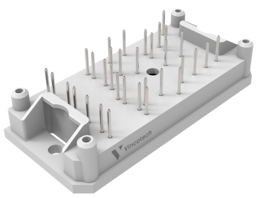
10-F112VPA015M7-LK88A74
datasheet

*flow*PACK 1	1200 V / 15 A

Topology features

- 3ph Vienna rectifier
- Inverter
- Open Emitter configuration
- Temperature sensor

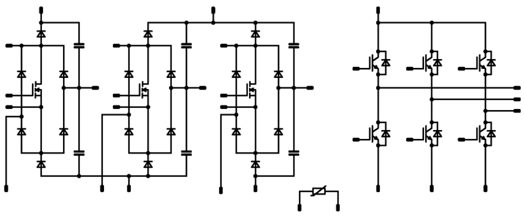
flow 1 17 mm housing



Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current
- Switching optimized for EMC

Schematic



Housing features

- Base isolation: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief

Target applications

- Embedded Drives
- Industrial Drives

Types

- 10-F112VPA015M7-LK88A74

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	22	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		30	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	60	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	22	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		30	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	45	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Boost Switch					
Drain-source voltage	V_{DSS}			600	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$	T_s = 80 °C	15	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}		100	A
Avalanche energy, single pulse	E_{AS}	V_{DD} = 50 V	I_D = 5,1 A	105	mJ
Avalanche energy, repetitive	E_{AR}	V_{DD} = 50 V	I_D = 5,1 A	0,53	mJ
MOSFET dv/dt ruggedness	dv/dt	V_{DS}= 0..400 V	T_s = 25 °C	80	V/ns
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	45	W
Gate-source voltage	V_{GSS}			±20	V
Reverse diode dv/dt	dv/dt			50	V/ns
Maximum Junction Temperature	T_{jmax}			150	°C
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	22	A
Surge (non-repetitive) forward current	I_{FSM}		T_j = 25 °C	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	41	W
Maximum junction temperature	T_{jmax}			150	°C
Rectifier Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	27	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 8,3 ms	T_j = 25 °C	150	A
Surge current capability	I^2t			112	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	34	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		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 s	6000	V
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				12,67	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
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		15	25 125 150		1,7 1,95 2,01	2,1(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			60	µA
Gate-emitter leakage current	I_{GES}		0	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}		0	10		25		2900		pF
Output capacitance	C_{oes}		0	10		25		120		pF
Reverse transfer capacitance	C_{res}		0	10		25		34		pF
Gate charge	Q_g	V_{CC} = 600 V	0/15		15	25		110		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,6		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 21,3 Ω R_{goff} = 21,3 Ω	±15	600	15	25 125 150		140,8 138,24 137,92		ns
Rise time	t_r	R_{gon} = 21,3 Ω R_{goff} = 21,3 Ω	±15	600	15	25 125 150		39,04 42,56 45,12		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 21,3 Ω R_{goff} = 21,3 Ω	±15	600	15	25 125 150		158,4 180,16 181,76		ns
Fall time	t_f	R_{gon} = 21,3 Ω R_{goff} = 21,3 Ω	±15	600	15	25 125 150		99,01 116,66 117,1		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=1,42 µC Q_{rFWD}=2,24 µC Q_{rFWD}=2,57 µC	±15	600	15	25 125 150		1,32 1,69 1,89		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	15	25 125 150		1,06 1,41 1,53		mWs

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
Inverter Diode										
Static										
Forward voltage	V_F				15	25 125 150		1,63 1,74 1,73	1,9(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			30	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,11		K/W
Dynamic										
Peak recovery current	I_{RRM}	d*i*/d*t*=299 A/µs d*i*/d*t*=278 A/µs d*i*/d*t*=291 A/µs	±15	600	15	25 125 150		11,37 12,4 12,74		A
Reverse recovery time	t_{rr}					25 125 150		252,95 381,91 431,74		ns
Recovered charge	Q_r					25 125 150		1,42 2,24 2,57		µC
Reverse recovered energy	E_{rec}					25 125 150		0,499 0,847 0,983		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		104,91 69,84 62,53		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										
Drain-source on-state resistance	$r_{DS(on)}$		10		10,5	25 125		94,4 168	99(1)	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,00053	25	3	3,5	4	V
Gate to Source Leakage Current	I_{GSS}		20	0		25			100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	600		25			1	μA
Internal gate resistance	r_g							5,9		Ω
Gate charge	Q_g		0/10	400	10,5	25		45		nC
Short-circuit input capacitance	C_{iss}	f = 250 kHz	0	400	0	25		1952		pF
Short-circuit output capacitance	C_{oss}							33		
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,57		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	0/10	400	15	25 125		35,84 33,6		ns
Rise time	t_r					25 125		9,28 10,24		ns
Turn-off delay time	$t_{d(off)}$					25 125		132,8 146,56		ns
Fall time	t_f					25 125		6,52 7,06		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,146 μC Q_{rFWD}=0,444 μC				25 125		0,122 0,239		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,086 0,098		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				15	25 125	1,88	2,47 1,73	2,73[1]	V
Reverse leakage current	I_R	V_r = 600 V				25			100	µA
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,71		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=1962 A/µs di/dt=1704 A/µs	0/10	400	15	25 125		16,98 24,21		A
Reverse recovery time	t_{rr}					25 125		14,8 33,06		ns
Recovered charge	Q_r					25 125		0,146 0,444		µC
Reverse recovered energy	E_{rec}					25 125		0,043 0,099		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		4283 1773		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	
Rectifier Diode										
Static										
Forward voltage	V_F				7	25 125 150		1,01 0,922	1,11(1) 1,01(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			5 700	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,03		K/W
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		47		nF
Tolerance							-10		10	%
Dissipation factor		f = 1 kHz				25		2,5		%

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	
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					25		130		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

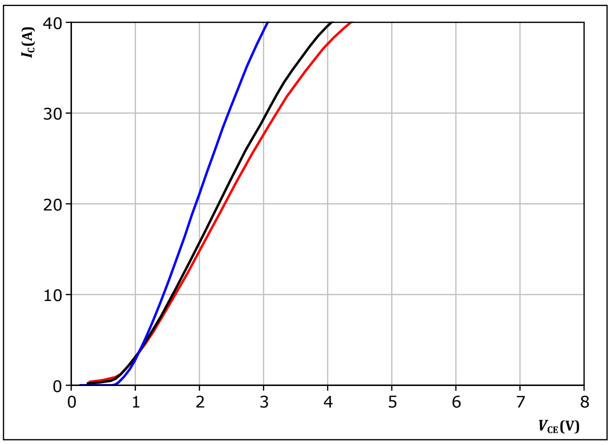
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



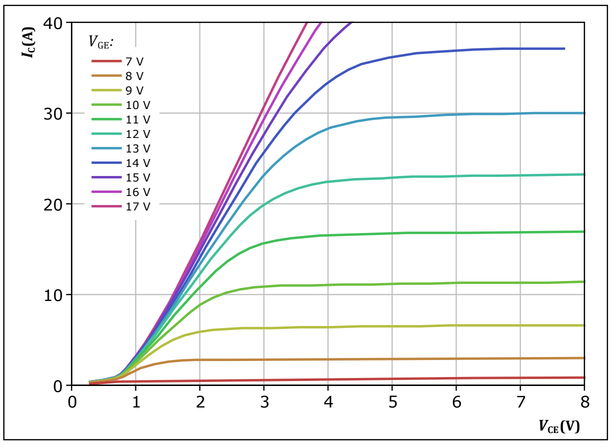
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



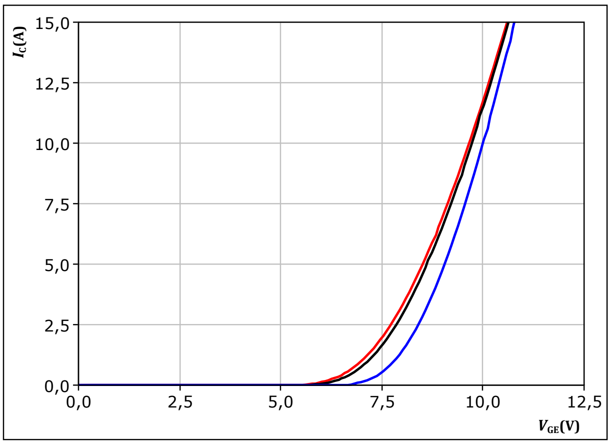
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$



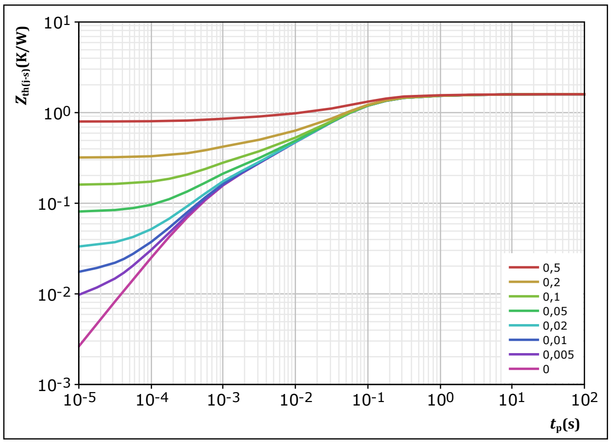
t_p =	250	µs
V_{CE} =	10	V

T_j: 25 °C, 125 °C, 150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,595 K/W

