



Vincotech

10-EY12NMA010MS-LS28F76T

datasheet

flowMNPC E2 SiC

1200 V / 10 mΩ

Topology features

- Kelvin Emitter for improved switching performance
- Temperature sensor
- Mixed Voltage Neutral Point Clamped Topology (T-Type)

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: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Compact housing
- CTI600 housing material
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

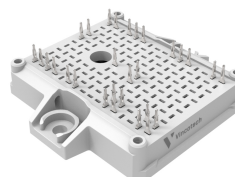
Target applications

- Charging Stations
- Industrial Drives
- Power Supply
- Solar Inverters
- UPS

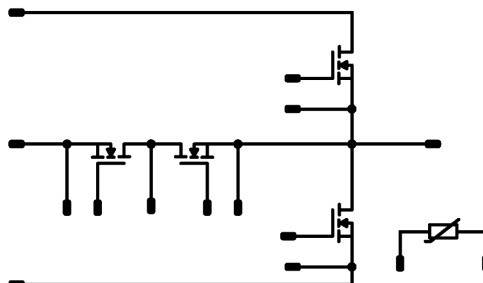
Types

- 10-EY12NMA010MS-LS28F76T

flow E2 12 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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Buck Switch

Drain-source voltage	V_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	116	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	480	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	207	W
Gate-source voltage	V_{GS}	static	-5 / 18	V
		dynamic	-10 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C

Boost Switch

Drain-source voltage	V_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	116	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	480	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	207	W
Gate-source voltage	V_{GS}	static	-5 / 18	V
		dynamic	-10 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{jop}		-40...+($T_{jmax} - 25$)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
Creepage distance			>12,7	mm
Clearance			9,08	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	

Buck Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		18		120	25 125 150		10,7 13,5 14,9	15 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,012	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			300	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			30	μA
Internal gate resistance	r_g							0,667		Ω
Gate charge	Q_g		-5/18	800	120	25		324		nC
Short-circuit input capacitance	C_{iss}	$f = 500 \text{ kHz}$	0	800	0	25		7800		pF
Short-circuit output capacitance	C_{oss}							405		
Reverse transfer capacitance	C_{rss}							18		
Diode forward voltage	V_{SD}		0		120	25		4,1		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{\text{paste}} = 5,2 \text{ W/mK}$ (PTM)						0,46		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	$t_{d(on)}$	$R_{gon} = 4 \ \Omega$ $R_{goff} = 4 \ \Omega$	-5/15	600	80	25		45,33		ns	
						125		39,83			
						150		39,24			
Rise time	t_r					25		26,11		ns	
						125		20,03			
						150		19,16			
Turn-off delay time	$t_{d(off)}$					25		70,78		ns	
						125		81,64			
						150		84,16			
Fall time	t_f					25		31,99		ns	
						125		32,88			
						150		34,59			
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD}=0,535 \ \mu C$ $Q_{tFWD}=1,25 \ \mu C$ $Q_{tFWD}=1,47 \ \mu C$	25		1,7		mWs				
			125		1,55						
			150		1,57						
Turn-off energy (per pulse)	E_{off}		25		0,498		mWs				
			125		0,518						
			150		0,528						
Peak recovery current	I_{RRM}	$di/dt=2986 \ A/\mu s$ $di/dt=4082 \ A/\mu s$ $di/dt=5419 \ A/\mu s$	25		35,03		A				
			125		58,71						
			150		66,43						
Reverse recovery time	t_{rr}		25		26,58		ns				
			125		36,88						
			150		38,54						
Recovered charge	Q_r		25		0,535		μC				
			125		1,25						
			150		1,47						
Reverse recovered energy	E_{rec}		25		0,102		mWs				
			125		0,353						
			150		0,428						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		2710,19		A/ μs					
		125		4236,24							
		150		5233,42							



