



Vincotech

10-F112VPA080MS-LK88A09

datasheet

flowPIM 1 + 3xPFC

1200 V / 80 mΩ

Topology features

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

Component features

- High Blocking Voltage with low drain source on state resistance
- High speed SiC-MOSFET technology
- Resistant to Latch-up

Housing features

- Base isolation: Al₂O₃
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Solder pin

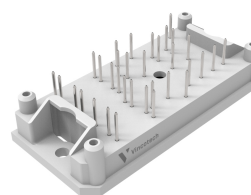
Target applications

- Embedded Drives
- HVAC
- Heat Pumps
- Industrial Drives

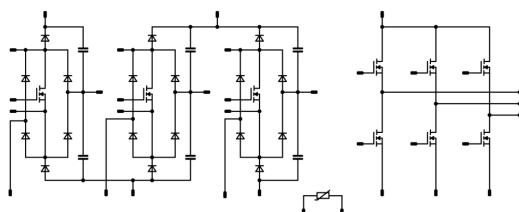
Types

- 10-F112VPA080MS-LK88A09

flow 1 17 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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Inverter Switch

Drain-source voltage	V_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	25	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	68	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	57	W
Gate-source voltage	V_{GSS}	static	0 / 18	V
		dynamic	-5 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C

Boost Switch

Drain-source voltage	V_{DS}		600	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	15	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	100	A
Avalanche energy, single pulse	E_{AS}	$V_{DD} = 50\text{ V}$ $I_D = 5,1\text{ A}$	105	mJ
Avalanche energy, repetitive	E_{AR}	$V_{DD} = 50\text{ V}$ $I_D = 5,1\text{ A}$	0,53	mJ
MOSFET dv/dt ruggedness	dv/dt	$V_{DS} = 0..400\text{ V}$ $T_s = 25\text{ °C}$	80	V/ns
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	45	W
Gate-source voltage	V_{GSS}	static	±20	V
Reverse diode dv/dt	dv/dt		50	V/ns
Maximum Junction Temperature	T_{jmax}		150	°C



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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Boost Diode

Peak repetitive reverse voltage	V_{RRM}		600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	30	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 25\text{ °C}$	185	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	41	W
Maximum junction temperature	T_{jmax}		175	°C

Neutral Point Diode

Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	21	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 8,3\text{ ms}$ $T_j = 25\text{ °C}$	150	A
Surge current capability	I^2t		112	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	26	W
Maximum junction temperature	T_{jmax}		150	°C

Rectifier Diode

Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	21	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 8,3\text{ ms}$ $T_j = 25\text{ °C}$	150	A
Surge current capability	I^2t		112	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	26	W
Maximum junction temperature	T_{jmax}		150	°C

Capacitor (DC)

Maximum DC voltage	V_{MAX}		630	V
Operation Temperature	T_{op}		-55 ... 150	°C



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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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
Creepage distance			> 12,7	mm
Clearance			12,67	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production



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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	

Inverter Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		18		15	25 125 150		72,9 82 89,5	110 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,0015	25	3,6	4,6	5,6	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			200	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			50	μA
Internal gate resistance	r_g							3		Ω
Short-circuit input capacitance	C_{iss}		0	10	0	25		2000		pF
Reverse transfer capacitance	C_{rss}							46		

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						1,66		K/W
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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		
Dynamic											
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 0,5 \Omega$ $R_{goff} = 0,5 \Omega$	0/18	600	16	25		12,2		ns	
						125		10,71			
						150		10,67			
Rise time	t_r					25		10,38			ns
						125		9,37			
						150		9,6			
Turn-off delay time	$t_{d(off)}$					25		28,92			ns
						125		31,07			
						150		31,96			
Fall time	t_f					25		5,43			ns
						125		3,97			
						150		3,6			
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD}=0,14 \mu C$ $Q_{rFWD}=0,249 \mu C$ $Q_{rFWD}=0,293 \mu C$	25		0,275			mWs			
			125		0,308						
			150		0,33						
Turn-off energy (per pulse)	E_{off}		25		0,025			mWs			
			125		0,026						
			150		0,025						
Peak recovery current	I_{RRM}	$di/dt=758 A/\mu s$ $di/dt=744 A/\mu s$ $di/dt=918 A/\mu s$	25		9,22			A			
			125		15,68						
			150		17,98						
Reverse recovery time	t_{rr}		25		24,71			ns			
			125		26,35						
			150		27,33						
Recovered charge	Q_r		25		0,14			μC			
			125		0,249						
			150		0,293						
Reverse recovered energy	E_{rec}		25		0,034			mWs			
			125		0,066						
			150		0,078						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		2362,3			A/ μs				
		125		3870,72							
		150		3806,54							



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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	$V_{GS(th)}$	$V_{DS} = V_{GS}$			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⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						1,57		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	0/10	400	15	25 125		20,73 20,34		ns
Rise time	t_r					25 125		3,84 3,94		ns
Turn-off delay time	$t_{d(off)}$					25 125		57,91 65,36		ns
Fall time	t_f					25 125		5,51 8,52		ns
Turn-on energy (per pulse)	E_{on}					25 125		0,069 0,193		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,016 0,022		mWs



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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	25 125 150		1,59 1,28 1,19	2,5 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 600$ V				25			10	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						2,33		K/W
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Dynamic

Peak recovery current	I_{RM}	$di/dt=4640$ A/µs $di/dt=3753$ A/µs	0/10	400	15	25 125		42,07 44,32		A
Reverse recovery time	t_{rr}					25 125		17,72 32,89		ns
Recovered charge	Q_r					25 125		0,39 0,741		µC
Reverse recovered energy	E_{rec}					25 125		0,098 0,148		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125		5644,61 2680,1		A/µs



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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	

Neutral Point Diode

Static

Forward voltage	V_F				7	25 125 150		1,02 0,936	1,2 ⁽¹⁾ 1,15 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1600$ V				25 125			5 700	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						2,66		K/W
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Rectifier Diode

Static

Forward voltage	V_F				7	25 125 150		1,02 0,936	1,2 ⁽¹⁾ 1,15 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1600$ V				25 125			5 700	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						2,66		K/W
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Capacitor (DC)

Static

Capacitance	C	DC bias voltage = 0 V				25		33		nF
Tolerance							-5		5	%



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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 R100	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$						3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$						4000		K
Vincotech Thermistor Reference									I	

⁽¹⁾ Value at chip level

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

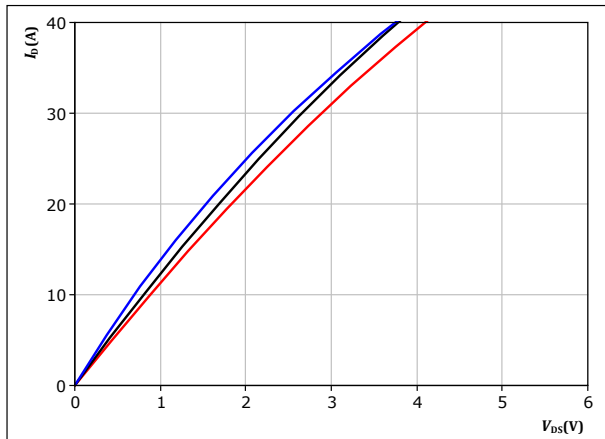


Inverter Switch Characteristics

figure 1. MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$



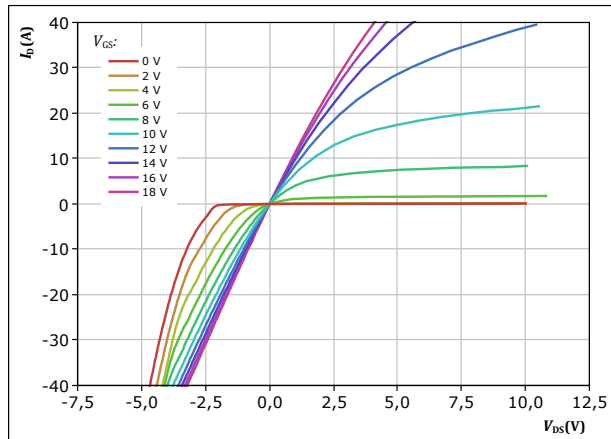
$t_p = 250 \mu s$
 $V_{GS} = 18 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 2. MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$