IGBT thermal model values

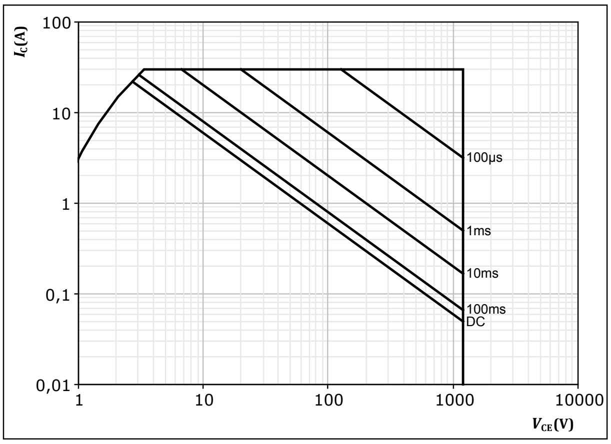
R (K/W)	τ (s)
4,90E-02	4,40E+00
1,40E-01	5,34E-01
8,04E-01	8,02E-02
2,98E-01	2,57E-02
1,69E-01	5,09E-03
1,35E-01	6,41E-04

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

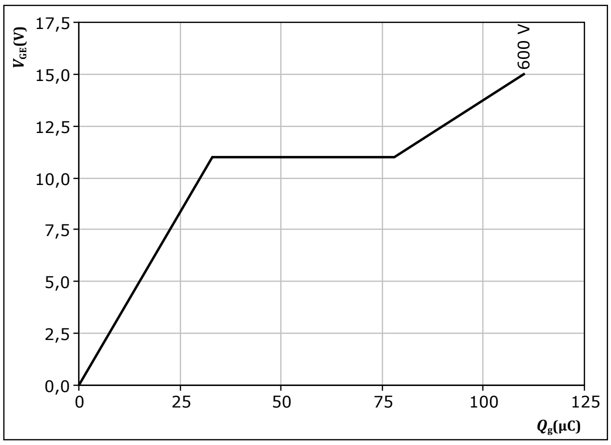


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



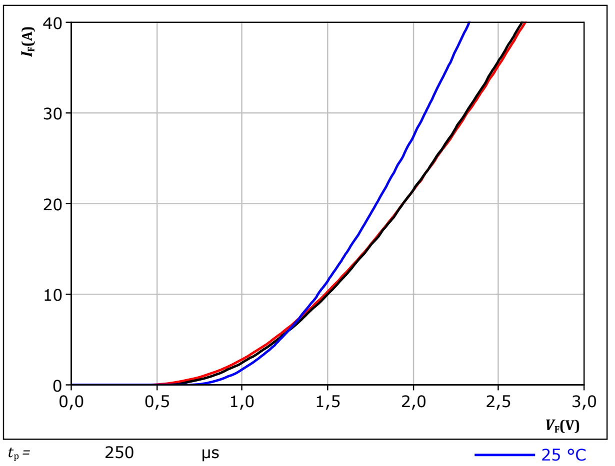
I_C =	15	A
T_j =	25	°C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



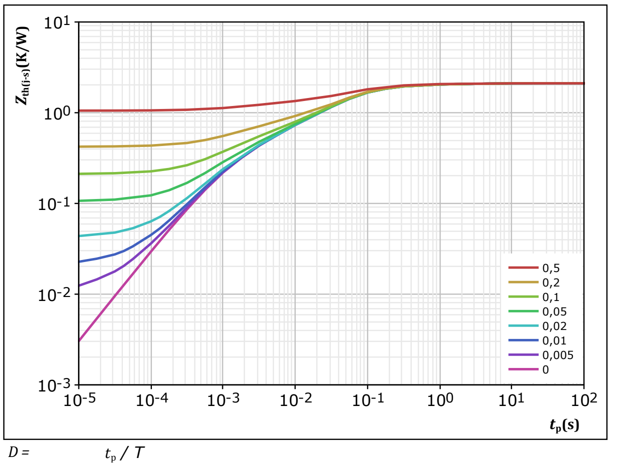
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,108 K/W

FWD thermal model values

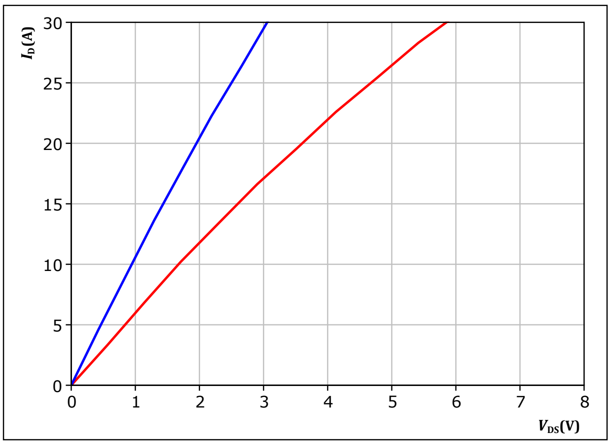
R (K/W)	τ (s)
8,99E-02	2,33E+00
4,04E-01	1,91E-01
1,05E+00	4,49E-02
3,39E-01	6,08E-03
2,29E-01	1,02E-03

Boost Switch Characteristics

figure 9. MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



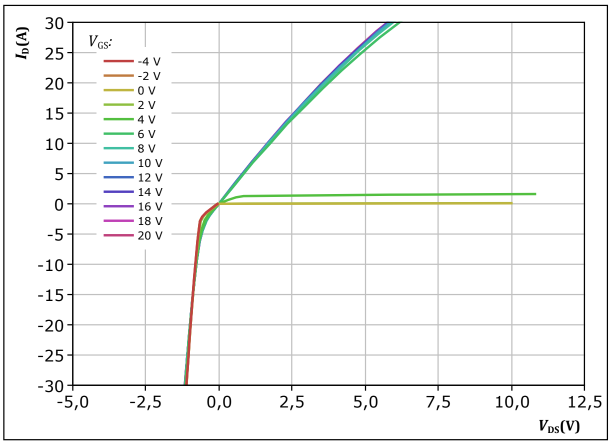
t_p =	250	µs
V_{GS} =	10	V

T_j: 25 °C (blue), 125 °C (red)

figure 10. MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



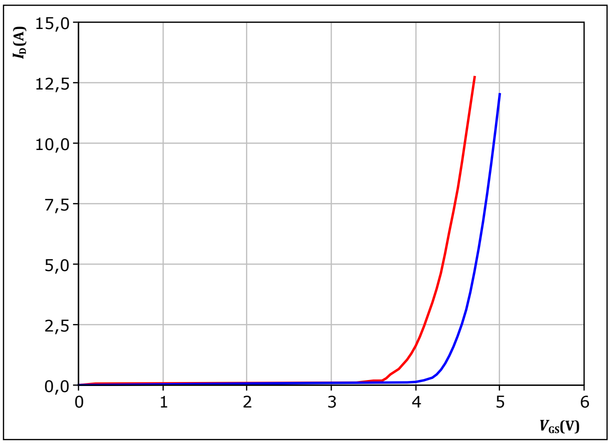
t_p =	250	µs
T_j =	125	°C

V_{GS} from -4 V to 20 V in steps of 2 V

figure 11. MOSFET

Typical transfer characteristics

$I_D = f(V_{GS})$



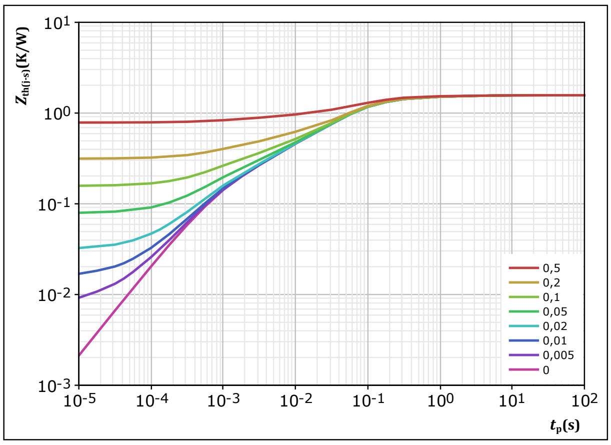
t_p =	250	µs
V_{DS} =	10	V

T_j: 25 °C (blue), 125 °C (red)

figure 12. MOSFET

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,57	K/W

MOSFET thermal model values

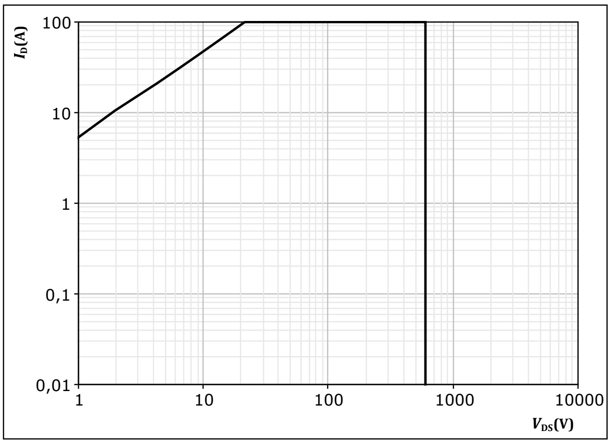
R (K/W)	τ (s)
6,39E-02	3,03E+00
2,01E-01	3,38E-01
9,37E-01	6,22E-02
2,33E-01	6,81E-03
1,35E-01	8,27E-04