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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	$r_{DS(on)}$		18		120	25 125 150		10,7 13,5 14,9	15 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,012	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			300	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			30	μA
Internal gate resistance	r_g							0,667		Ω
Gate charge	Q_g		-5/18	800	120	25		324		nC
Short-circuit input capacitance	C_{iss}	$f = 500$ kHz	0	800	0	25		7800		pF
Short-circuit output capacitance	C_{oss}							405		
Reverse transfer capacitance	C_{rss}							18		
Diode forward voltage	V_{SD}		0		120	25		4,1		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,46		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	$t_{d(on)}$	$R_{gon} = 4\ \Omega$ $R_{goff} = 4\ \Omega$	-5/15	600	80	25		40,23		ns	
						125		35,3			
						150		34,18			
Rise time	t_r					25		27,88			ns
						125		20,89			
						150		20,08			
Turn-off delay time	$t_{d(off)}$					25		72,37			ns
						125		81,41			
						150		83,66			
Fall time	t_f					25		39,71			ns
						125		47,2			
						150		49,39			
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD}=0,614\ \mu C$ $Q_{rFWD}=1,58\ \mu C$ $Q_{rFWD}=1,86\ \mu C$	25		1,93			mWs			
			125		1,88						
			150		1,94						
Turn-off energy (per pulse)	E_{off}		25		0,419			mWs			
			125		0,478						
			150		0,508						
Peak recovery current	I_{RRM}	$di/dt=2731\ A/\mu s$ $di/dt=3936\ A/\mu s$ $di/dt=4568\ A/\mu s$	25		39,28			A			
			125		68,57						
			150		76,18						
Reverse recovery time	t_{rr}		25		26,92			ns			
			125		38,48						
			150		38,99						
Recovered charge	Q_r		25		0,614			μC			
			125		1,58						
			150		1,86						
Reverse recovered energy	E_{rec}		25		0,121			mWs			
			125		0,458						
			150		0,573						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		4176,48			A/ μs				
		125		4086,1							
		150		4847,42							



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datasheet

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		5		k Ω
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 493 \Omega$				100	-5		5	%
Power dissipation	P							245		mW
Power dissipation constant	d					25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. ± 2 %						3375		K
B-value	$B_{(25/100)}$	Tol. ± 2 %						3437		K
Vincotech Thermistor Reference									K	

⁽¹⁾ Value at chip level

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



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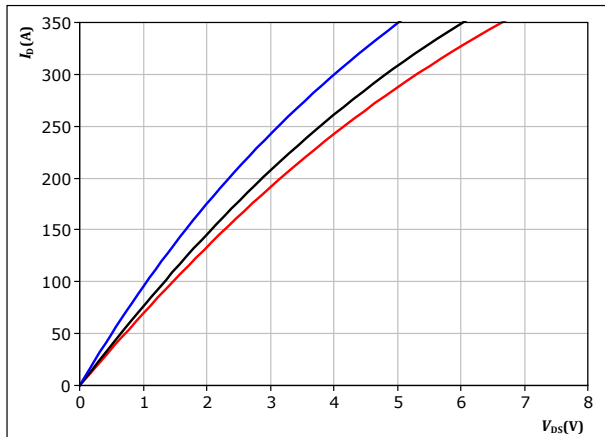
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Buck Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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

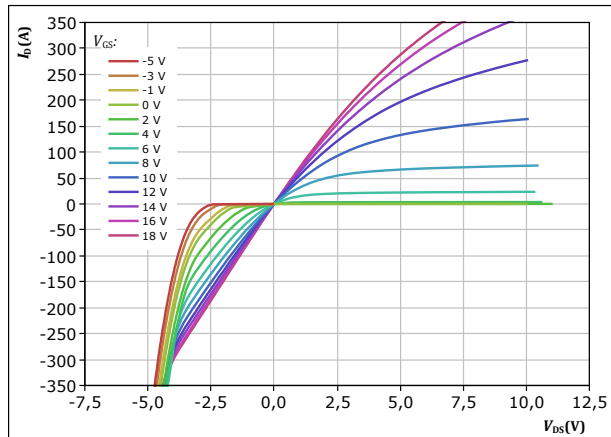


$t_p = 250 \mu s$
 $V_{GS} = 18 V$
 $T_j: 25^\circ C, 125^\circ C, 150^\circ C$

figure 2. MOSFET

Typical output characteristics

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

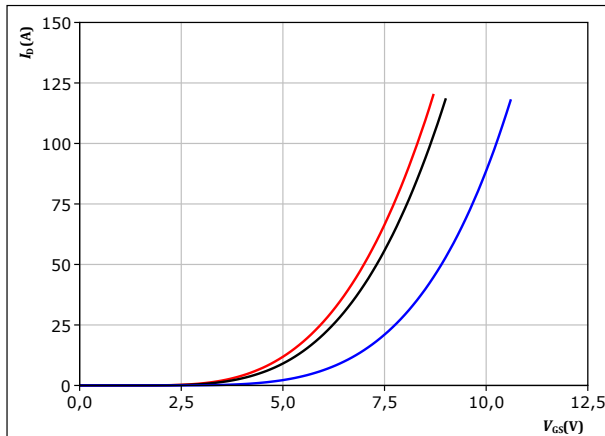


$t_p = 250 \mu s$
 $T_j = 150^\circ C$
 V_{GS} from -5 V to 18 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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