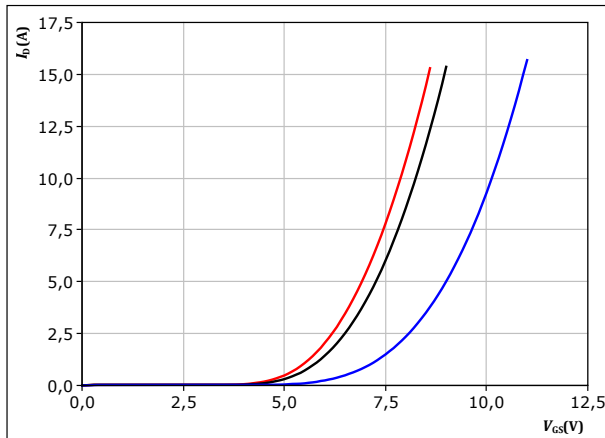


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GS} from 0 V to 18 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

$$I_D = f(V_{GS})$$



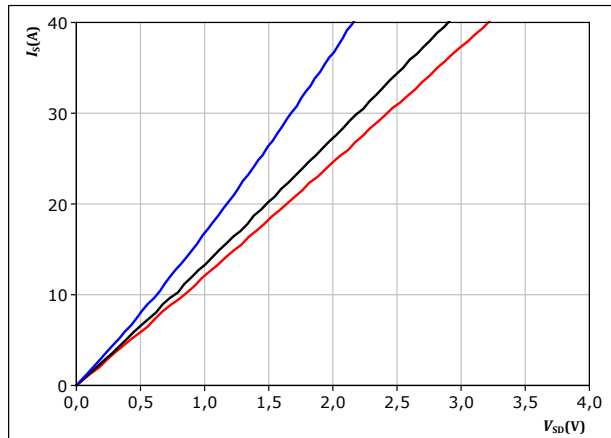
$t_p = 250 \mu s$
 $V_{DS} = 23 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 4. MOSFET

Typical reverse drain current characteristics

$$I_{SD} = f(V_{SD})$$



$t_p = 250 \mu s$
 $V_{GS} = 18 V$

T_j :
— 25 °C
— 125 °C
— 150 °C



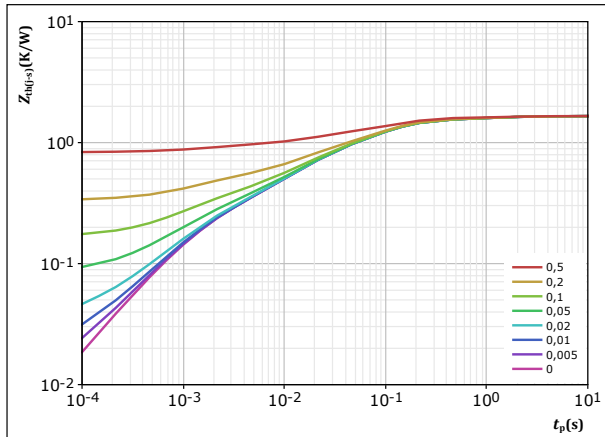
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Inverter Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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



$$D = t_p / T$$

$$R_{th(j-a)} = 1,657 \text{ K/W}$$

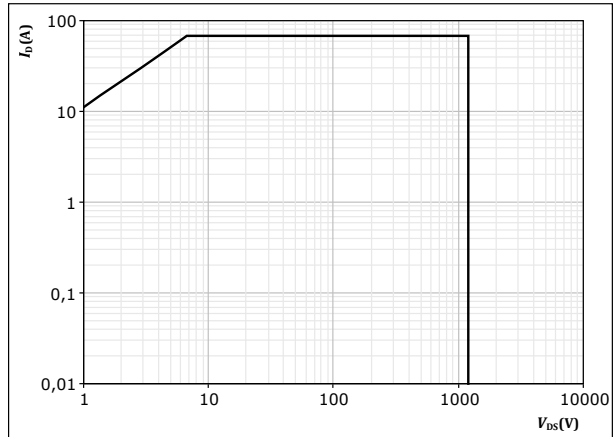
MOSFET thermal model values

R (K/W)	τ (s)
1,74E-02	8,30E+00
1,39E-01	9,74E-01
8,83E-01	8,90E-02
4,36E-01	1,42E-02
1,87E-01	1,24E-03

figure 6. MOSFET

Safe operating area

$$I_D = f(V_{DS})$$



D = single pulse

$$T_a = 80 \text{ } ^\circ\text{C}$$

$$V_{GS} = 18 \text{ V}$$

$$T_j = T_{jmax}$$



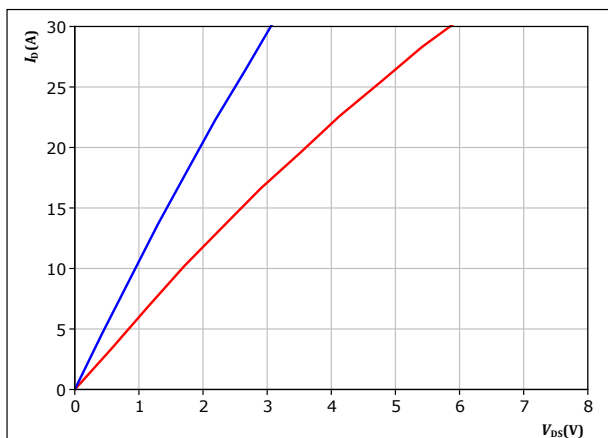
Boost Switch Characteristics

figure 7.

MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$



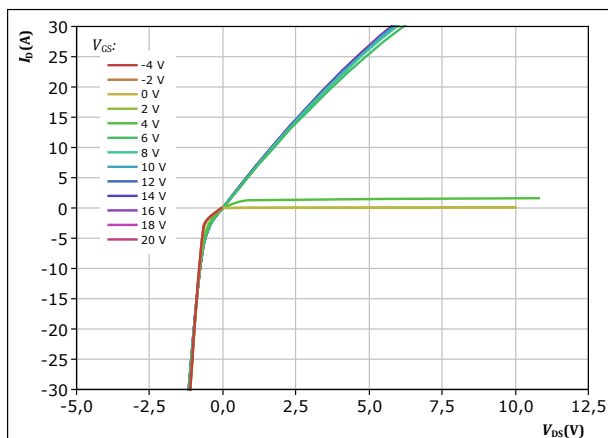
$t_p = 250 \mu s$
 $V_{GS} = 10 V$
 $T_j: 25 ^\circ C$ (blue line)
 $125 ^\circ C$ (red line)

figure 8.

MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$



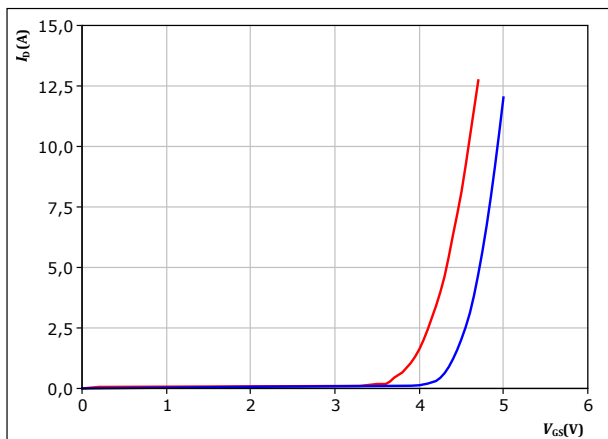
$t_p = 250 \mu s$
 $T_j = 125 ^\circ C$
 V_{GS} from -4 V to 20 V in steps of 2 V

figure 9.

MOSFET

Typical transfer characteristics

$$I_D = f(V_{GS})$$



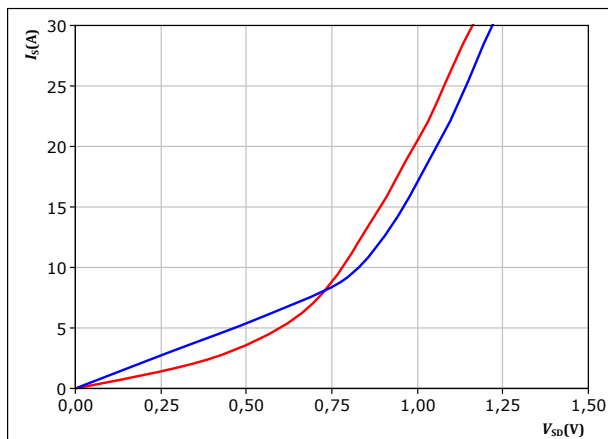
$t_p = 250 \mu s$
 $V_{DS} = 10 V$
 $T_j: 25 ^\circ C$ (blue line)
 $125 ^\circ C$ (red line)

figure 10.