Boost Switch Characteristics

figure 13.	MOSFET

Safe operating area

I_D = f(V_{DS})



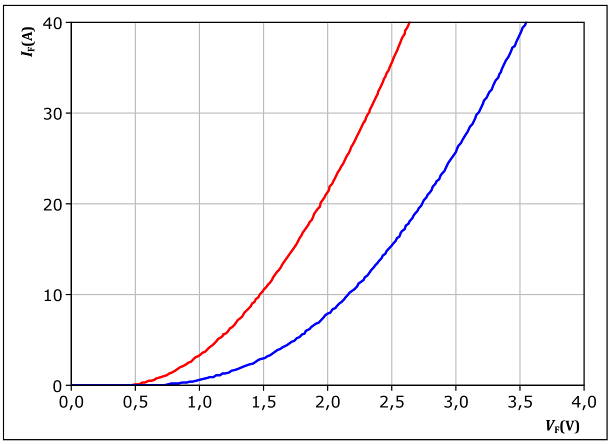
D =	single pulse	
T_s =	80	°C
V_{GS} =	10	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 14. **FWD**

Typical forward characteristics

I_F = f(V_F)



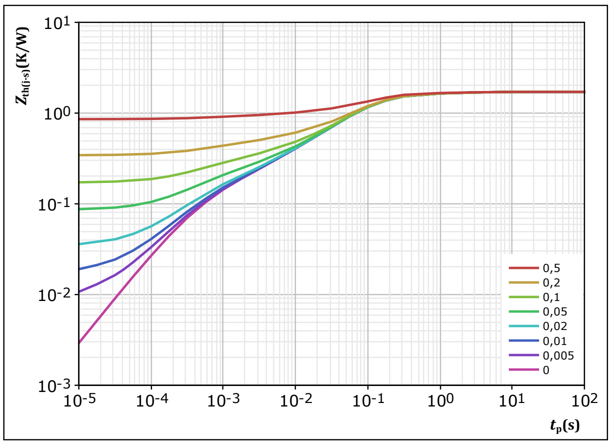
t_p = 250 µs

T_j: 25 °C, 125 °C

figure 15. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,713 K/W

FWD thermal model values

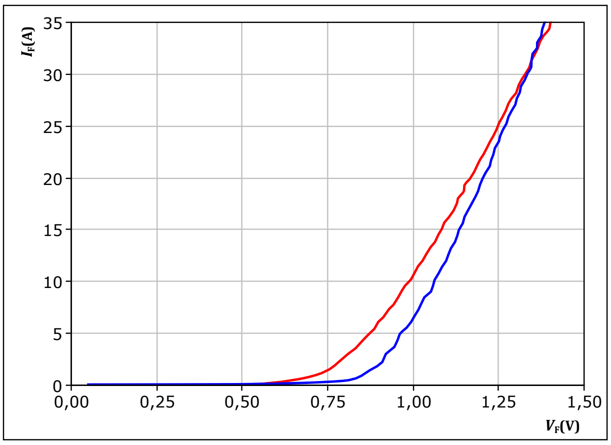
R (K/W)	τ (s)
7,49E-02	2,70E+00
1,69E-01	4,49E-01
9,61E-01	9,37E-02
2,39E-01	3,41E-02
1,24E-01	6,38E-03
7,56E-02	1,23E-03
7,06E-02	3,59E-04

Rectifier Diode Characteristics

figure 16. **Rectifier**

Typical forward characteristics

I_F = f(V_F)



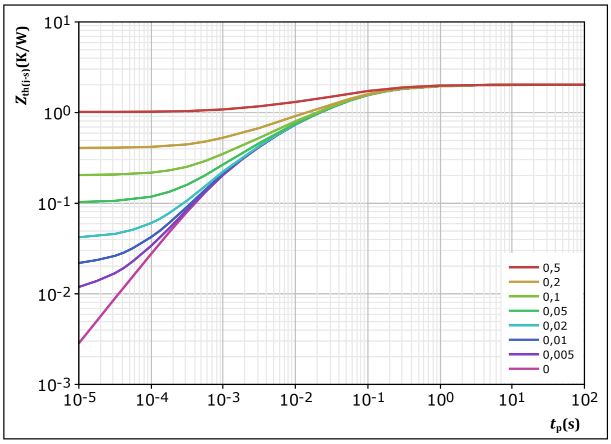
t_p = 250 µs

T_j: 25 °C, 125 °C

figure 17. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,032 K/W

Rectifier thermal model values

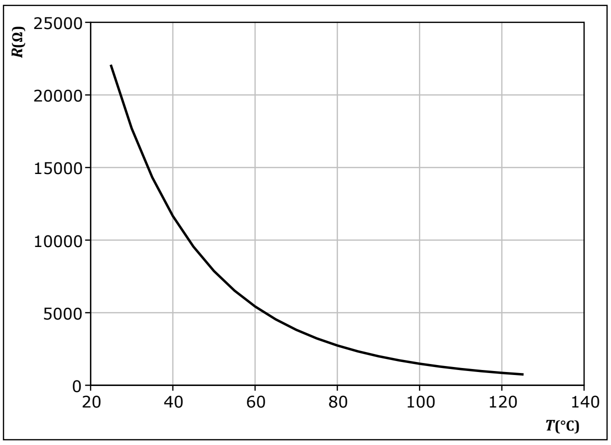
R (K/W)	τ (s)
1,06E-01	2,32E+00
4,93E-01	2,00E-01
7,85E-01	4,15E-02
4,66E-01	6,59E-03
1,83E-01	9,43E-04

Thermistor Characteristics

figure 18.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

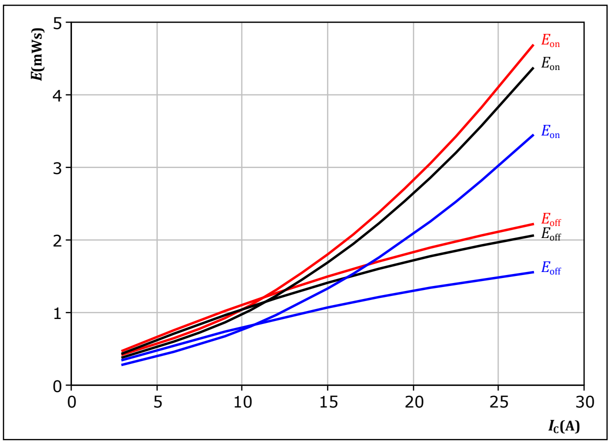


Inverter Switching Characteristics

figure 19. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



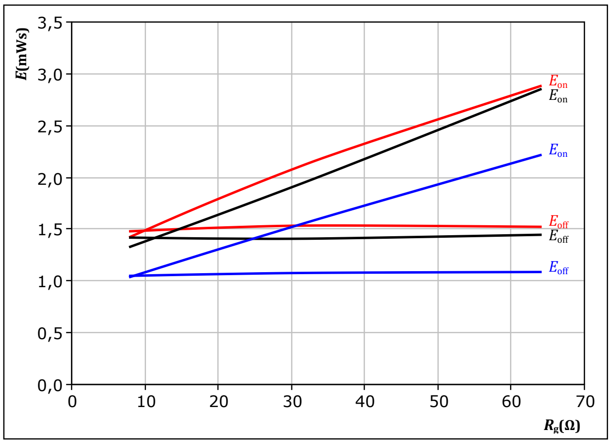
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	21,3	Ω		150 °C
R_{goff} =	21,3	Ω		

figure 20. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

E = f(R_g)



