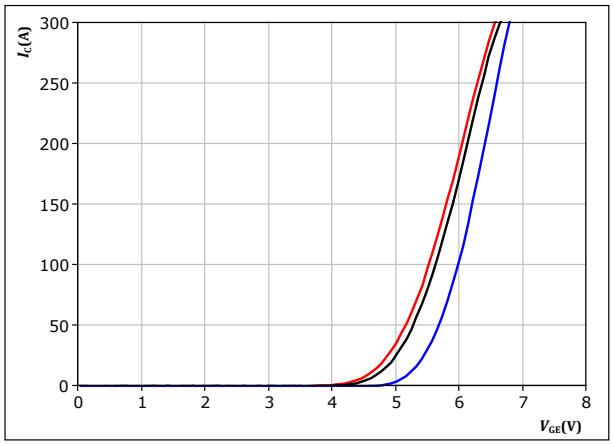
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

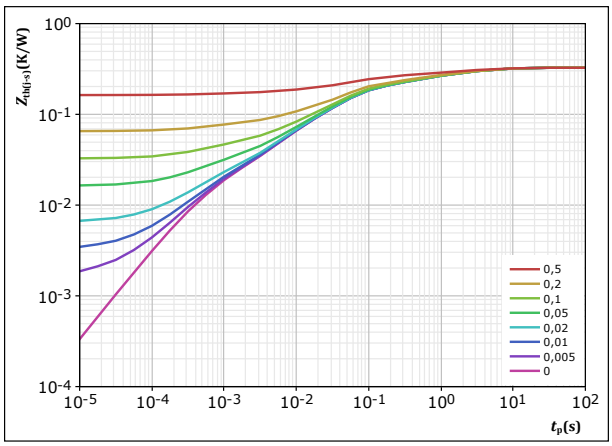


t_p =	250	µs		
V_{CE} =	10	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,326	K/W

IGBT thermal model values

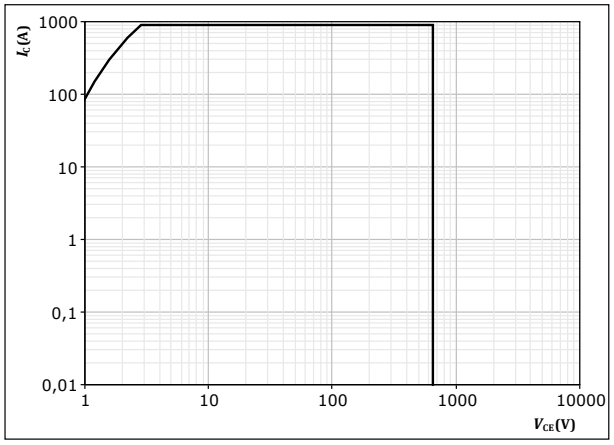
R (K/W)	τ (s)
5,25E-02	4,41E+00
8,00E-02	6,71E-01
1,45E-01	5,30E-02
3,51E-02	7,06E-03
1,33E-02	5,20E-04

Buck Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



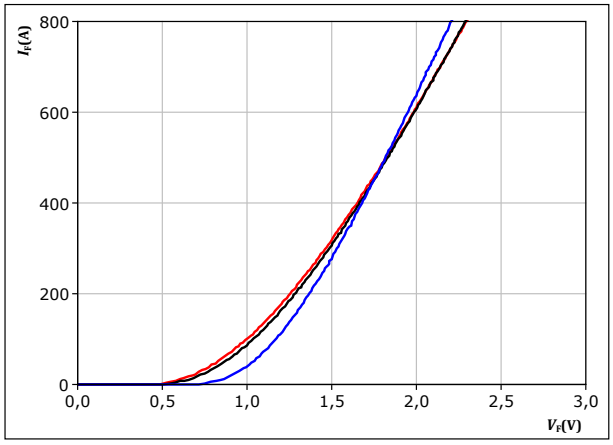
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



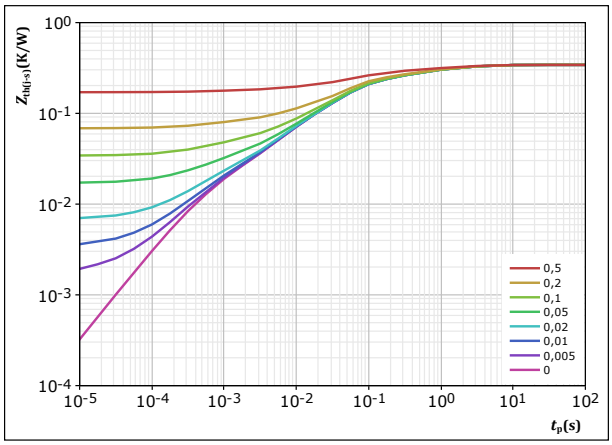
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,342 K/W

FWD thermal model values

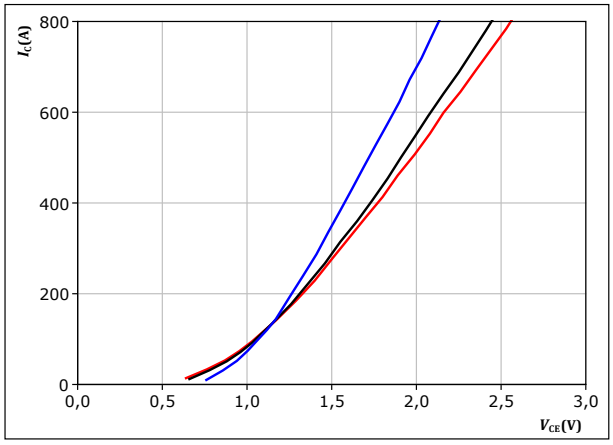
R (K/W)	τ (s)
3,55E-02	2,97E+00
8,34E-02	5,51E-01
1,74E-01	5,48E-02
3,60E-02	6,87E-03
1,28E-02	5,34E-04