MOSFET

Typical reverse drain current characteristics

$$I_{SD} = f(V_{SD})$$



$t_p = 250 \mu s$
 $V_{GS} = 10 V$
 $T_j: 25 ^\circ C$ (blue line)
 $125 ^\circ C$ (red line)

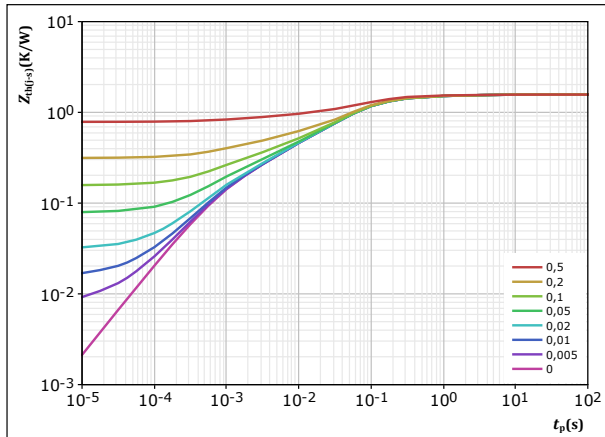


Boost Switch Characteristics

figure 11. MOSFET

Transient thermal impedance as a function of pulse width

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



$$D = t_p / T$$

$$R_{th(j-a)} = 1,57 \text{ K/W}$$

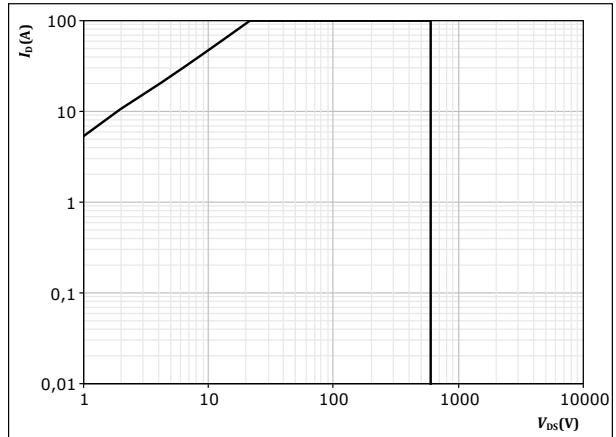
MOSFET thermal model values

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

figure 12. MOSFET

Safe operating area

$$I_D = f(V_{DS})$$



D = single pulse

$$T_a = 80 \text{ } ^\circ\text{C}$$

$$V_{GS} = 10 \text{ V}$$

$$T_j = T_{jmax}$$



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Boost Diode Characteristics

figure 13.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

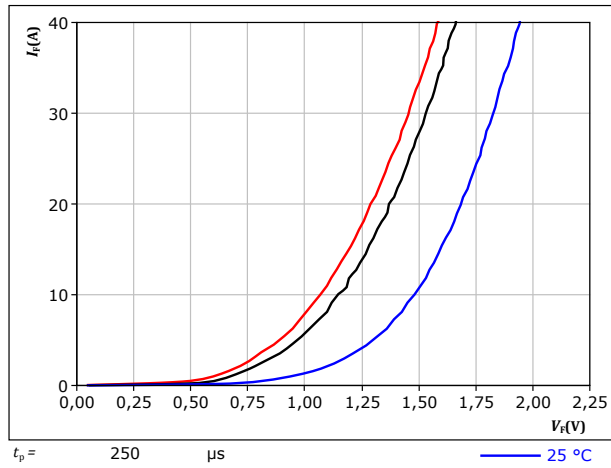
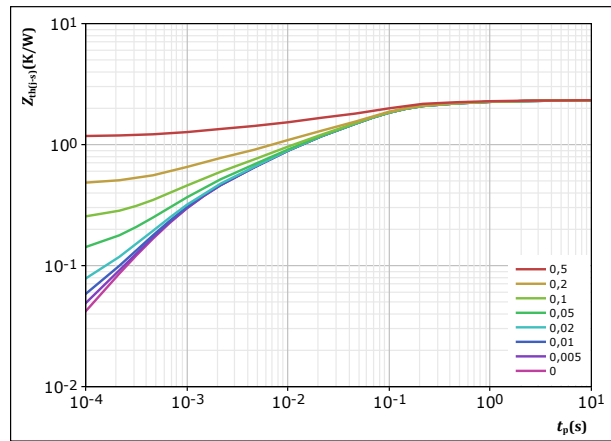


figure 14.

FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T
$R_{th(j-s)} =$	2,328 K/W
FWD thermal model values	
R (K/W)	τ (s)
7,17E-02	4,19E+00
2,46E-01	4,04E-01
1,17E+00	6,27E-02
5,36E-01	7,39E-03
3,14E-01	9,07E-04



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Neutral Point Diode Characteristics

figure 15. Rectifier

Typical forward characteristics

$I_F = f(V_F)$

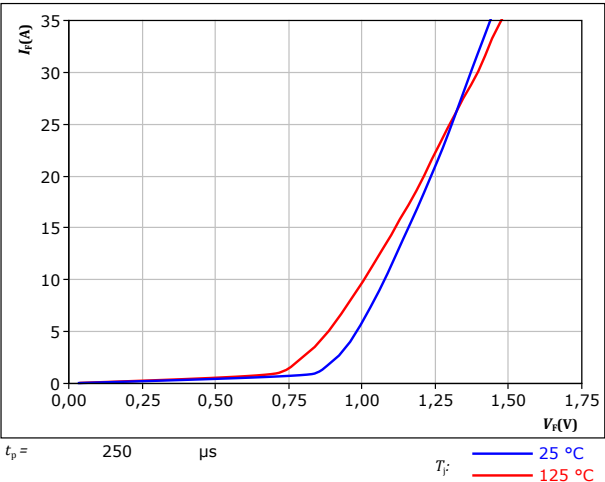
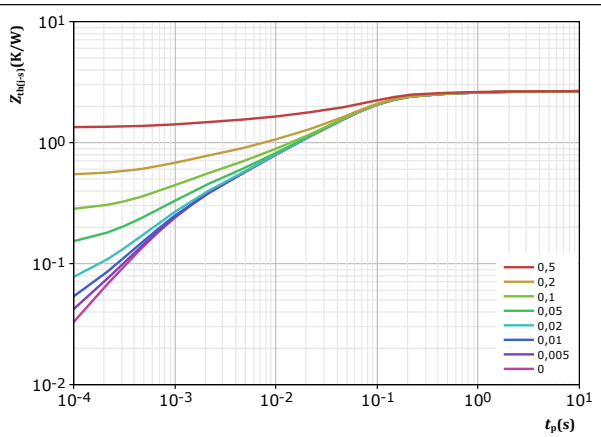


figure 16. Rectifier

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T	
$R_{th(j-s)} =$	2,663	K/W
Rectifier thermal model values		
R (K/W)	τ (s)	
5,42E-02	4,38E+00	
2,48E-01	4,58E-01	
1,73E+00	6,32E-02	
3,84E-01	7,21E-03	
2,50E-01	9,57E-04	



Rectifier Diode Characteristics

figure 17. Rectifier

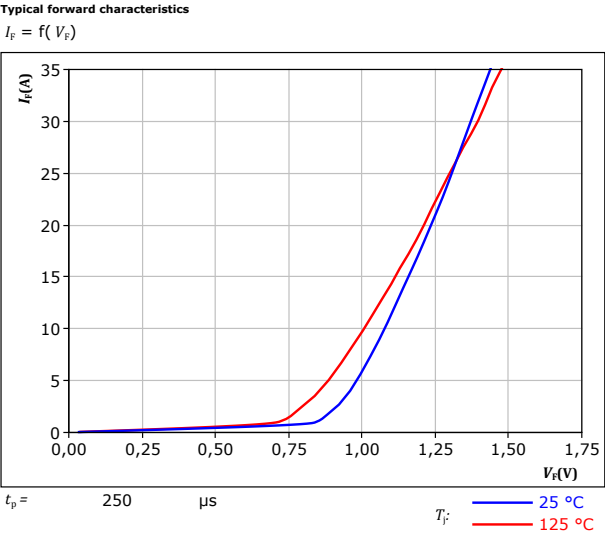
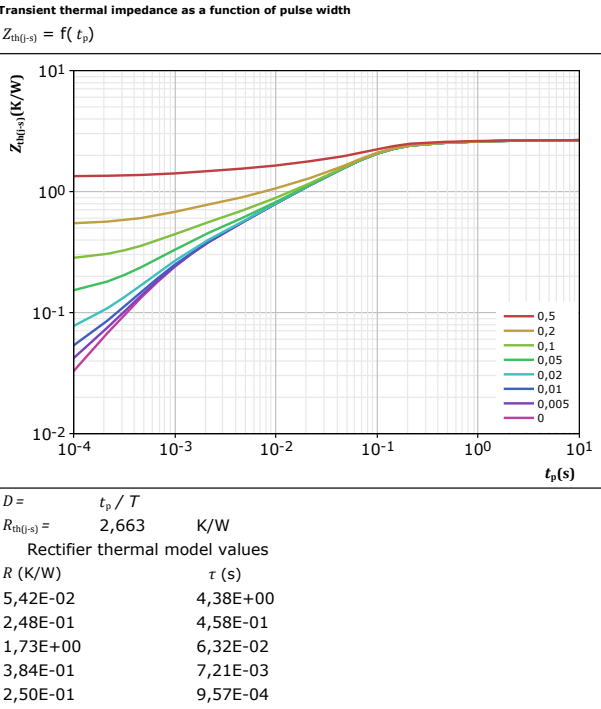