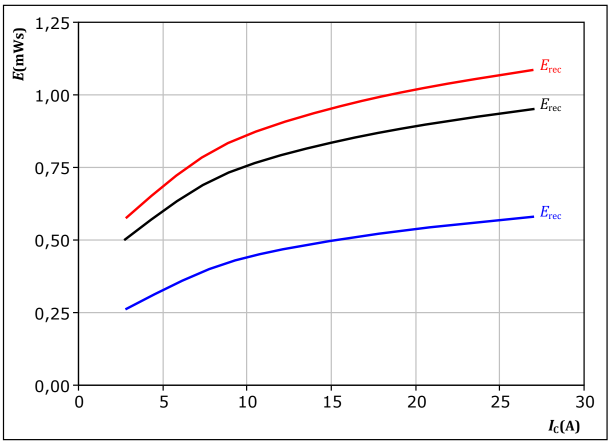
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	15	A		150 °C

figure 21. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



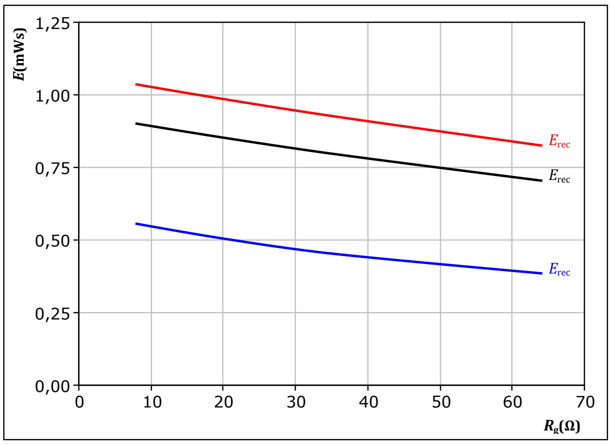
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	21,3	Ω		150 °C

figure 22. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

E_{rec} = f(R_g)



With an inductive load at

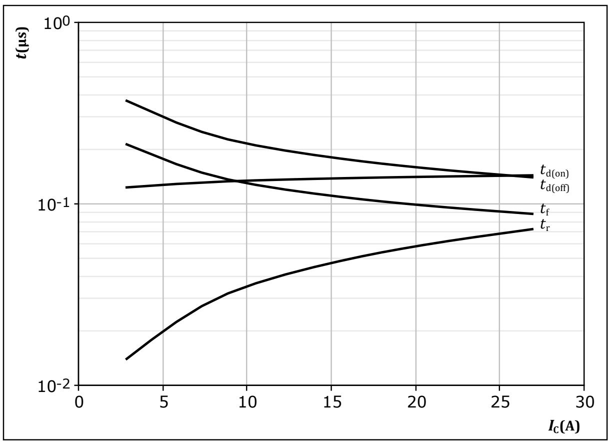
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	15	A		150 °C

Inverter Switching Characteristics

figure 23. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



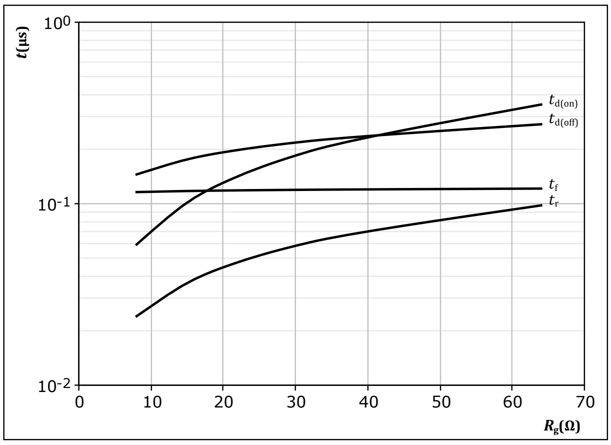
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	21,3	Ω
R_{goff} =	21,3	Ω

figure 24. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

t = f(R_g)



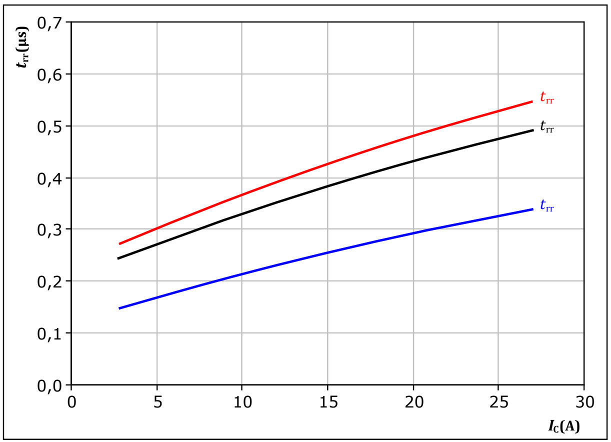
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	15	A

figure 25. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

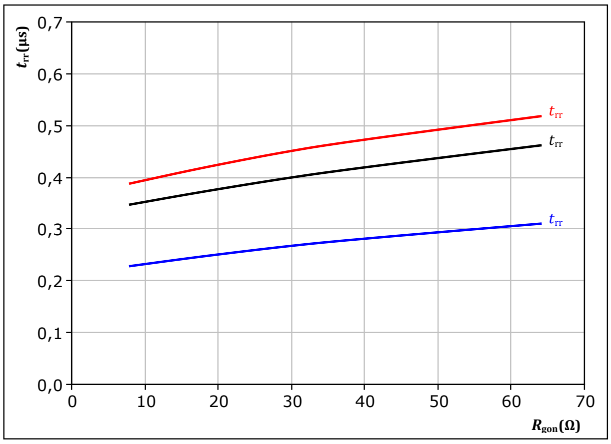
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	21,3	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 26. **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} =	600	V
V_{GE} =	±15	V
I_C =	15	A

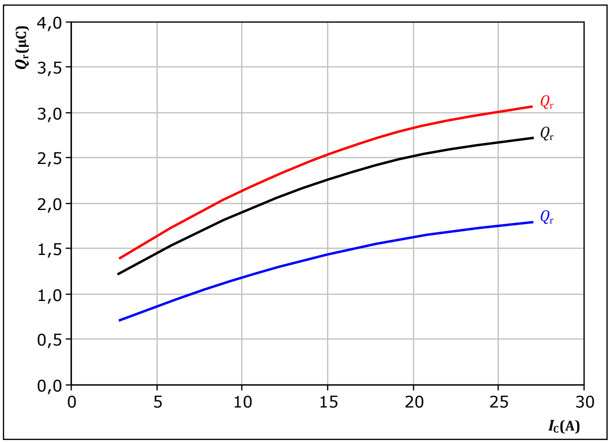
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 27. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



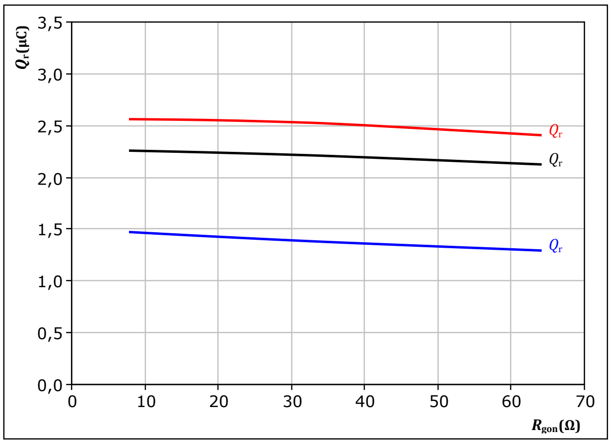
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	21,3	Ω		150 °C

figure 28. FWD

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

$Q_r = f(R_{gon})$



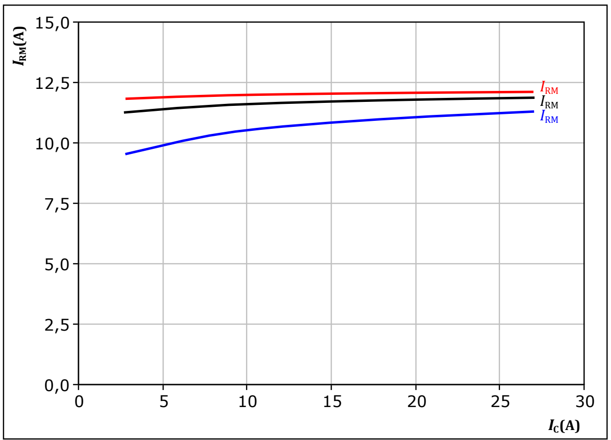
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	15	A		150 °C

figure 29. FWD

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



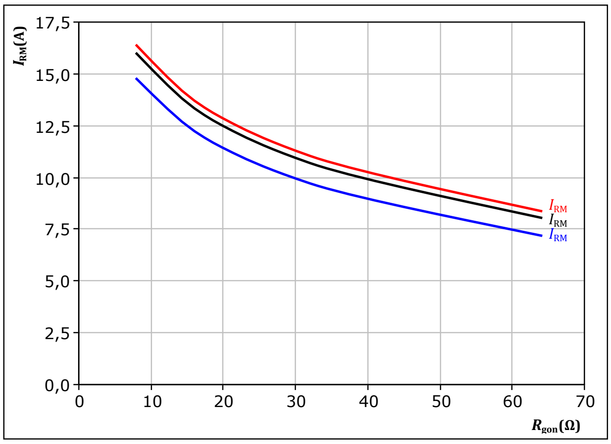
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	21,3	Ω		150 °C

figure 30. 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

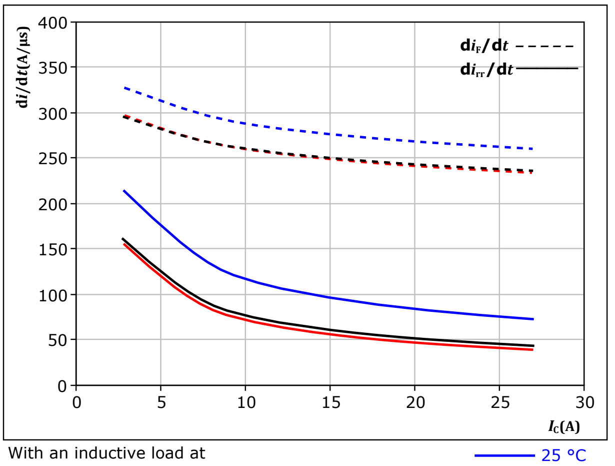
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	15	A		150 °C