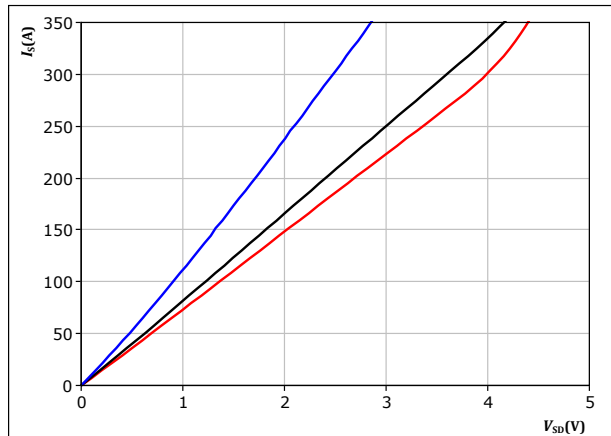


$t_p = 250 \mu s$
 $V_{DS} = 23 V$
 $T_j: 25^\circ C, 125^\circ C, 150^\circ C$

figure 4. MOSFET

Typical reverse drain current characteristics

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



$t_p = 250 \mu s$
 $V_{GS} = 18 V$
 $T_j: 25^\circ C, 125^\circ C, 150^\circ C$

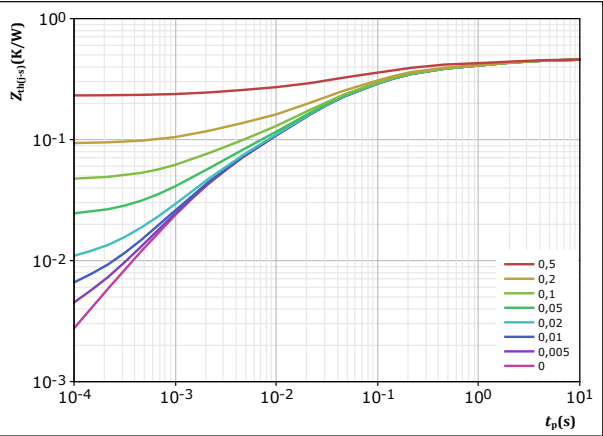


Buck Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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



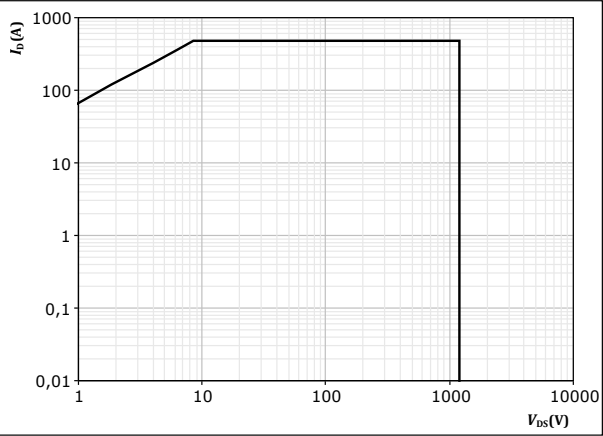
$D = \frac{t_p}{T}$
 $R_{th(j-a)} = 0,458 \text{ K/W}$
MOSFET thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
1,97E-02	7,02E+00
8,13E-02	1,20E+00
1,93E-01	1,09E-01
1,29E-01	1,98E-02
4,01E-02	2,03E-03

figure 6. MOSFET

Safe operating area

$I_D = f(V_{DS})$



$D = \text{single pulse}$

$T_s =$	80	°C
$V_{GS} =$	18	V
$T_j =$	T_{jmax}	



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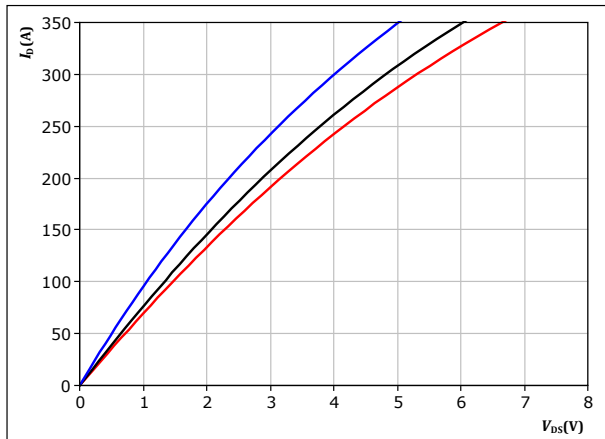
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Boost Switch Characteristics