figure 18. Rectifier





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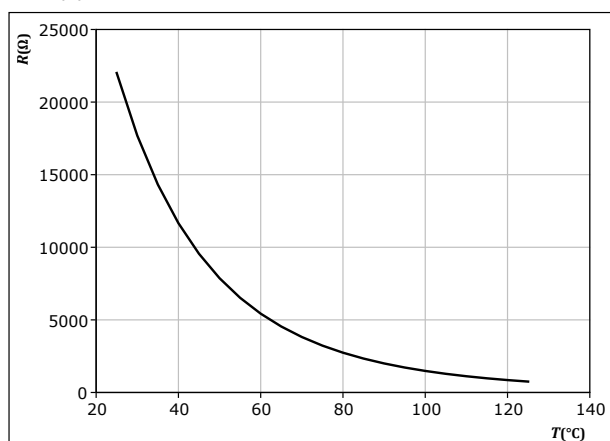
Thermistor Characteristics

figure 19.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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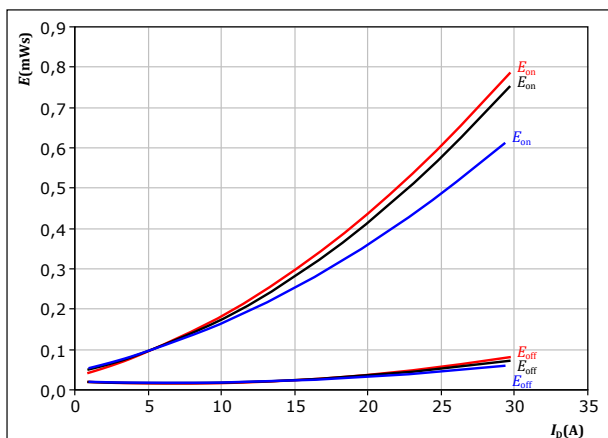
Inverter Switching Characteristics

figure 20.

MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



With an inductive load at

$V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 0,5$ Ω
 $R_{goff} = 0,5$ Ω

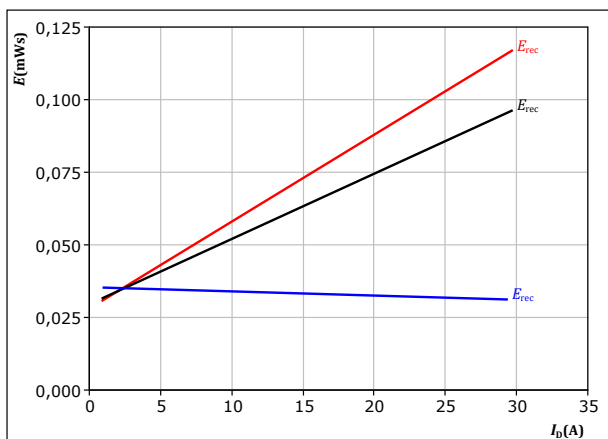
T_j : 25 °C
125 °C
150 °C

figure 22.

MOSFET

Typical reverse recovered energy loss as a function of drain current

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



With an inductive load at

$V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 0,5$ Ω

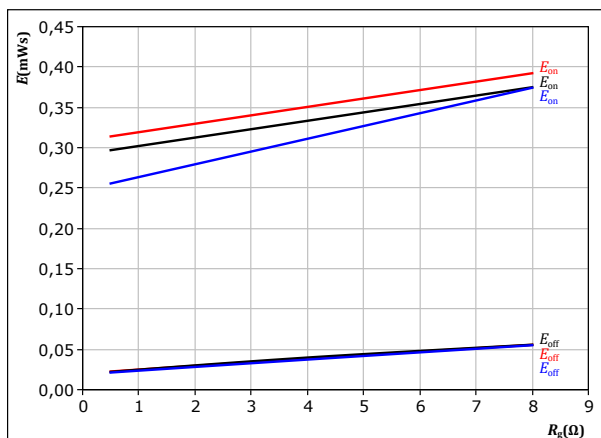
T_j : 25 °C
125 °C
150 °C

figure 21.

MOSFET

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

$$E = f(R_g)$$



With an inductive load at

$V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 16$ A

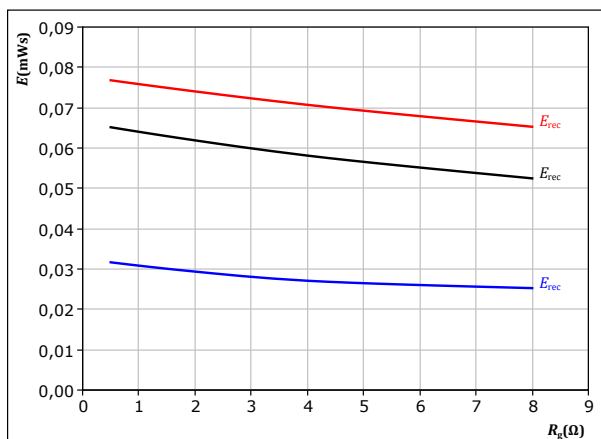
T_j : 25 °C
125 °C
150 °C

figure 23.

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

$V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 16$ A

T_j : 25 °C
125 °C
150 °C



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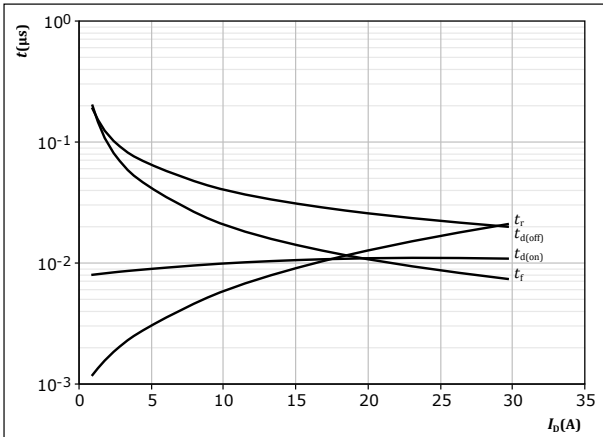
10-F112VPA080MS-LK88A09 datasheet

Inverter Switching Characteristics

figure 24.

MOSFET

Typical switching times as a function of drain current
 $t = f(I_D)$



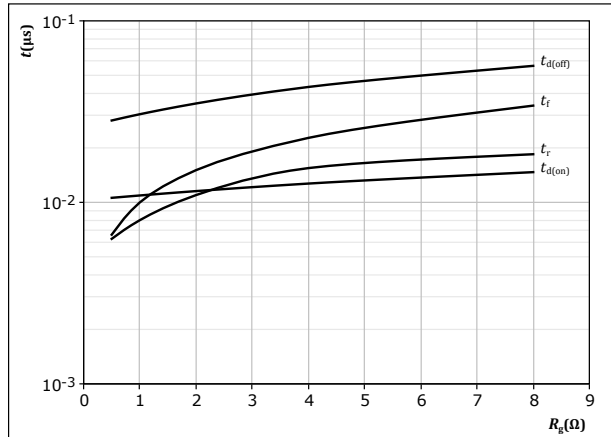
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 0,5$ Ω
 $R_{goff} = 0,5$ Ω

figure 25.

MOSFET

Typical switching times as a function of MOSFET turn on gate resistor
 $t = f(R_g)$



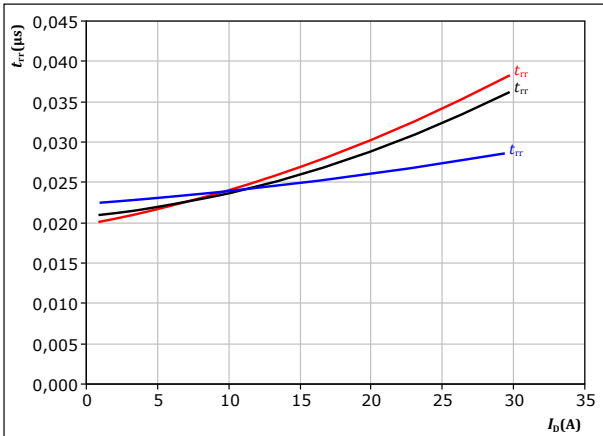
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 16$ A

figure 26.