Inverter Switching Characteristics

figure 31. **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)



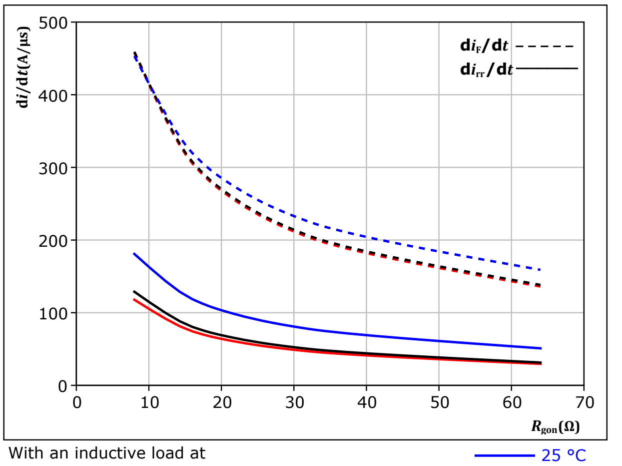
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	21,3	Ω		150 °C

figure 32. **FWD**

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

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



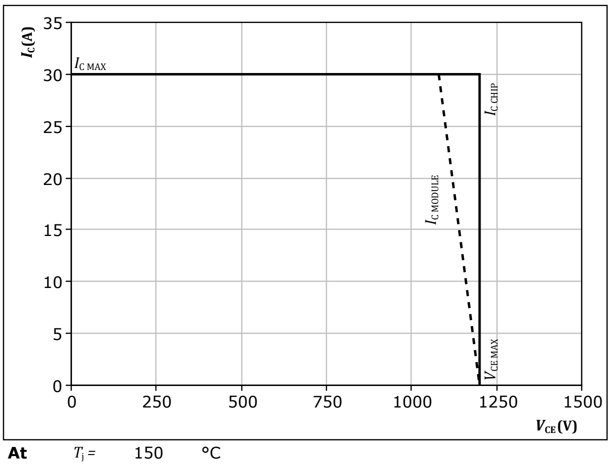
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	15	A		150 °C

figure 33. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



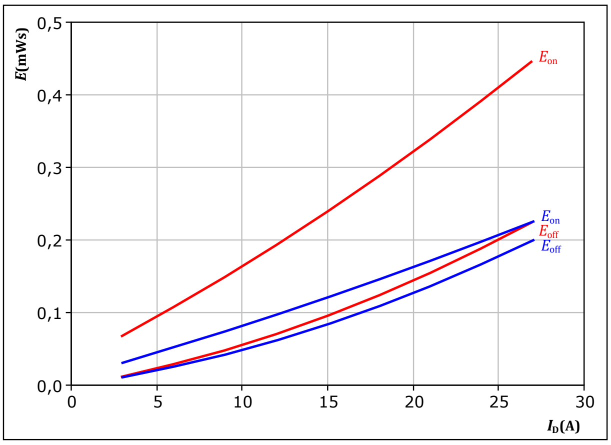
At	T_j =	150	°C
	R_{gon} =	21,3	Ω
	R_{goff} =	21,3	Ω

Boost Switching Characteristics

figure 34. MOSFET

Typical switching energy losses as a function of drain current

$E = f(I_D)$



With an inductive load at

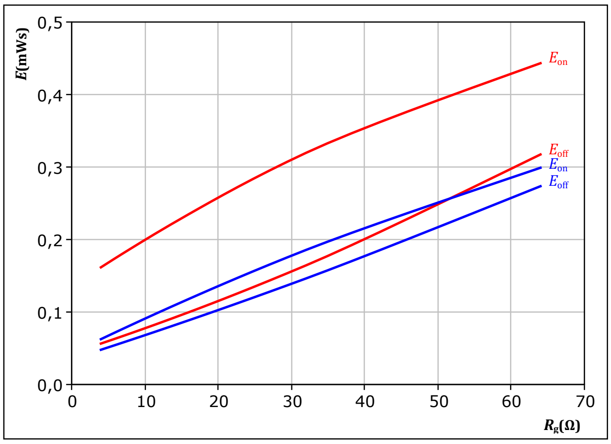
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

T_j: 25 °C (blue), 125 °C (red)

figure 35. MOSFET

Typical switching energy losses as a function of MOSFET turn on gate resistor

$E = f(R_g)$



With an inductive load at

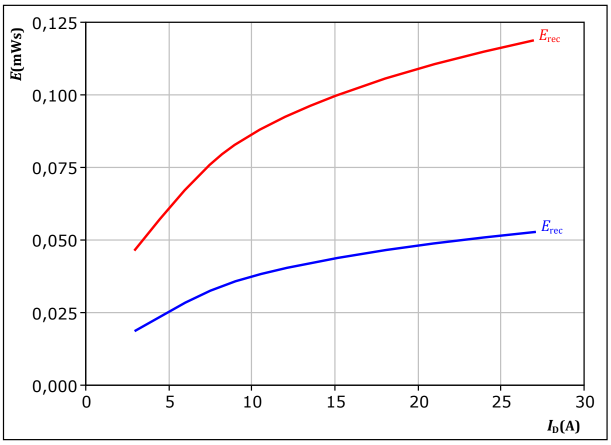
V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	15	A

T_j: 25 °C (blue), 125 °C (red)

figure 36. MOSFET

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



With an inductive load at

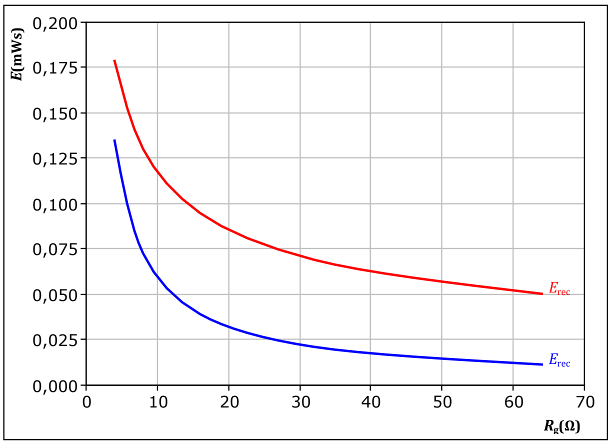
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	16	Ω

T_j: 25 °C (blue), 125 °C (red)

figure 37. MOSFET

Typical reverse recovered energy loss as a function of MOSFET turn on gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	15	A

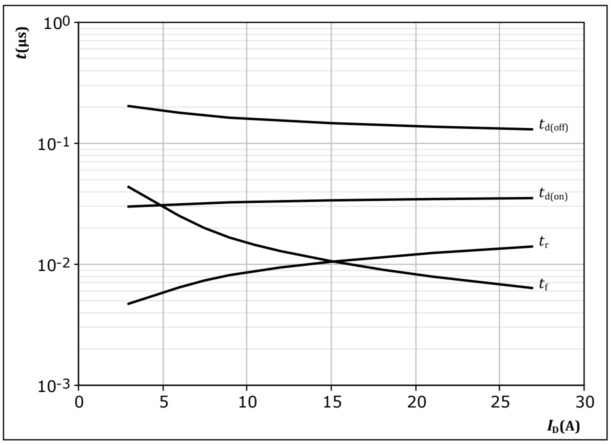
T_j: 25 °C (blue), 125 °C (red)

Boost Switching Characteristics

figure 38. MOSFET

Typical switching times as a function of drain current

t = f(I_D)