Boost Switch Characteristics

figure 8. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

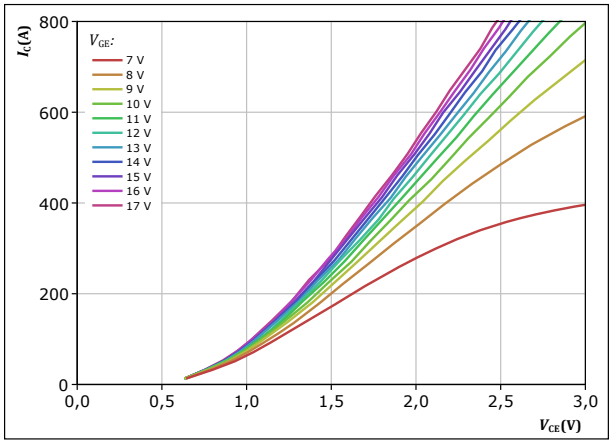


t_p =	250	µs		
V_{GE} =	15	V	T_j:	25 °C
				125 °C
				150 °C

figure 9. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



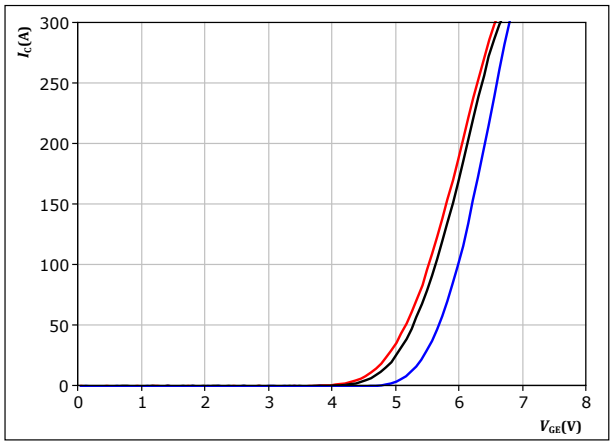
t_p =	250	µs
T_j =	150	°C

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

figure 10. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

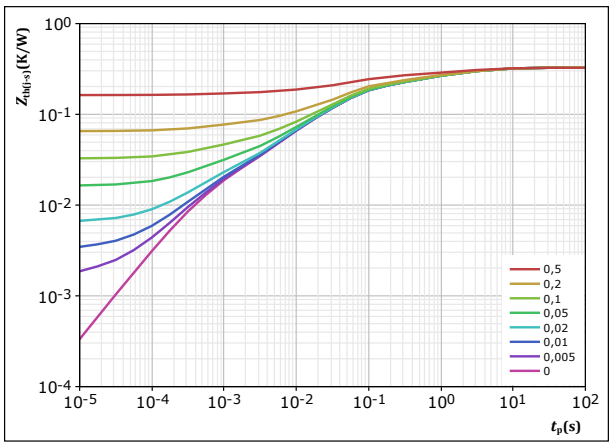


t_p =	250	µs		
V_{CE} =	10	V	T_j:	25 °C
				125 °C
				150 °C

figure 11. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,326	K/W

IGBT thermal model values

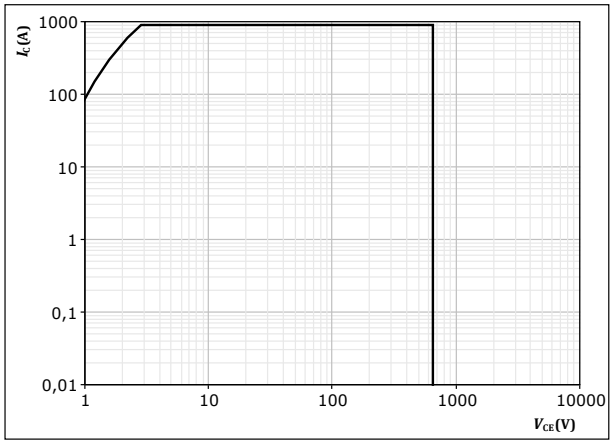
R (K/W)	τ (s)
5,25E-02	4,41E+00
8,00E-02	6,71E-01
1,45E-01	5,30E-02
3,51E-02	7,06E-03
1,33E-02	5,20E-04

Boost Switch Characteristics

figure 12. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



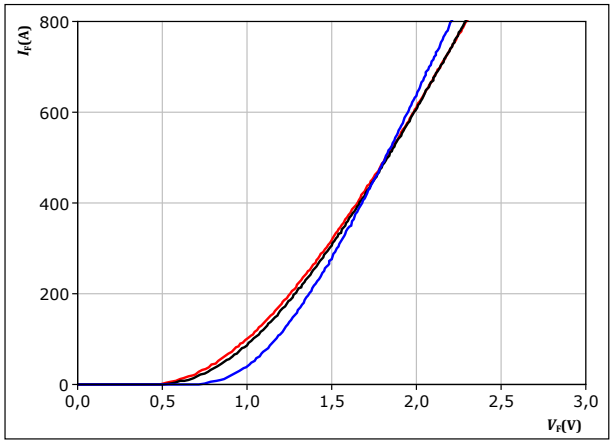
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



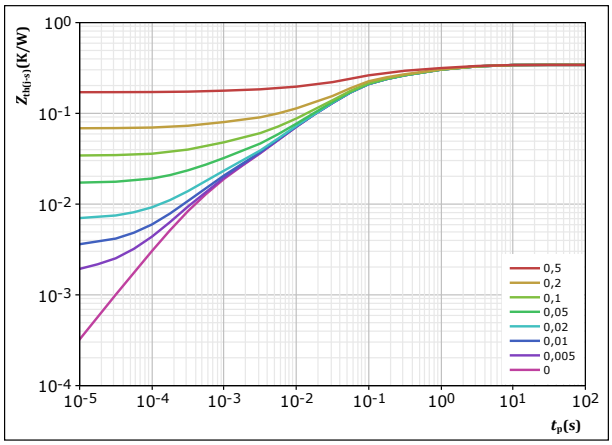
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 14. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,342 K/W

FWD thermal model values

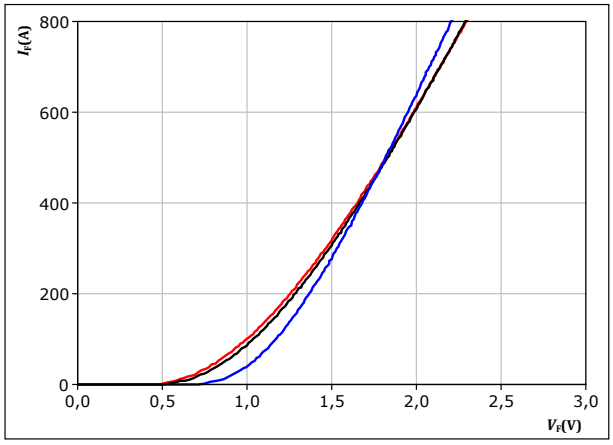
R (K/W)	τ (s)
3,55E-02	2,97E+00
8,34E-02	5,51E-01
1,74E-01	5,48E-02
3,60E-02	6,87E-03
1,28E-02	5,34E-04