MOSFET

Typical reverse recovery time as a function of drain current
 $t_{rr} = f(I_D)$

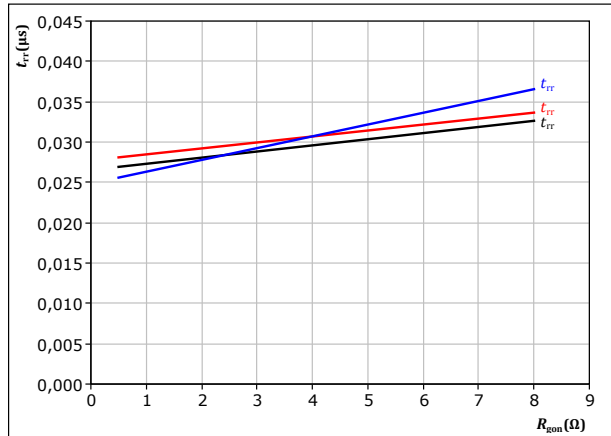


At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 0,5$ Ω
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 27.

MOSFET

Typical reverse recovery time as a function of MOSFET turn on gate resistor
 $t_{rr} = f(R_{gon})$



At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 16$ A
 $T_j:$ — 25 °C
— 125 °C
— 150 °C



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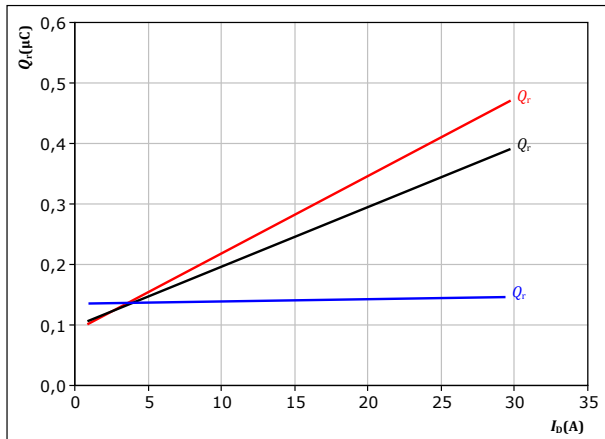
Inverter Switching Characteristics

figure 28.

MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



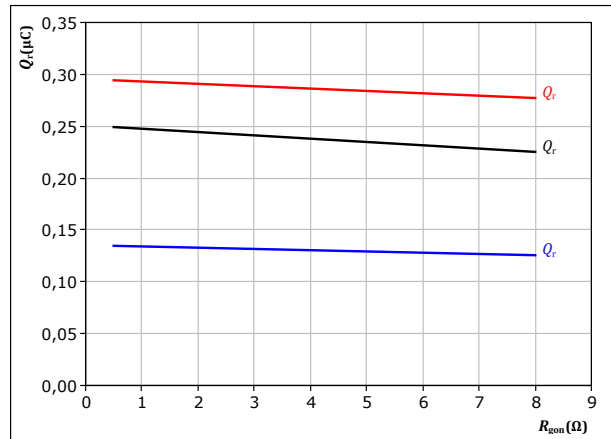
At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 0,5$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 29.

MOSFET

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

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



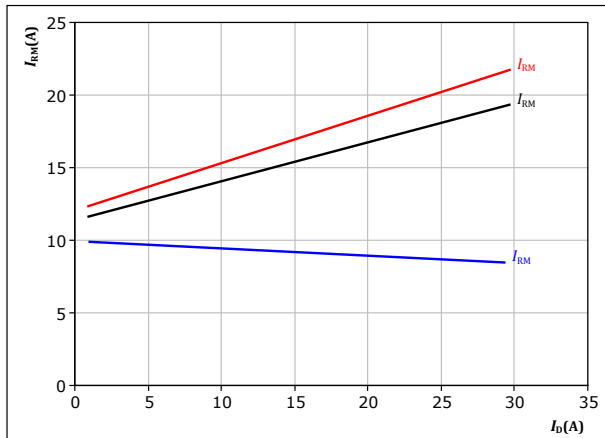
At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 16$ A
 T_j : 25 °C
125 °C
150 °C

figure 30.

MOSFET

Typical peak reverse recovery current as a function of drain current

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



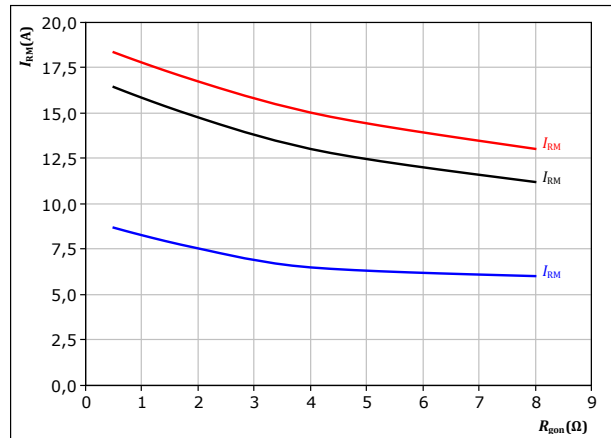
At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 0,5$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 31.

MOSFET

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

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



At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 16$ A
 T_j : 25 °C
125 °C
150 °C



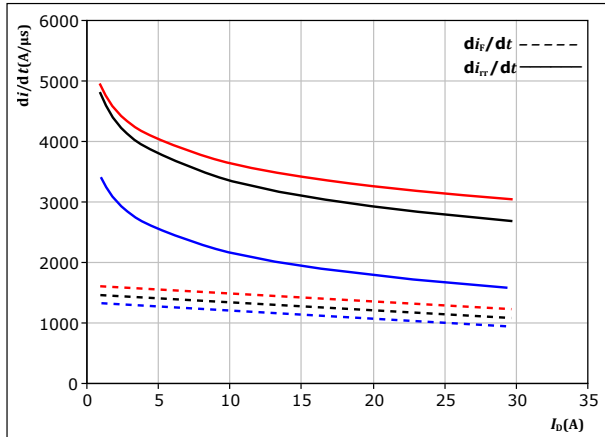
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10-F112VPA080MS-LK88A09
datasheet

Inverter Switching Characteristics

figure 32. MOSFET

Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_r/dt = f(I_D)$

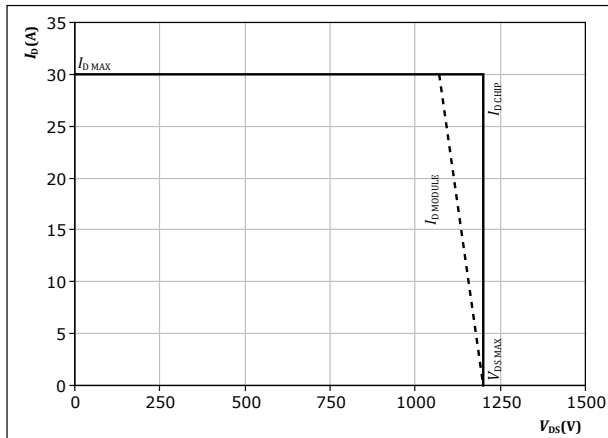


At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 0,5$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

figure 34. MOSFET

Reverse bias safe operating area

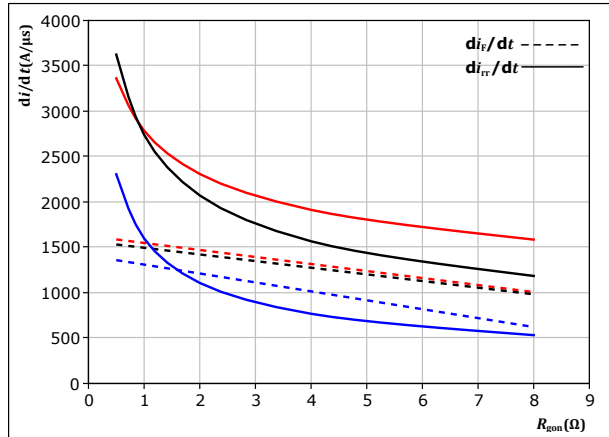
$I_D = f(V_{DS})$



At $T_j = 150$ °C
 $R_{gon} = 0,5$ Ω
 $R_{goff} = 0,5$ Ω

figure 33. MOSFET

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



At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 16$ A
 $T_j = 25$ °C
 125 °C
 150 °C



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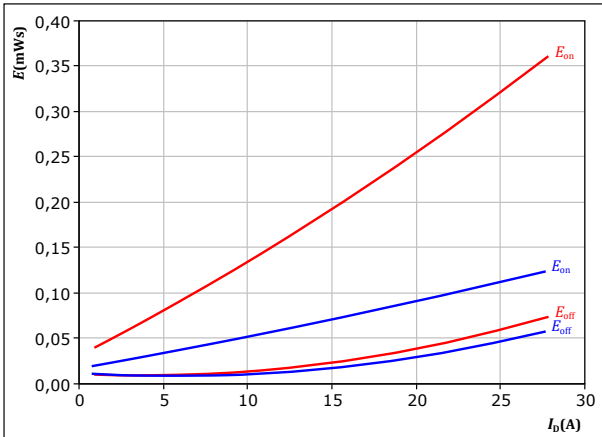
Boost Switching Characteristics

figure 35.