figure 7. MOSFET

Typical output characteristics

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

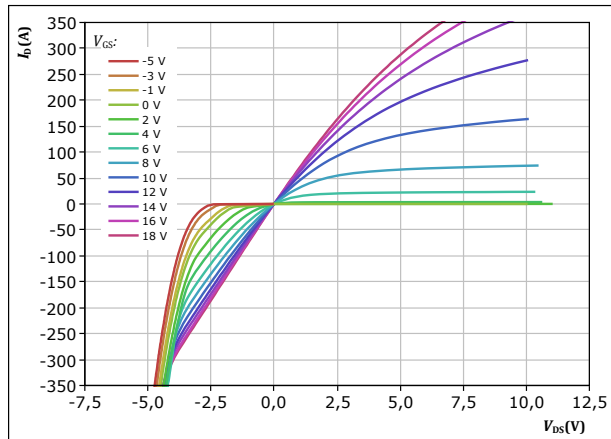


$t_p = 250 \mu s$
 $V_{GS} = 18 V$
 $T_j: 25 ^\circ C$
 $125 ^\circ C$
 $150 ^\circ C$

figure 8. MOSFET

Typical output characteristics

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

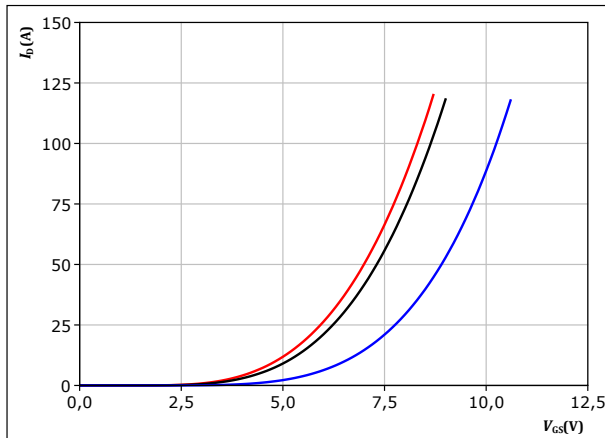


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GS} from -5 V to 18 V in steps of 2 V

figure 9. MOSFET

Typical transfer characteristics

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

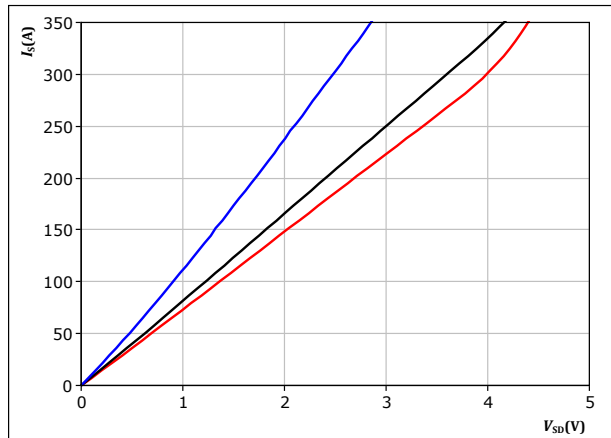


$t_p = 250 \mu s$
 $V_{DS} = 23 V$
 $T_j: 25 ^\circ C$
 $125 ^\circ C$
 $150 ^\circ C$

figure 10. MOSFET

Typical reverse drain current characteristics

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



$t_p = 250 \mu s$
 $V_{GS} = 18 V$
 $T_j: 25 ^\circ C$
 $125 ^\circ C$
 $150 ^\circ C$