Boost Sw. Inv. Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



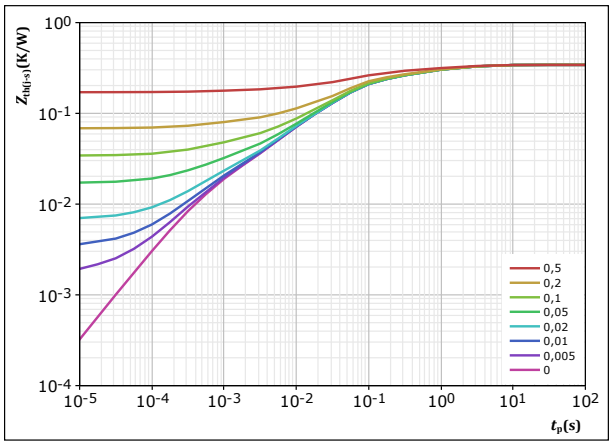
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,342 K/W

FWD thermal model values

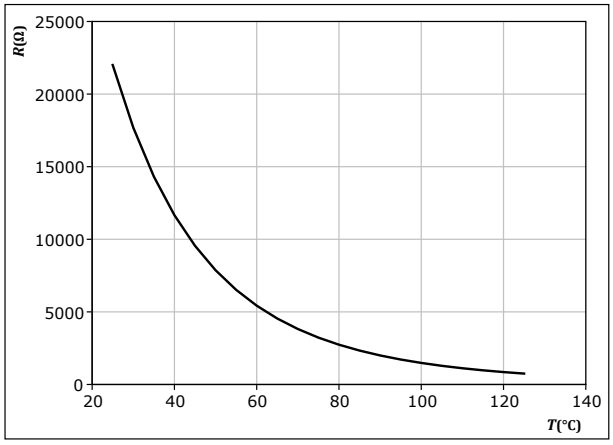
R (K/W)	τ (s)
3,55E-02	2,97E+00
8,34E-02	5,51E-01
1,74E-01	5,48E-02
3,60E-02	6,87E-03
1,28E-02	5,34E-04

Thermistor Characteristics

figure 17. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

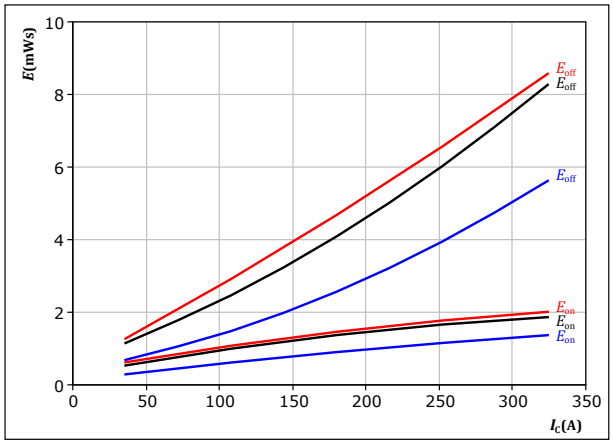


Buck Switching Characteristics

figure 18. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



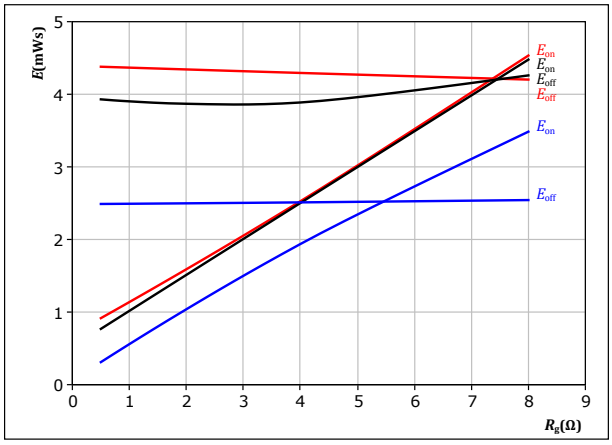
With an inductive load at

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 19. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



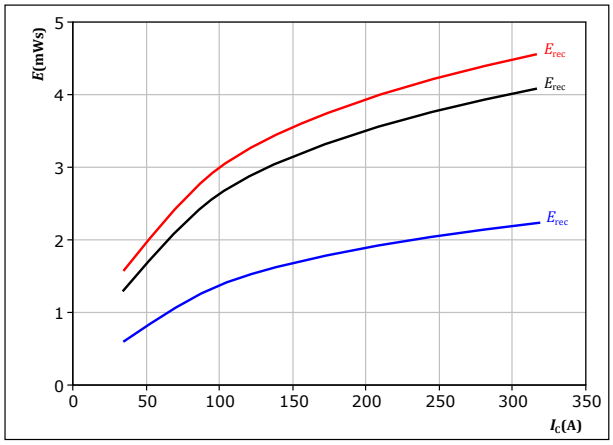
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

figure 20. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



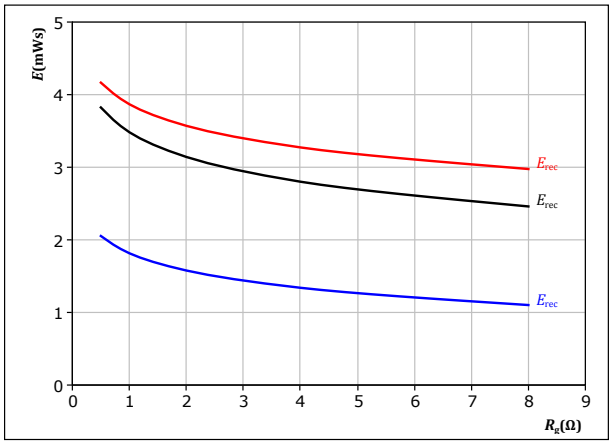
With an inductive load at

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

figure 21. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

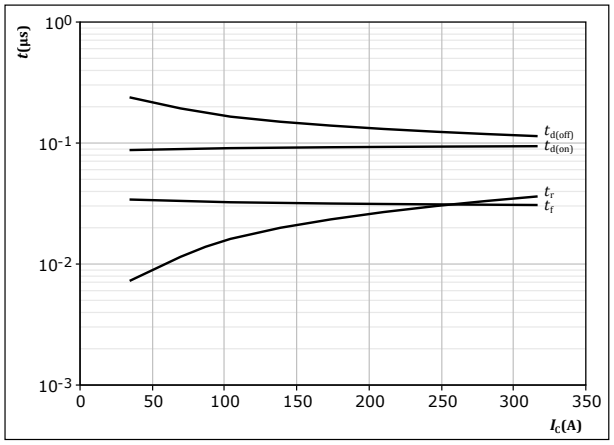
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