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
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

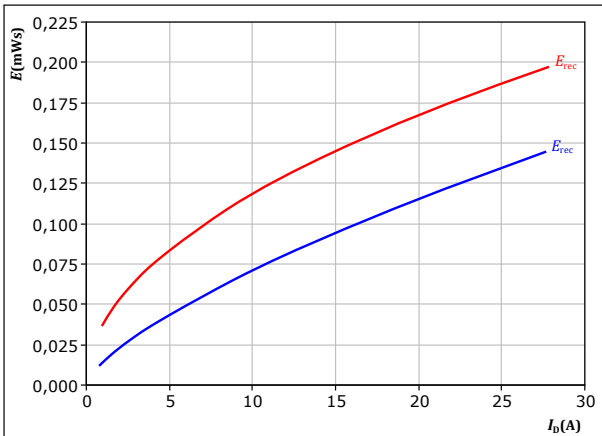
T_j : 25 °C
125 °C

figure 37.

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
 $R_{gon} = 2$ Ω

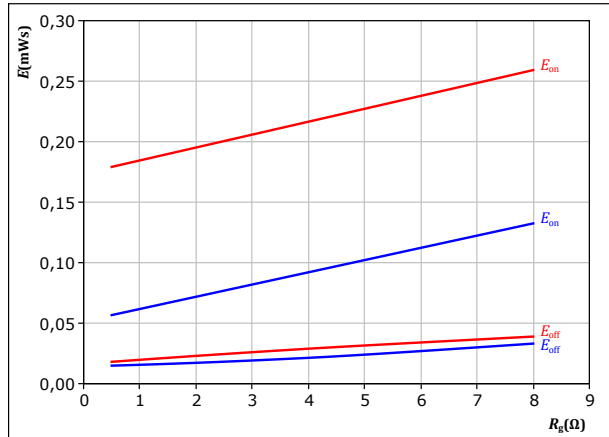
T_j : 25 °C
125 °C

figure 36.

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

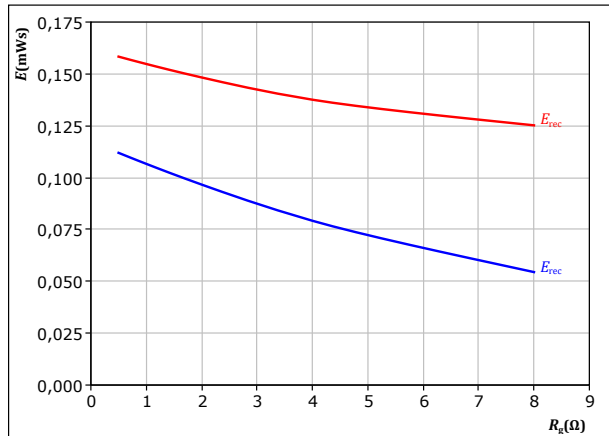
T_j : 25 °C
125 °C

figure 38.

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
125 °C



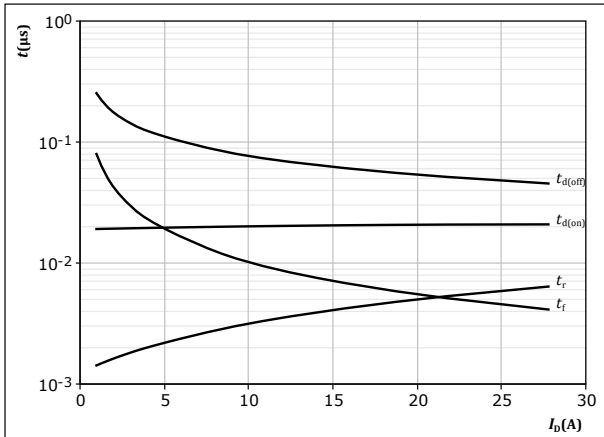
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Boost Switching Characteristics

figure 39. MOSFET

Typical switching times as a function of drain current
 $t = f(I_D)$

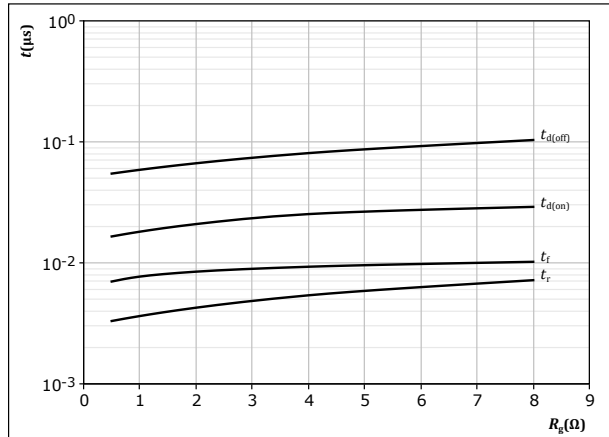


With an inductive load at

$T_j = 125$ °C
 $V_{DS} = 400$ V
 $V_{GS} = 0/10$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

figure 40. MOSFET

Typical switching times as a function of MOSFET turn on gate resistor
 $t = f(R_g)$

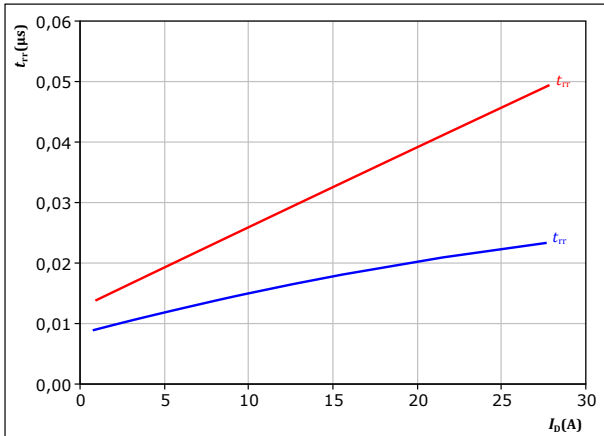


With an inductive load at

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

figure 41. MOSFET

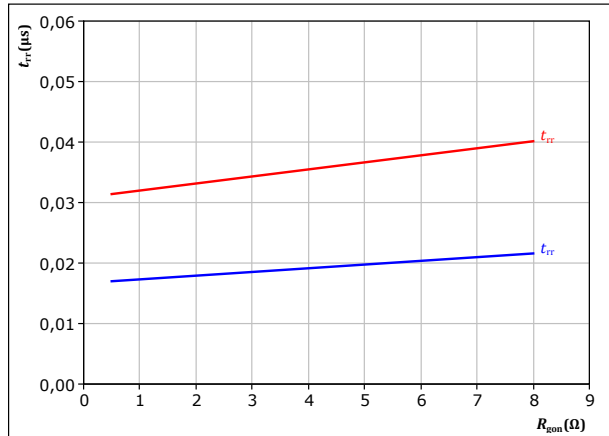
Typical reverse recovery time as a function of drain current
 $t_{rr} = f(I_D)$