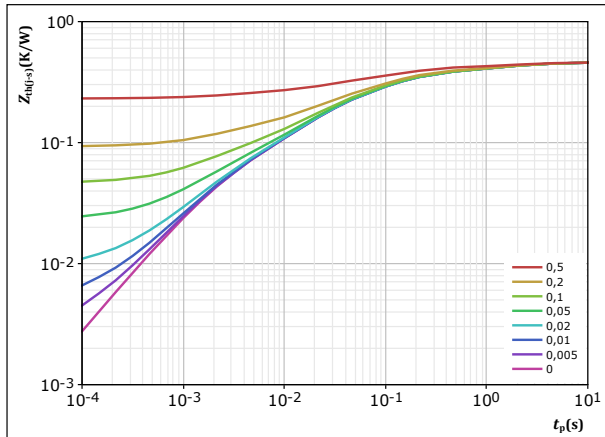


Boost Switch Characteristics

figure 11. MOSFET

Transient thermal impedance as a function of pulse width

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



$$D = \frac{t_p}{T}$$

$$R_{th(j-a)} = 0,458 \text{ K/W}$$

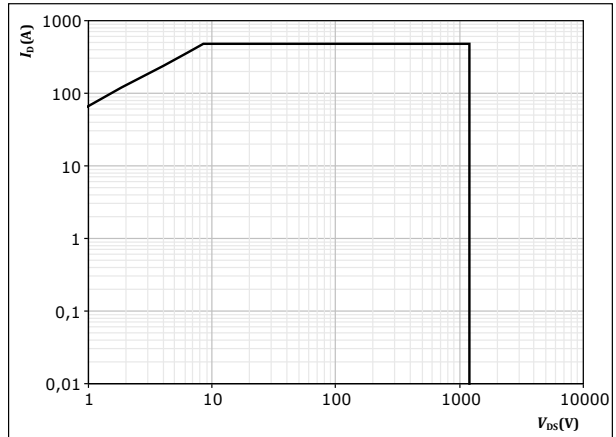
MOSFET thermal model values

R (K/W)	τ (s)
1,97E-02	7,02E+00
8,13E-02	1,20E+00
1,93E-01	1,09E-01
1,29E-01	1,98E-02
4,01E-02	2,03E-03

figure 12. MOSFET

Safe operating area

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



$D = \text{single pulse}$

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

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

$$T_j = T_{jmax}$$



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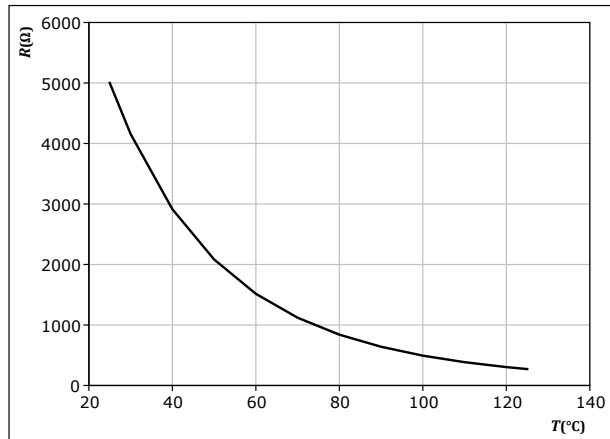
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Thermistor Characteristics

figure 13. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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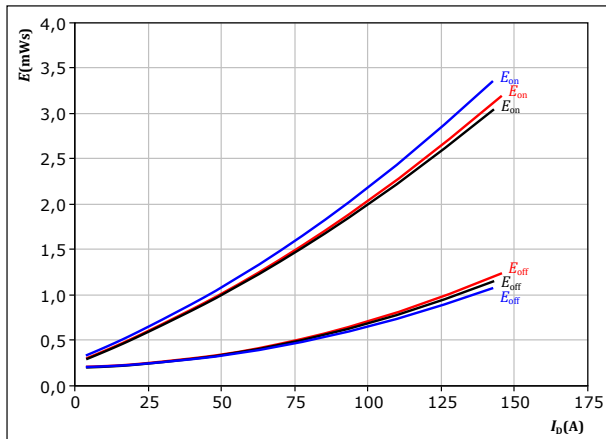
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Buck Switching Characteristics

figure 14. MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



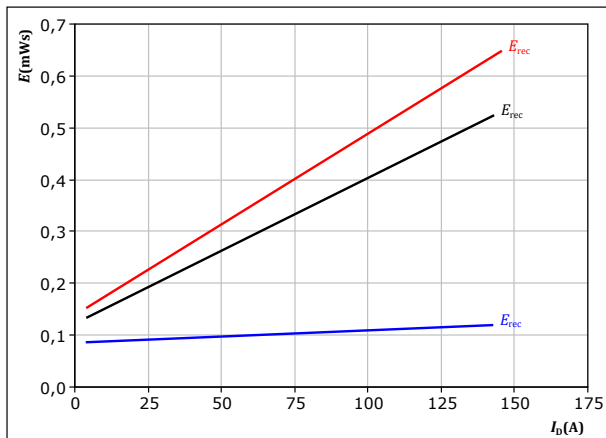
With an inductive load at

$V_{DS} =$	600	V	$T_j:$	25 °C
$V_{GS} =$	-5/15	V		125 °C
$R_{gon} =$	4	Ω		150 °C
$R_{goff} =$	4	Ω		