Buck Switching Characteristics

figure 22. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



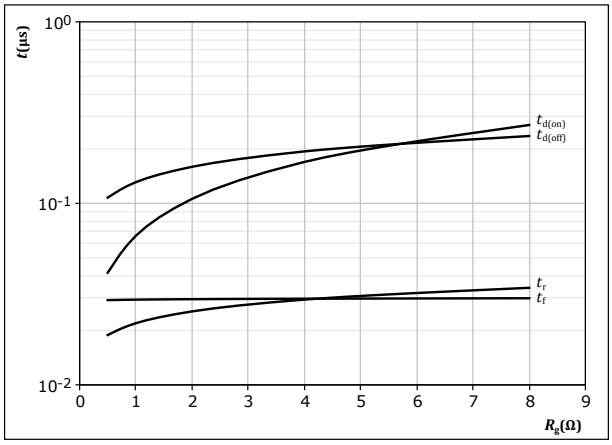
With an inductive load at

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

figure 23. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



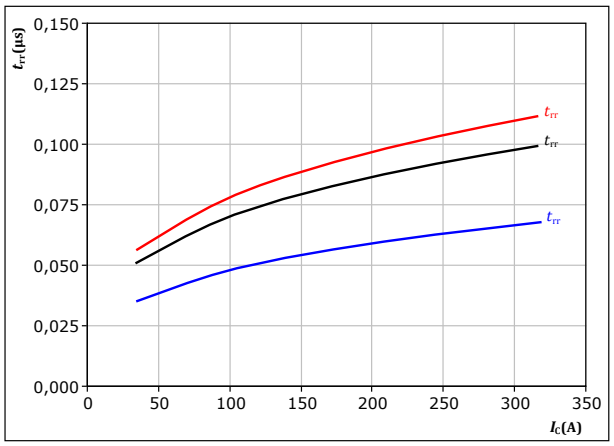
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	180	A

figure 24. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

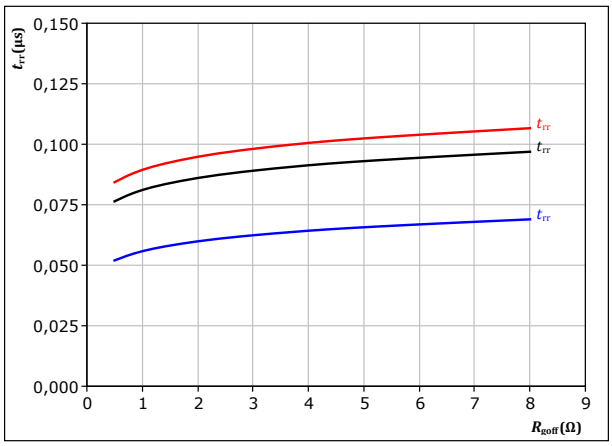
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 25. **FWD**

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

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



With an inductive load at

V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	180	A

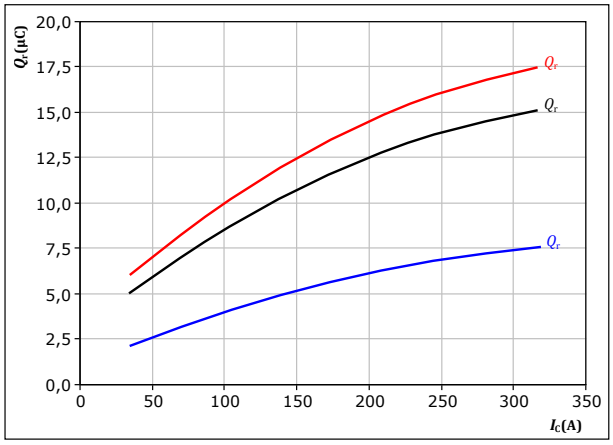
T_j: 25 °C, 125 °C, 150 °C

Buck Switching Characteristics

figure 26. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



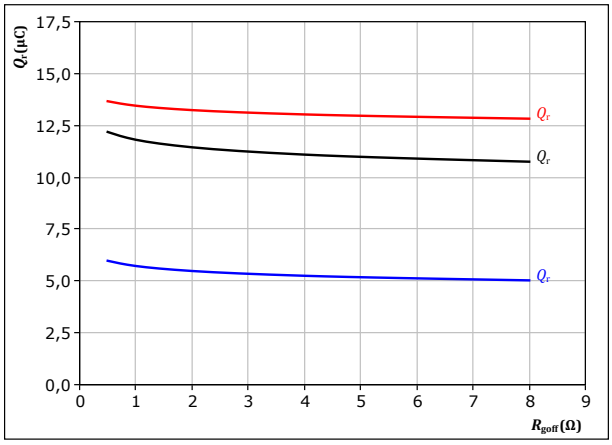
With an inductive load at

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

figure 27. **FWD**

Typical recovered charge as a function of turn off gate resistor

$Q_r = f(R_{goff})$



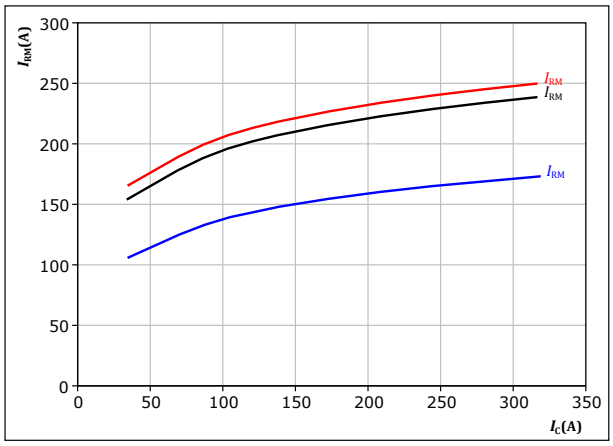
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	180	A	150 °C

figure 28. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



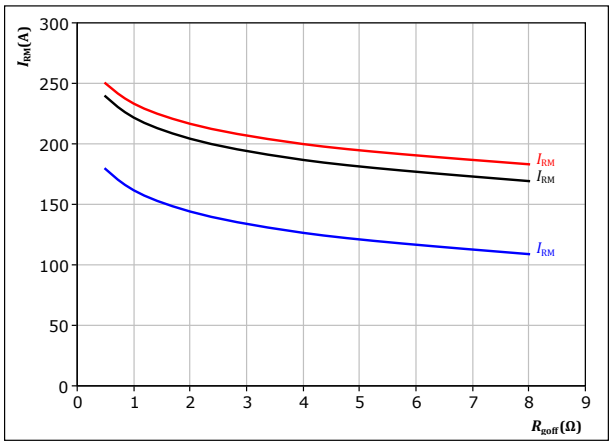
With an inductive load at

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

figure 29. **FWD**

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

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



With an inductive load at

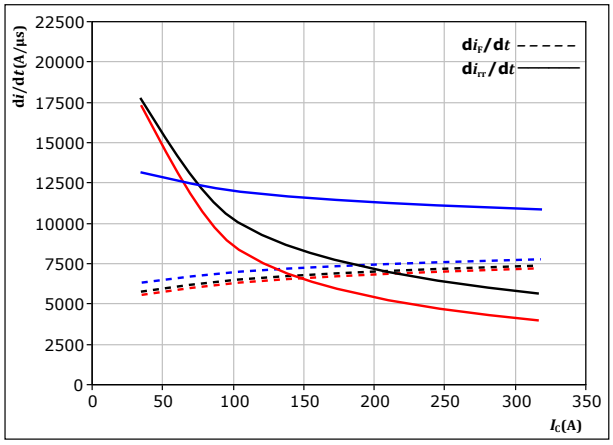
V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	180	A	150 °C