At $V_{DS} = 400$ V
 $V_{GS} = 0/10$ V
 $R_{gon} = 2$ Ω
 T_j : — 25 °C
— 125 °C

figure 42. 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

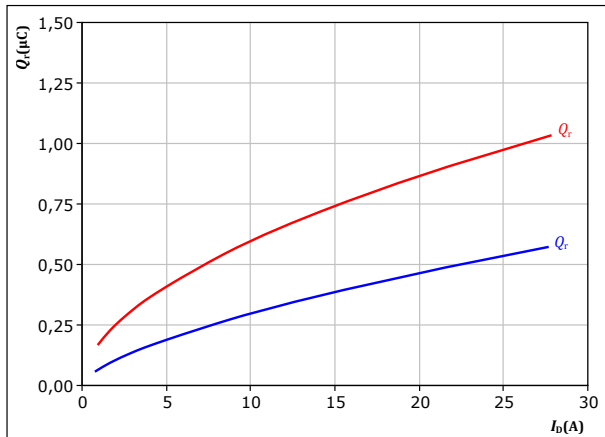


Boost Switching Characteristics

figure 43. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

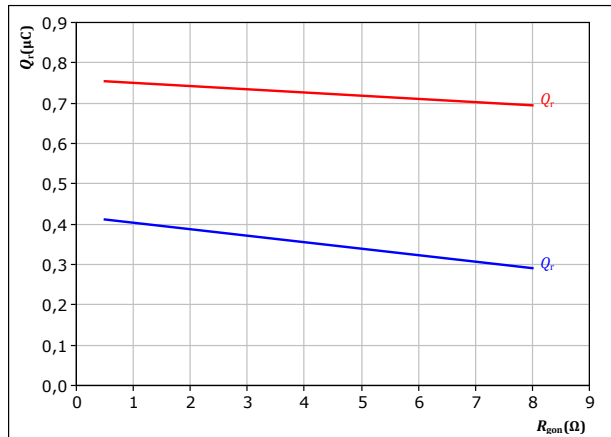


At $V_{DS} = 400$ V
 $V_{GS} = 0/10$ V
 $R_{gon} = 2$ Ω
 T_j : — 25 °C
— 125 °C

figure 44. MOSFET

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

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

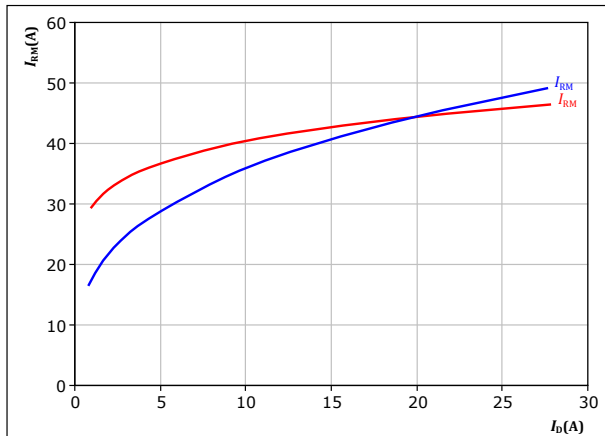


At $V_{DS} = 400$ V
 $V_{GS} = 0/10$ V
 $I_D = 15$ A
 T_j : — 25 °C
— 125 °C

figure 45. MOSFET

Typical peak reverse recovery current as a function of drain current

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

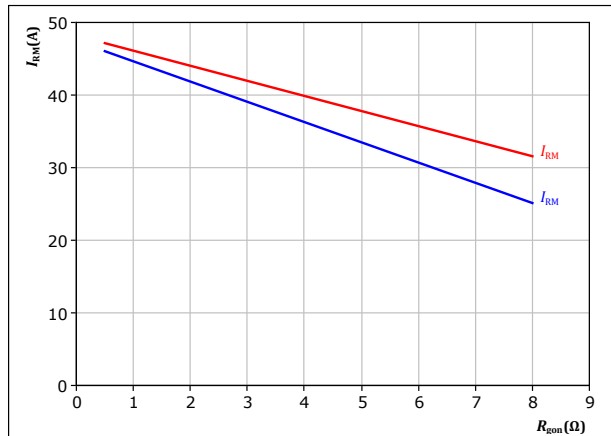


At $V_{DS} = 400$ V
 $V_{GS} = 0/10$ V
 $R_{gon} = 2$ Ω
 T_j : — 25 °C
— 125 °C

figure 46. 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
 $V_{GS} = 0/10$ V
 $I_D = 15$ A
 T_j : — 25 °C
— 125 °C



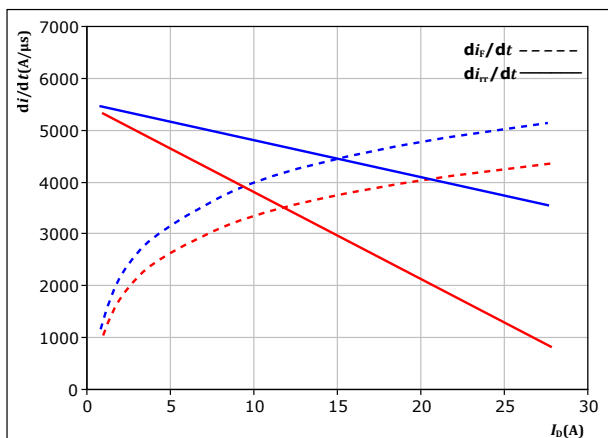
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datasheet

Boost Switching Characteristics

figure 47. MOSFET

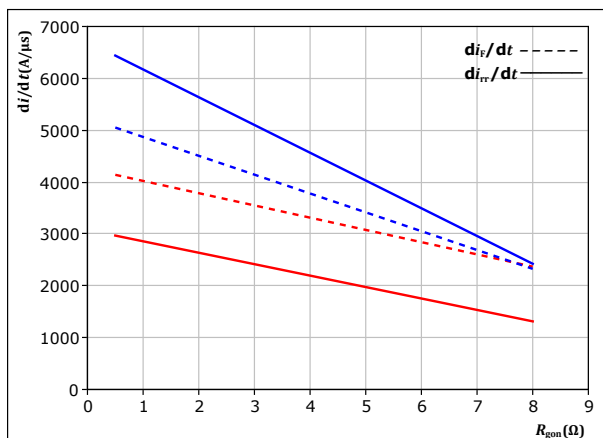
Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_r/dt = f(I_D)$



At $V_{DS} = 400$ V
 $V_{GS} = 0/10$ V
 $R_{gon} = 2$ Ω
 T_j : 25°C (blue line)
 125°C (red line)

figure 48. MOSFET

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

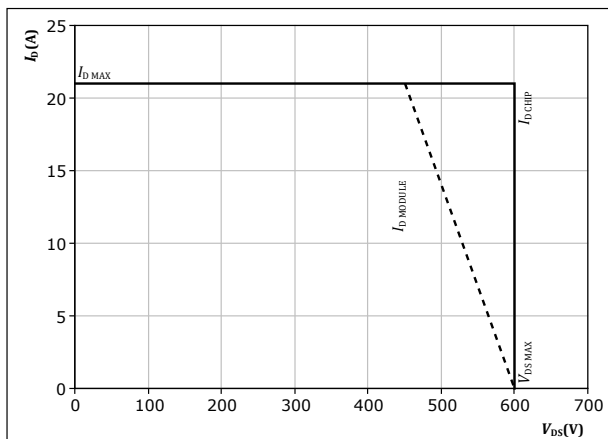


At $V_{DS} = 400$ V
 $V_{GS} = 0/10$ V
 $I_D = 15$ A
 T_j : 25°C (blue line)
 125°C (red line)

figure 49. MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



At $T_j = 125$ $^\circ\text{C}$
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω



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Switching Definitions

figure 50. MOSFET

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

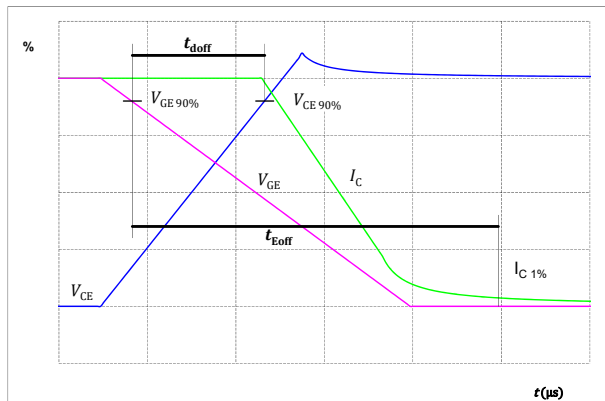


figure 51. MOSFET

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

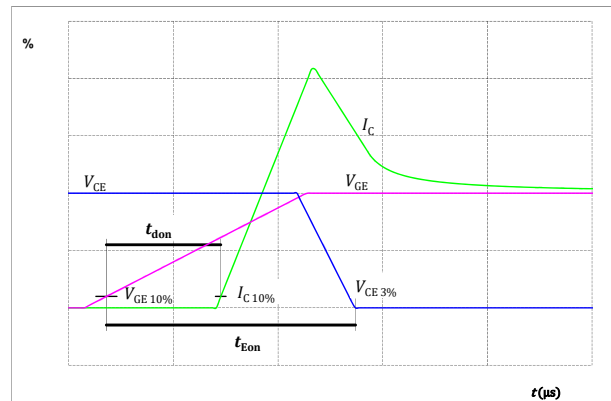


figure 52. MOSFET

Turn-off Switching Waveforms & definition of t_f

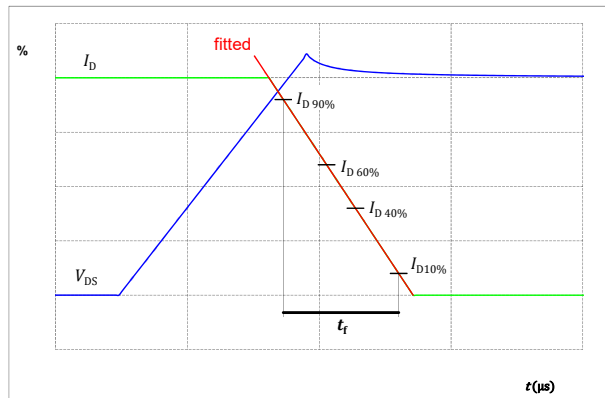
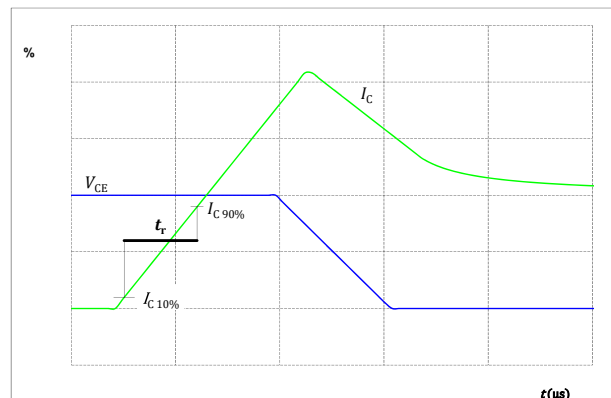