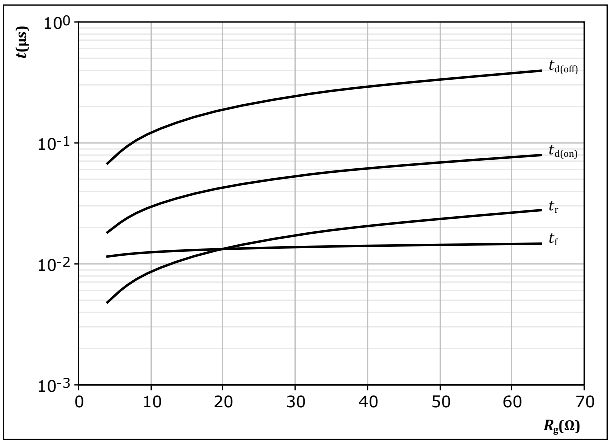
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 39. MOSFET

Typical switching times as a function of MOSFET turn on gate resistor

t = f(R_g)



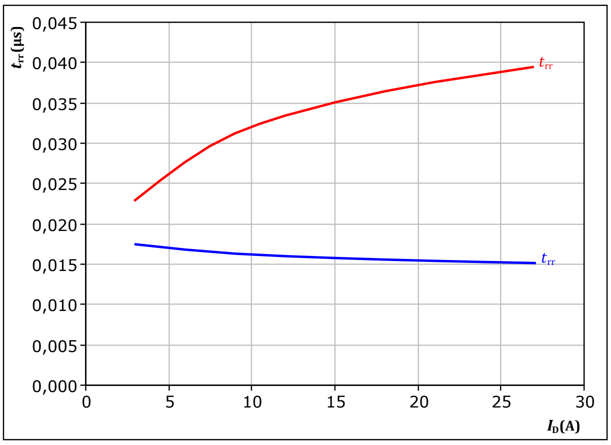
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	15	A

figure 40. MOSFET

Typical reverse recovery time as a function of drain current

t_{rr} = f(I_D)



At

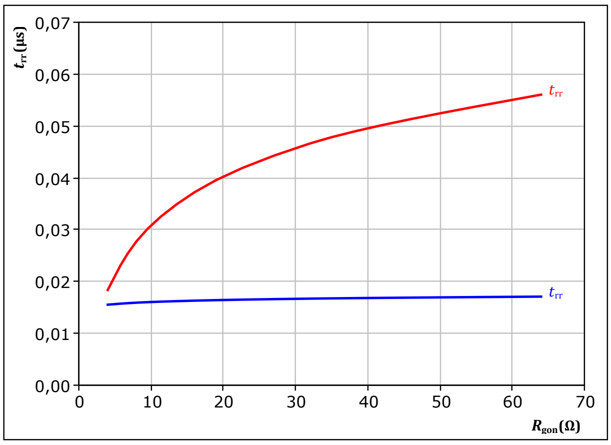
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	16	Ω

T_j: 25 °C / 125 °C

figure 41. MOSFET

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

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



At

V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	15	A

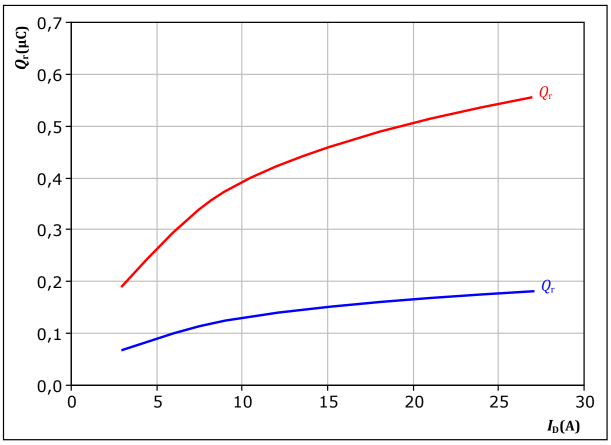
T_j: 25 °C / 125 °C

Boost Switching Characteristics

figure 42. **MOSFET**

Typical recovered charge as a function of drain current

Q_r = f(I_D)

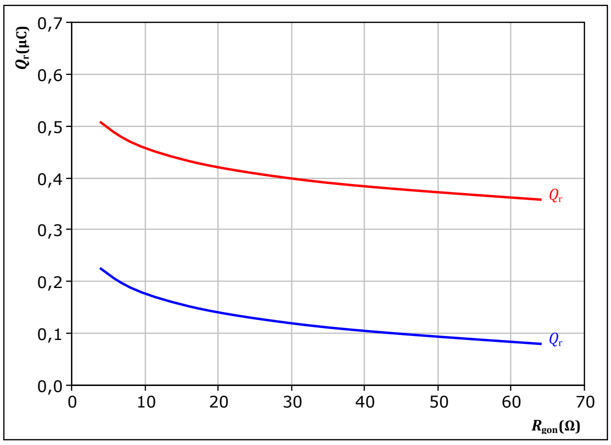


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
R_{gon} =	16	Ω		

figure 43. **MOSFET**

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

Q_r = f(R_{gon})

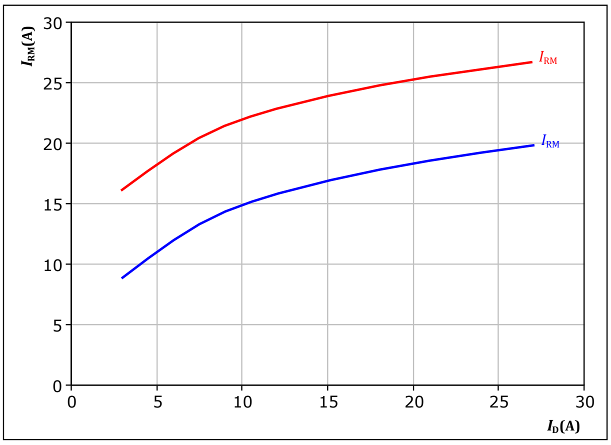


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
I_D =	15	A		

figure 44. **MOSFET**

Typical peak reverse recovery current as a function of drain current

I_{RM} = f(I_D)

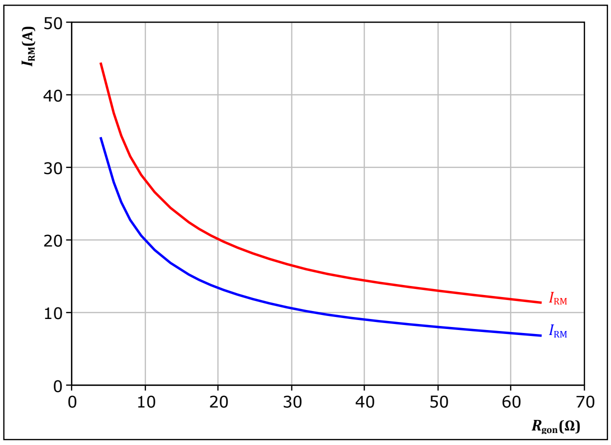


At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
R_{gon} =	16	Ω		

figure 45. **MOSFET**

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

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



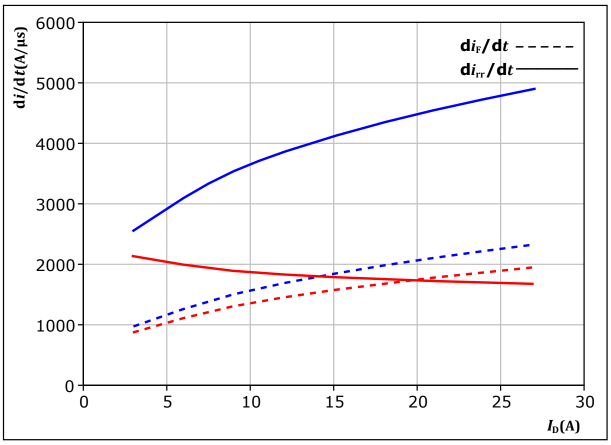
At				
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/10	V		125 °C
I_D =	15	A		

Boost Switching Characteristics

figure 46. MOSFET

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

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

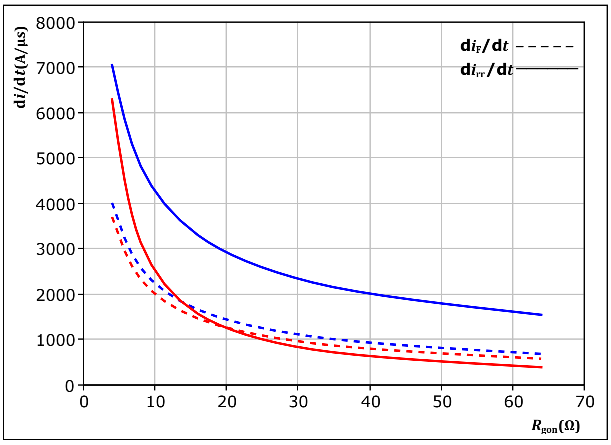


At				
	V_{DS} =	400	V	
	V_{GS} =	0/10	V	T_j: 25 °C / 125 °C
	R_{gon} =	16	Ω	

figure 47. MOSFET

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

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

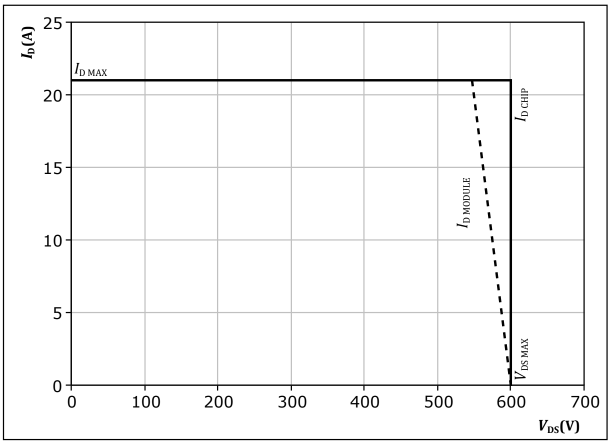


At				
	V_{DS} =	400	V	
	V_{GS} =	0/10	V	T_j: 25 °C / 125 °C
	I_D =	15	A	

figure 48. MOSFET

Reverse bias safe operating area

I_D = f(V_{DS})