Buck Switching Characteristics

figure 30. **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)



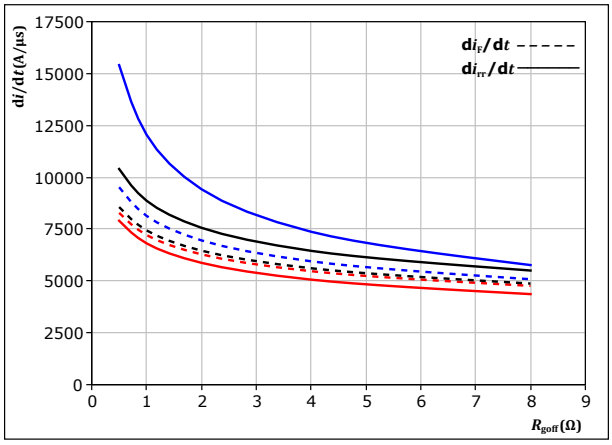
With an inductive load at

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

figure 31. **FWD**

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

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



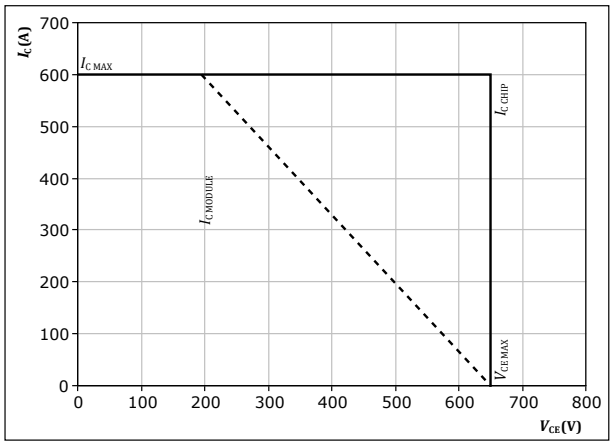
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

figure 32. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

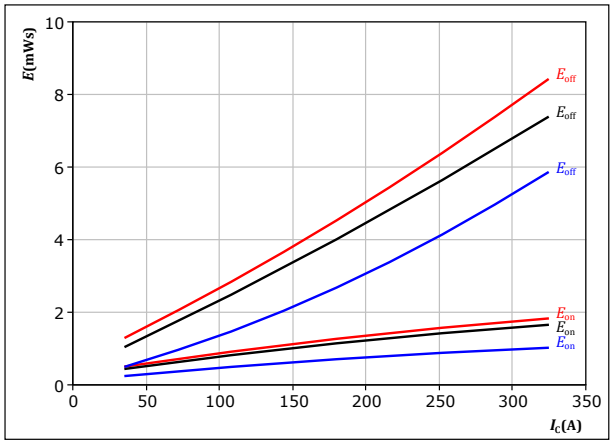
T_j =	150	°C	
R_{gon} =	2	Ω	
R_{goff} =	2	Ω	

Boost Switching Characteristics

figure 33. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



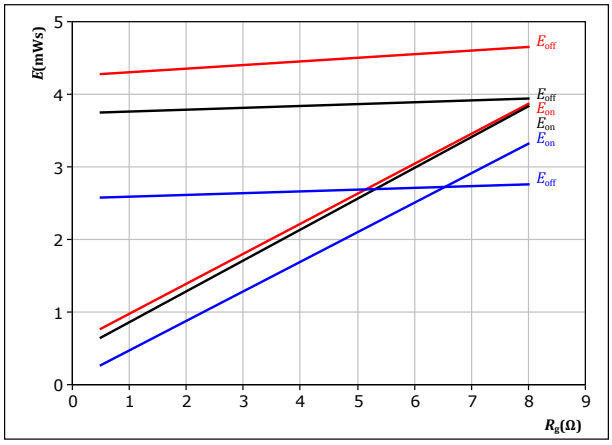
With an inductive load at

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 34. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



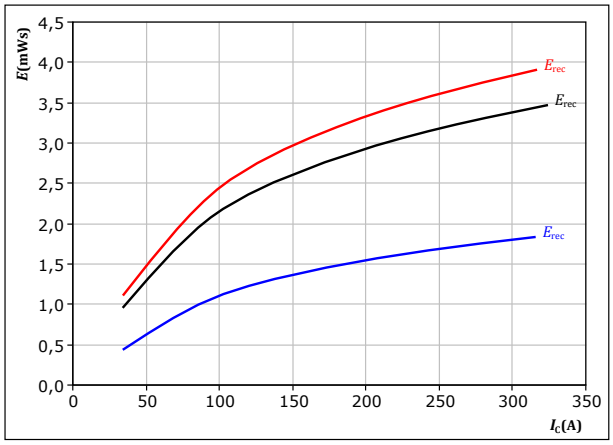
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

figure 35. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



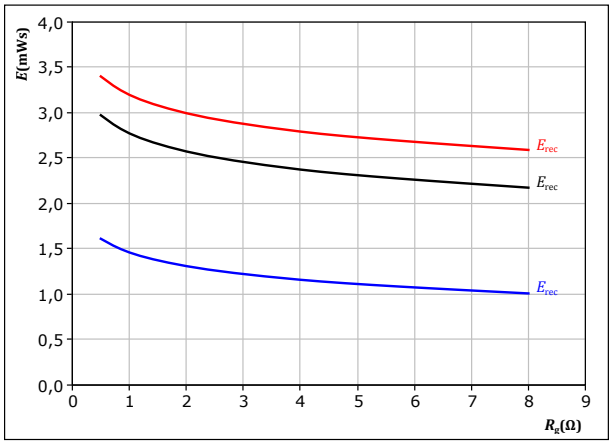
With an inductive load at

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

figure 36. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

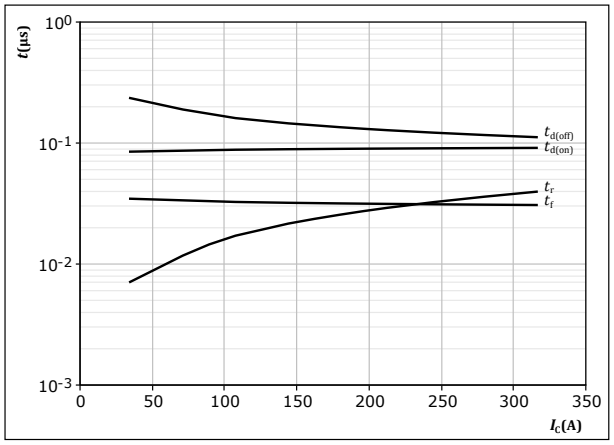
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