figure 53. MOSFET

Turn-on Switching Waveforms & definition of t_r





Switching Definitions

figure 54. FWD

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

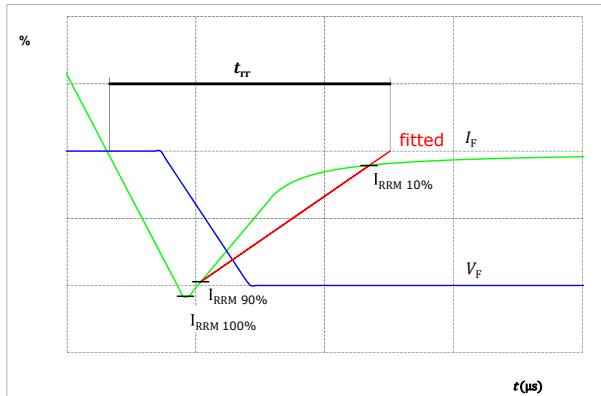


figure 55. FWD

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

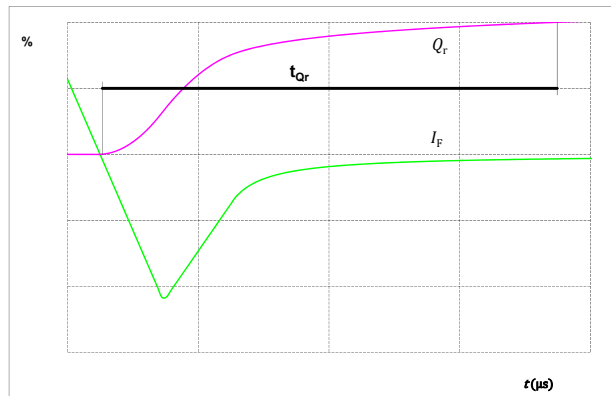
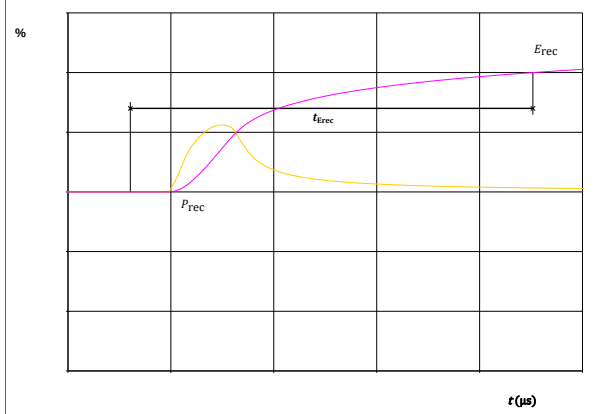


figure 56. FWD

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





datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-F112VPA080MS-LK88A09
With thermal paste (5,2 W/mK, PTM6000HV)	10-F112VPA080MS-LK88A09-/7/

Marking							
	Text	Name		Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNN- TTTTTIVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTIVV	LLLLL	SSSS	WWYY			

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

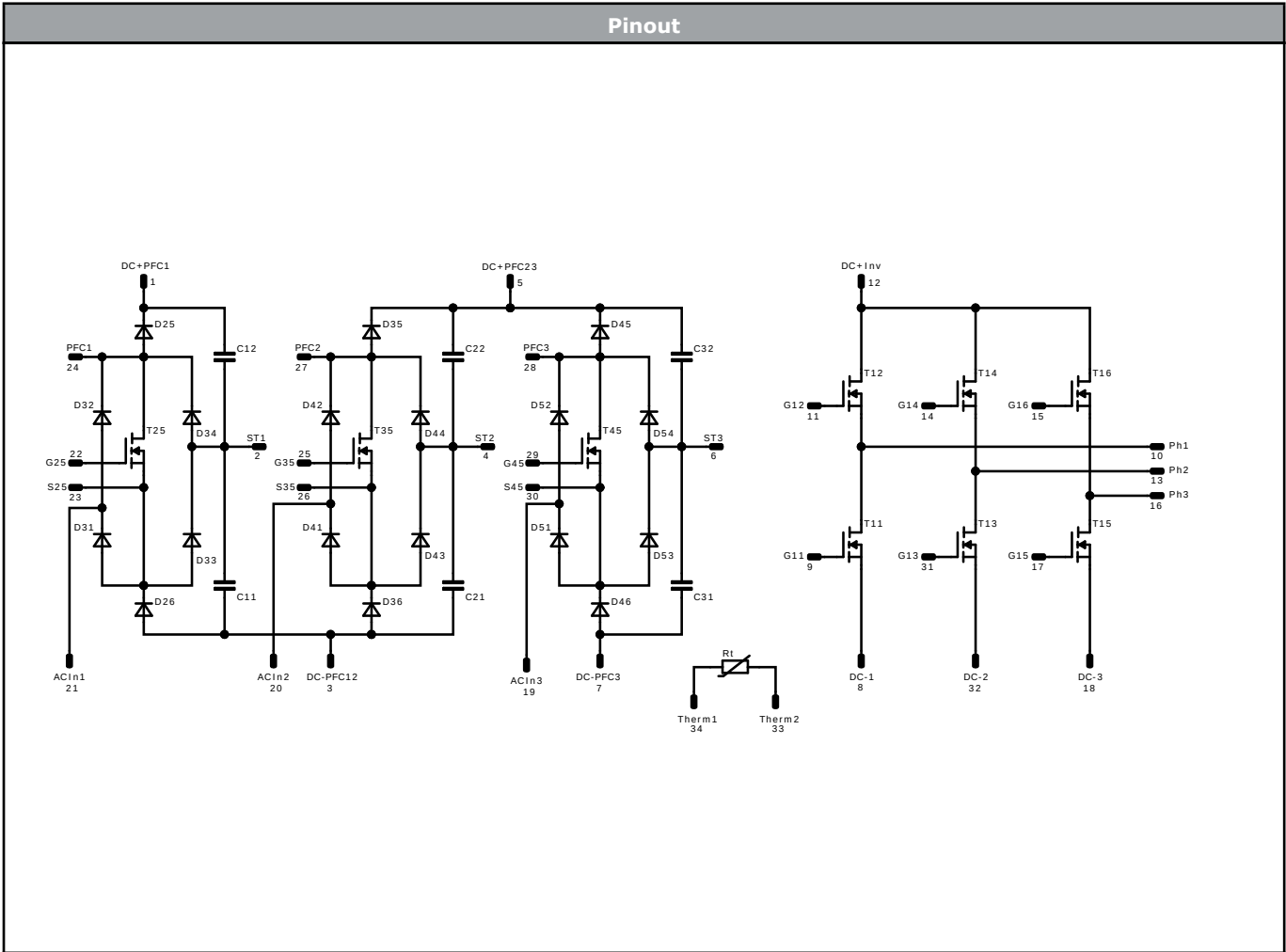
Outline

Tolerance of preposition: ±0.5mm at the end of pins
Dimension of coordinate axis is only other without tolerance



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datasheet



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	MOSFET	1200 V	80 mΩ	Inverter Switch	
T25, T35, T45	MOSFET	600 V	77 mΩ	Boost Switch	
D25, D35, D45, D26, D36, D46	FWD	600 V	15 A	Boost Diode	
D33, D34, D43, D44, D53, D54	Rectifier	1600 V	12 A	Neutral Point Diode	
D31, D32, D41, D42, D51, D52	Rectifier	1600 V	12 A	Rectifier Diode	
C11, C12, C21, C22, C31, C32	Capacitor	630 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	



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datasheet

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.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,sp}=175^{\circ}\text{C}$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-F112VPA080MS-LK88A09-D2-14	1 Oct. 2026	Correct Isolation Voltage	

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