At			
	T_j =	125	°C
	R_{gon} =	16	Ω
	R_{goff} =	16	Ω

Inverter Switching Definitions

figure 49. **IGBT**

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

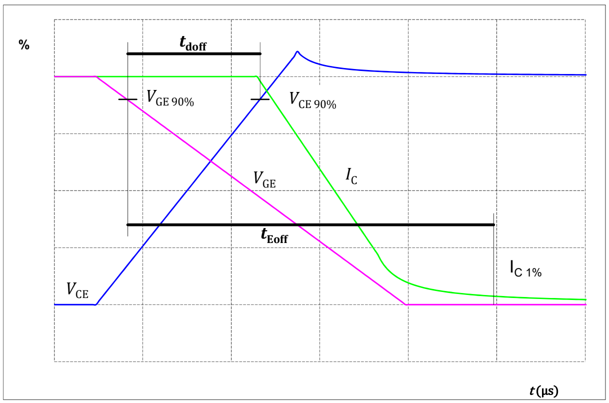


figure 50. **IGBT**

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

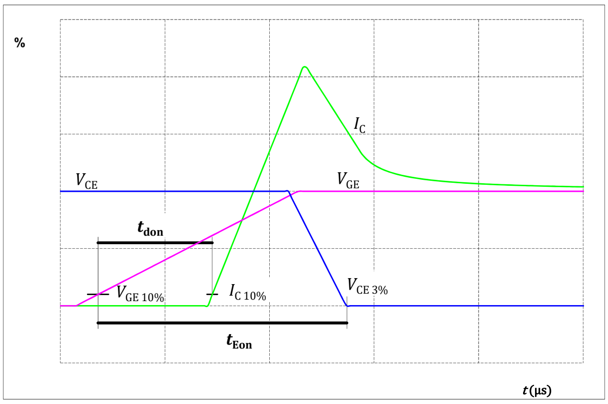


figure 51. **IGBT**

Turn-off Switching Waveforms & definition of t_f

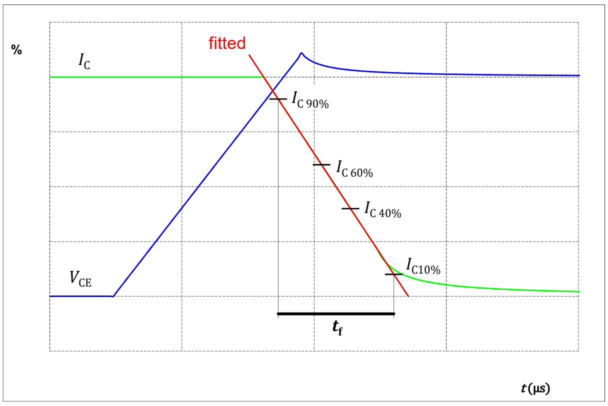
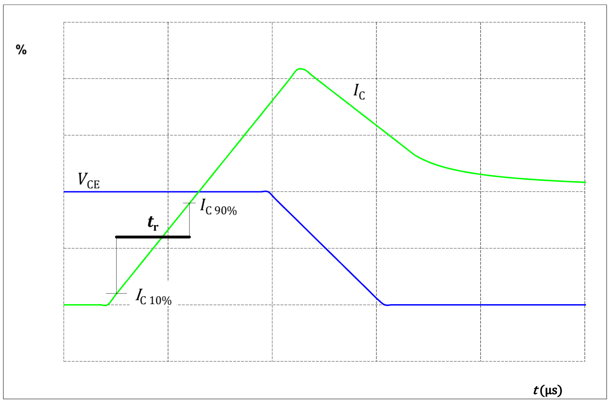


figure 52. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Inverter Switching Definitions

figure 53. **FWD**

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

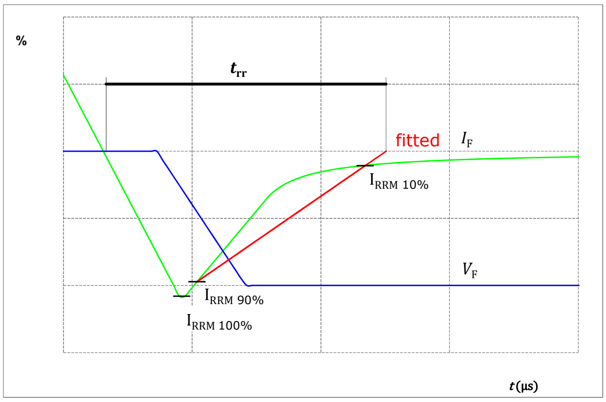
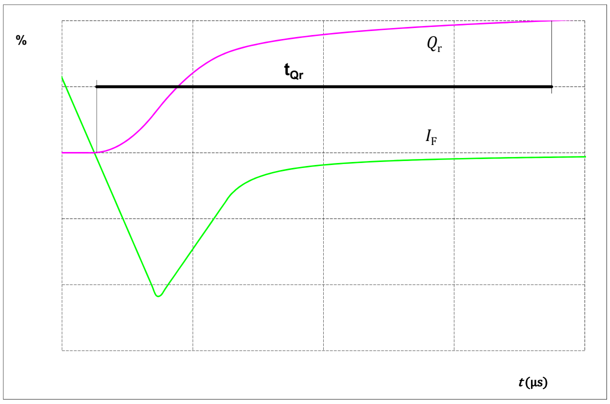


figure 54. **FWD**

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



Boost Switching Definitions

figure 49. **MOSFET**

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

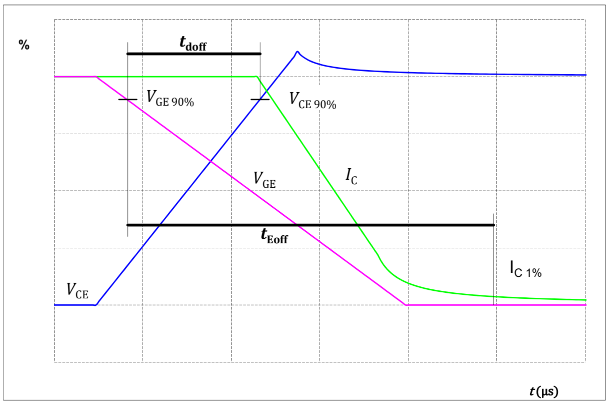


figure 50. **MOSFET**

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

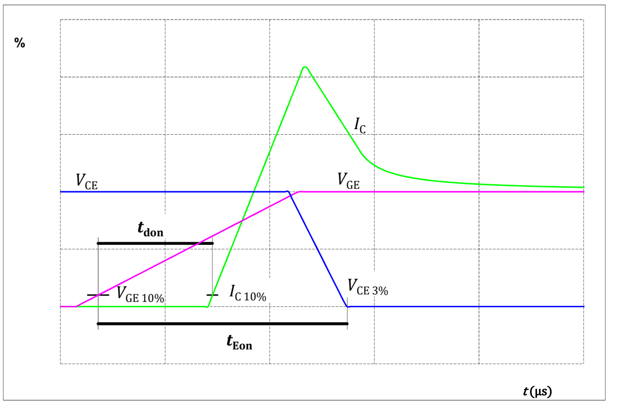


figure 51. **MOSFET**

Turn-off Switching Waveforms & definition of t_f

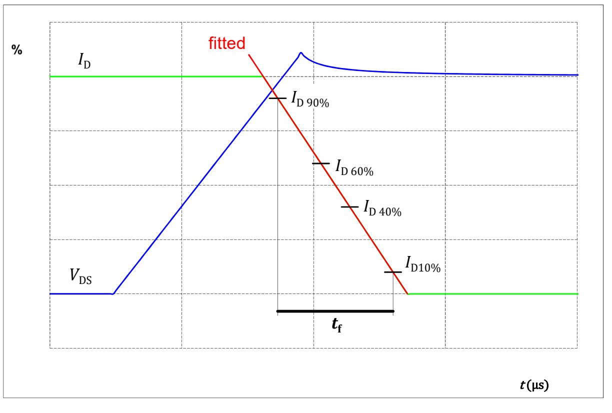
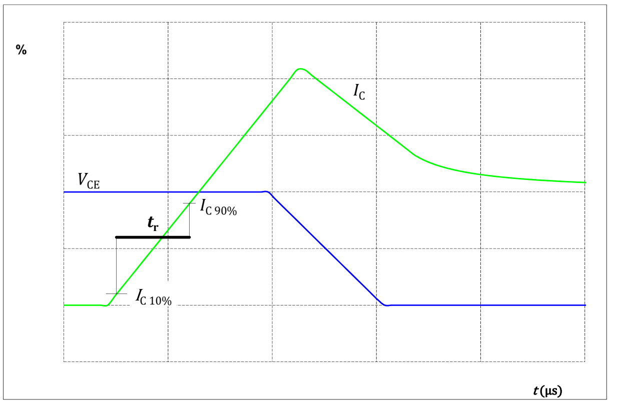