Boost Switching Characteristics

figure 37. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



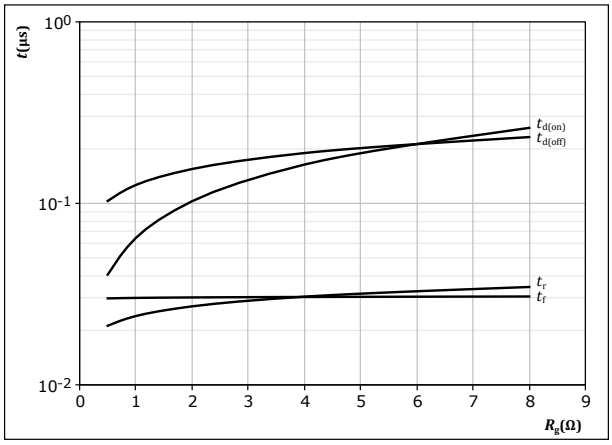
With an inductive load at

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

figure 38. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



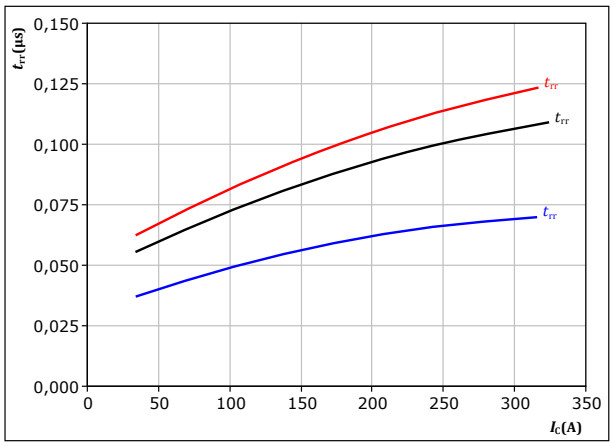
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	180	A

figure 39. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

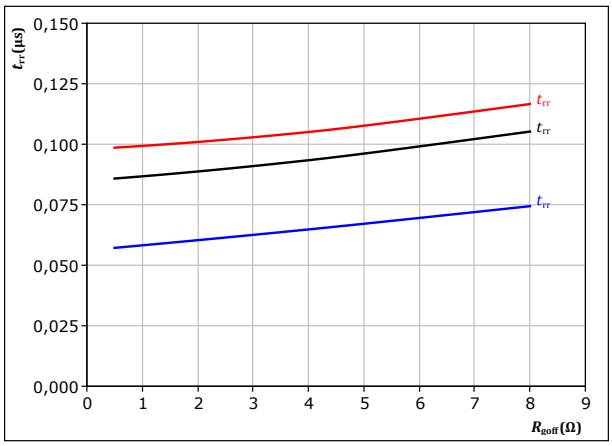
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 40. **FWD**

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

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



With an inductive load at

V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	180	A

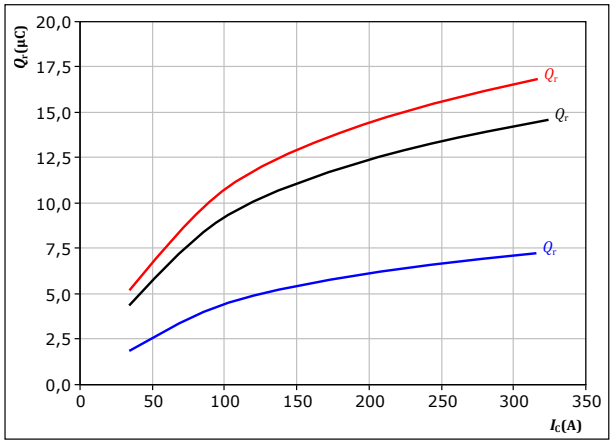
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 41. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



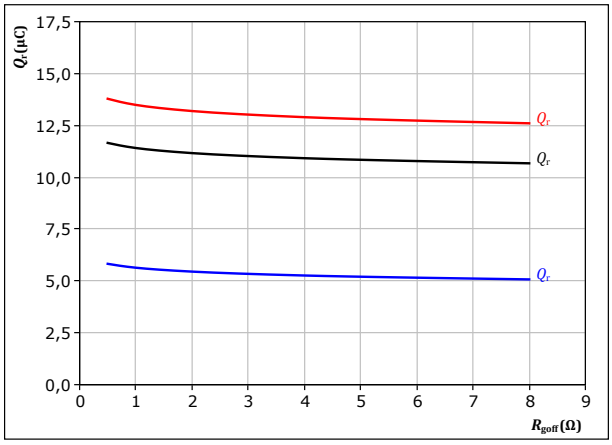
With an inductive load at

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

figure 42. **FWD**

Typical recovered charge as a function of turn off gate resistor

$Q_r = f(R_{goff})$



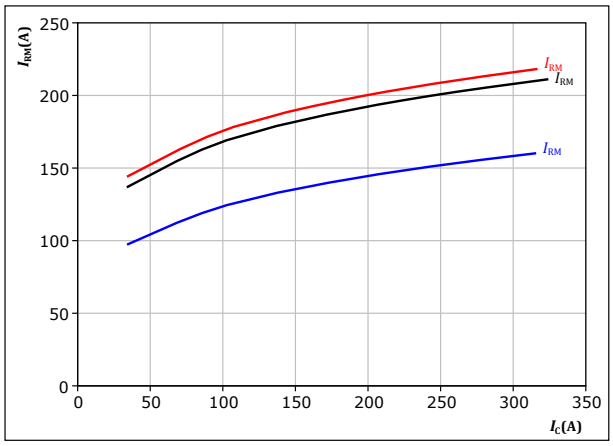
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	180	A	150 °C

figure 43. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



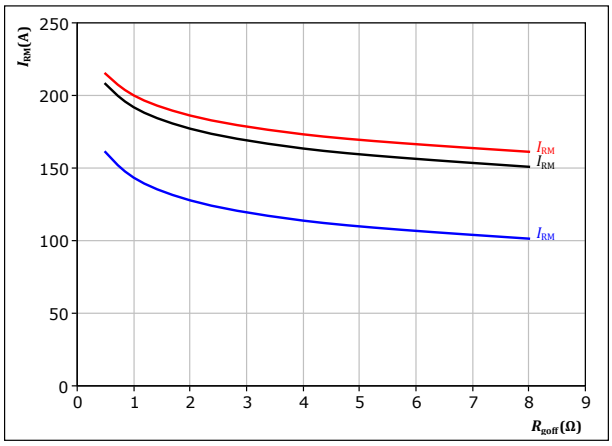
With an inductive load at

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

figure 44. **FWD**

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

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



With an inductive load at

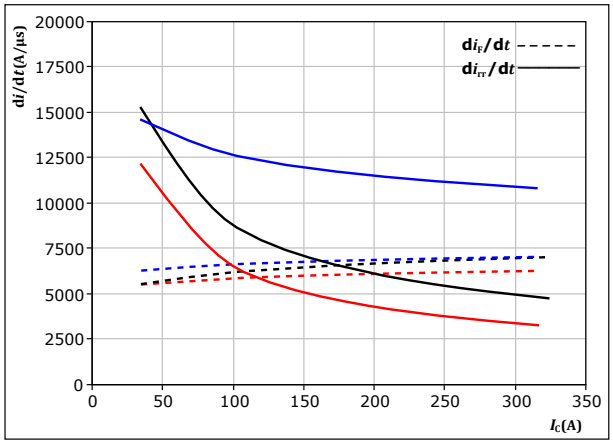
V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	±15	V	125 °C
I_C =	180	A	150 °C

Boost Switching Characteristics

figure 45. **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)



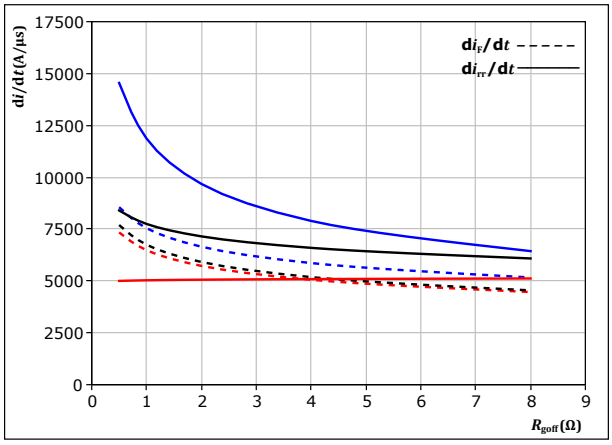
With an inductive load at

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

figure 46. **FWD**

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

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



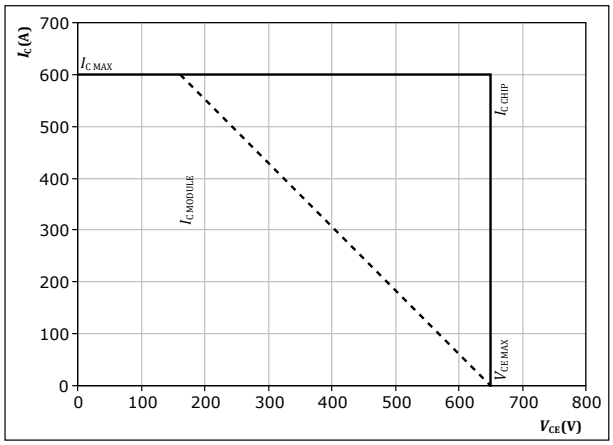
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

figure 47. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

T_j =	150	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Switching Definitions

figure 48. **IGBT**

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

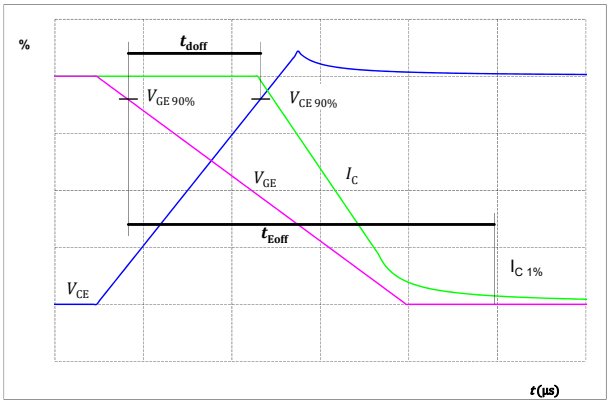


figure 49. **IGBT**

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

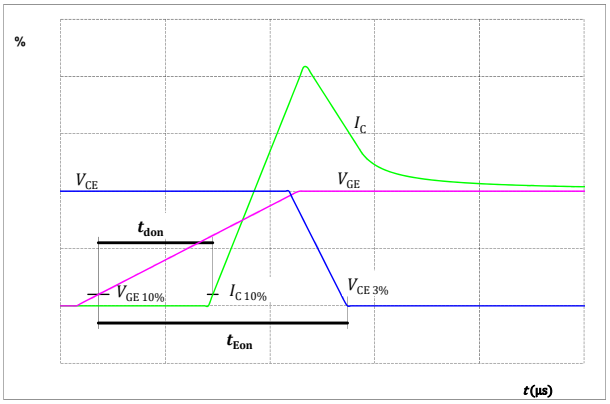


figure 50. **IGBT**

Turn-off Switching Waveforms & definition of t_f

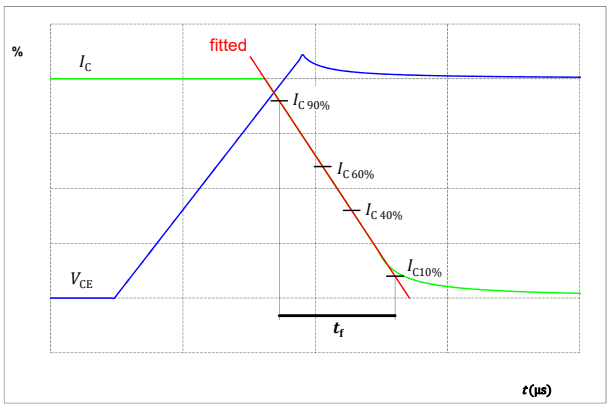
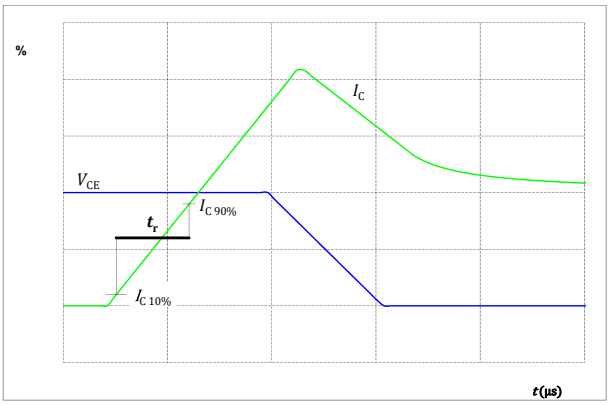