figure 52. **MOSFET**

Turn-on Switching Waveforms & definition of t_r



Boost Switching Definitions

figure 53. **FWD**

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

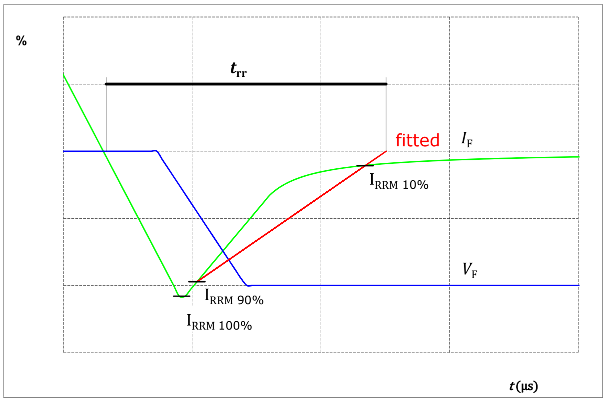


figure 54. **FWD**

Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})

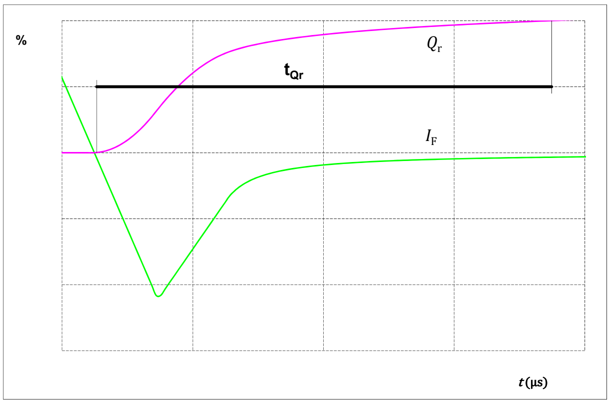
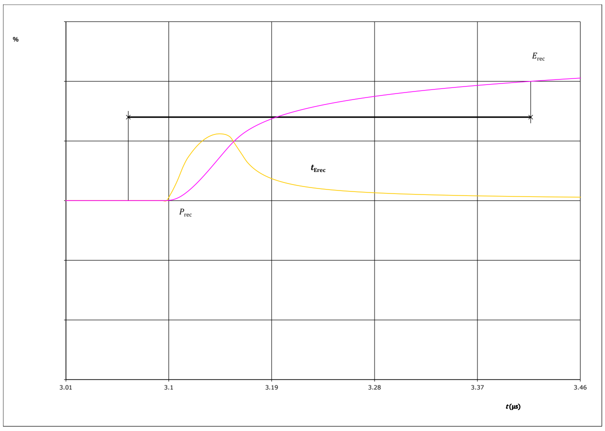


figure 55. **FWD**

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

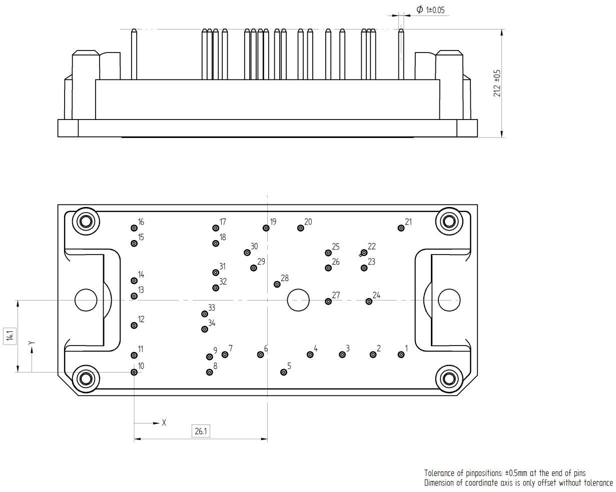


Ordering Code	
Version	**Ordering Code**
Without thermal paste	10-F112VPA015M7-LK88A74
With thermal paste (5,2 W/mK, PTM6000HV)	10-F112VPA015M7-LK88A74-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-F112VPA015M7-LK88A74-/3/

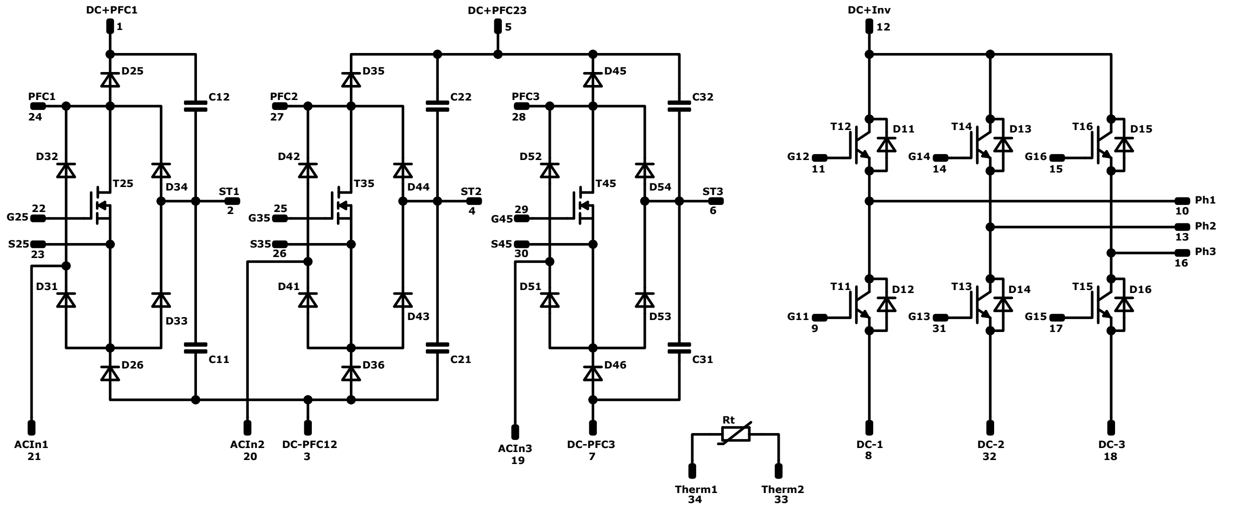
Marking							
	**Text**	**Name**		**Date code**	**UL & VIN**	**Lot**	**Serial**
		NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	52,2	3,45	DC+PFC1
2	46,7	3,45	ST1
3	40,7	3,45	DC-PFC12
4	34,4	3,45	ST2
5	29,25	0	DC+PFC23
6	24,7	3,45	ST3
7	17,75	3,45	DC-PFC3
8	14,75	0	DC-1
9	14,75	3	G11
10	0	0	Ph1
11	0	3,3	G12
12	0	9,15	DC+Inv
13	0	14,9	Ph2
14	0	17,9	G14
15	0	25,2	G16
16	0	28,2	Ph3
17	15,95	28,2	G15
18	15,95	25,2	DC-3
19	25,8	28,2	ACIn3
20	32,55	28,2	ACIn2
21	52,2	28,2	ACIn1
22	44,95	23,4	G25
23	44,95	20,4	S25
24	45,9	13,85	PFC1
25	37,95	23,35	G35
26	37,95	20,4	S35
27	37,95	13,85	PFC2
28	27,95	17,2	PFC3
29	23,35	20,4	G45
30	22,1	23,4	S45
31	15,95	19,5	G13
32	15,95	16,5	DC-2
33	13,8	11,4	Therm2
34	13,8	8,4	Therm1



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	15 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	15 A	Inverter Diode	
T25, T35, T45	MOSFET	600 V	77 mΩ	Boost Switch	
D25, D35, D45, D26, D36, D46	FWD	600 V	15 A	Boost Diode	
D31, D32, D33, D34, D41, D42, D43, D44, D51, D52, D53, D54	Rectifier	1600 V	12 A	Rectifier Diode	
C11, C12, C21, C22, C31, C32	Capacitor	630 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	

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

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

Package data
Package data for *flow* 1 packages see vincotech.com website.

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
10-F112VPA015M7-LK88A74-D3-14	3 Jun. 2022	Change Boost Diode, Rectifier Diode	