figure 51. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 52. **FWD**

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

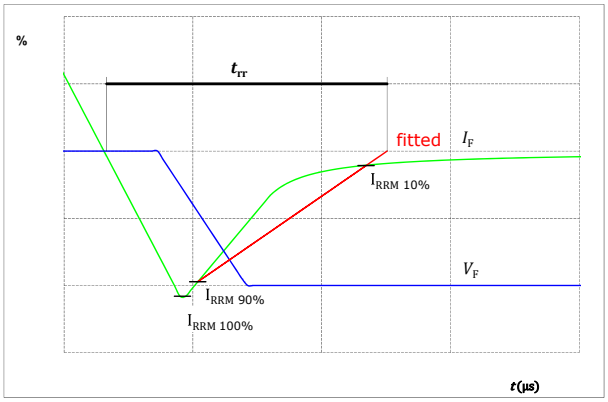
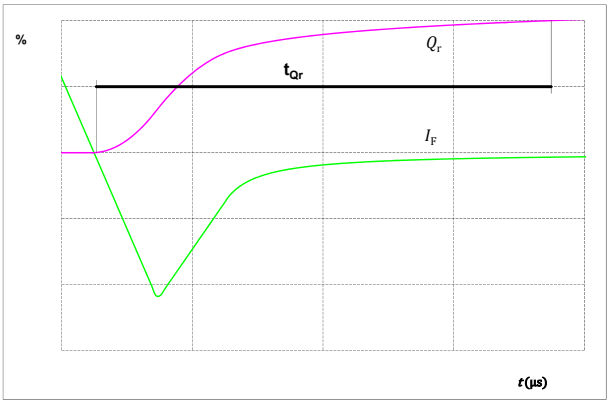


figure 53. **FWD**

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



Ordering Code

Version	Ordering Code
With thermal paste (4,4 W/mK, PTM6000)	B0-SP07NIA300S5-LM38F58T-/7/

Marking

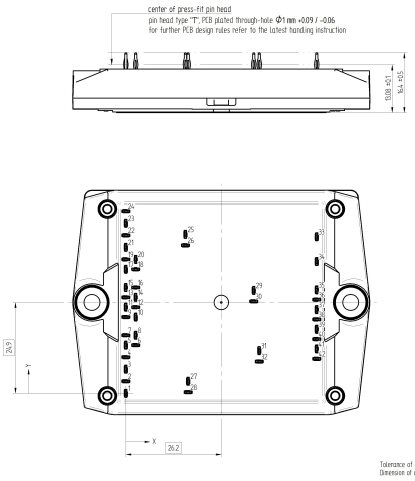
	Name	Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV	WWYY	UL VIN	LLLLL	SSSS

	Type&Ver	Lot number	Serial	Date code		
Datamatrix	TTTTTTVV	LLLLL	SSSS	WWYY		

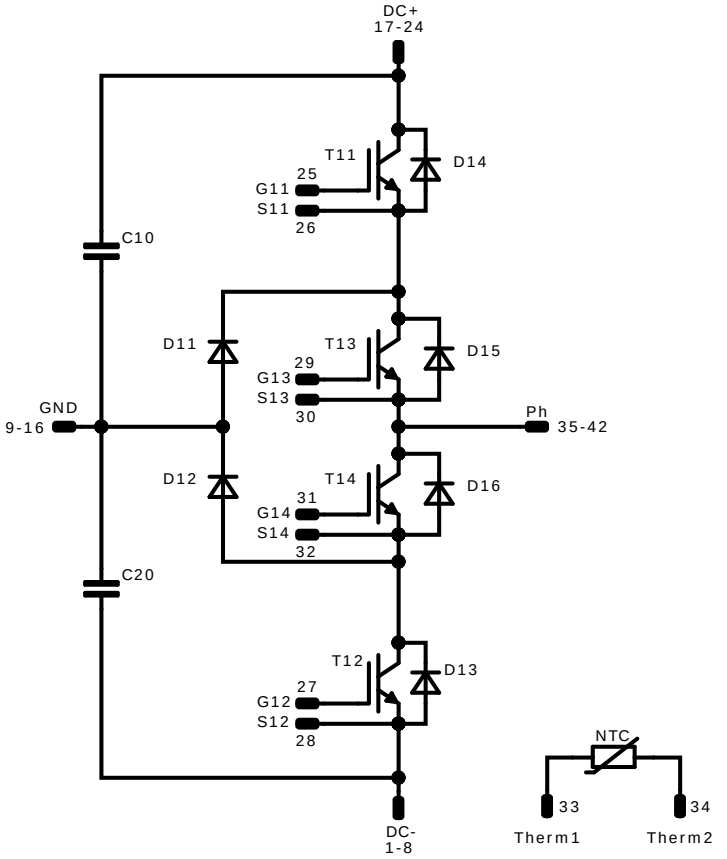
Outline

Pin table [mm]

Pin	X	Y	Function
1	0	0	DC-
2	0	3,3	DC-
3	0	6,6	DC-
4	0	9,9	DC-
5	0	13,2	DC-
6	2,7	13,2	DC-
7	0	15,9	DC-
8	2,7	15,9	DC-
9	0	20,9	GND
10	2,7	20,9	GND
11	0	23,6	GND
12	2,7	23,6	GND
13	0	26,3	GND
14	2,7	26,3	GND
15	0	29	GND
16	2,7	29	GND
17	0	34	DC+
18	2,7	34	DC+
19	0	36,7	DC+
20	2,7	36,7	DC+
21	0	40	DC+
22	0	43,3	DC+
23	0	46,6	DC+
24	0	49,9	DC+
25	16,35	43,55	G11
26	16,35	40,55	S11
27	17,1	3,3	G12
28	17,1	0,3	S12
29	35,1	28,2	G13
30	35,1	25,2	S13
31	36,6	11,7	G14
32	36,6	8,7	S14
33	52,4	42,9	Therm1
34	52,4	36,1	Therm2
35	52,4	28,35	Ph
36	52,4	25,65	Ph
37	52,4	22,95	Ph
38	52,4	20,25	Ph
39	52,4	17,55	Ph
40	52,4	14,85	Ph
41	52,4	12,15	Ph
42	52,4	9,45	Ph



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	
T13, T14	IGBT	650 V	300 A	Boost Switch	
D13, D14	FWD	650 V	300 A	Boost Diode	
D15, D16	FWD	650 V	300 A	Boost Sw. Inv. Diode	
C10, C20	Capacitor	630 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 45	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* S3 packages see vincotech.com website.

Package data
Package data for *flow* S3 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at 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
B0-SP07NIA300S5-LM38F58T-D1-14	19 Nov. 2020		
B0-SP07NIA300S5-LM38F58T-D2-14	7 Jul. 2021	Module marking is updated with UL logo, product is unchanged	