figure 16. MOSFET

Typical reverse recovered energy loss as a function of drain current

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



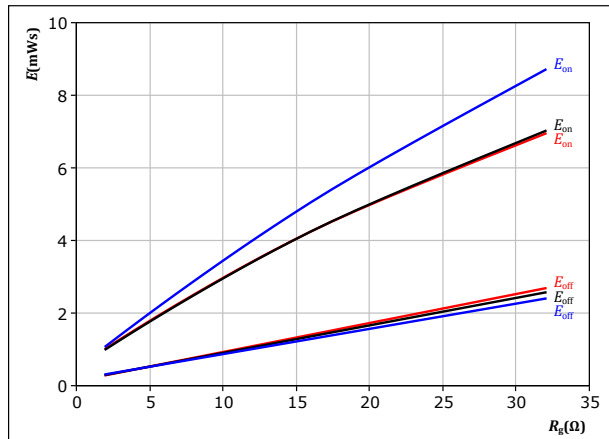
With an inductive load at

$V_{DS} =$	600	V	$T_j:$	25 °C
$V_{GS} =$	-5/15	V		125 °C
$R_{gon} =$	4	Ω		150 °C

figure 15. MOSFET

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

$$E = f(R_g)$$



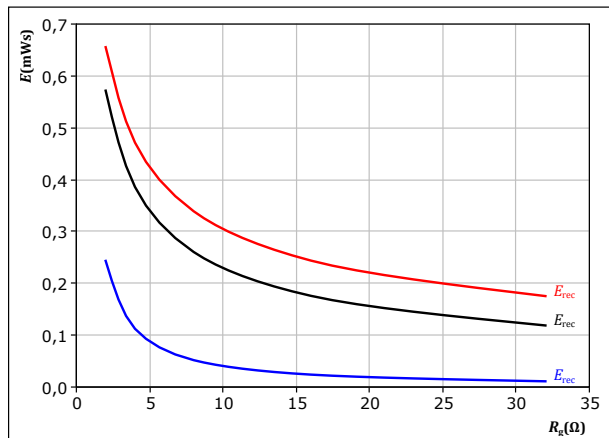
With an inductive load at

$V_{DS} =$	600	V	$T_j:$	25 °C
$V_{GS} =$	-5/15	V		125 °C
$I_D =$	80	A		150 °C

figure 17. 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	$T_j:$	25 °C
$V_{GS} =$	-5/15	V		125 °C
$I_D =$	80	A		150 °C



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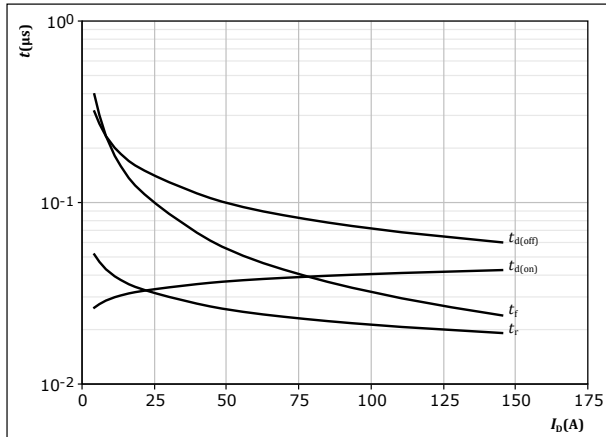
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datasheet

Buck Switching Characteristics

figure 18.

MOSFET

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



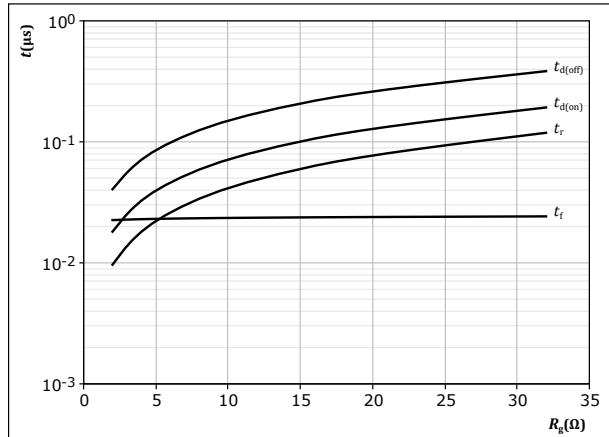
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 19.

MOSFET

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



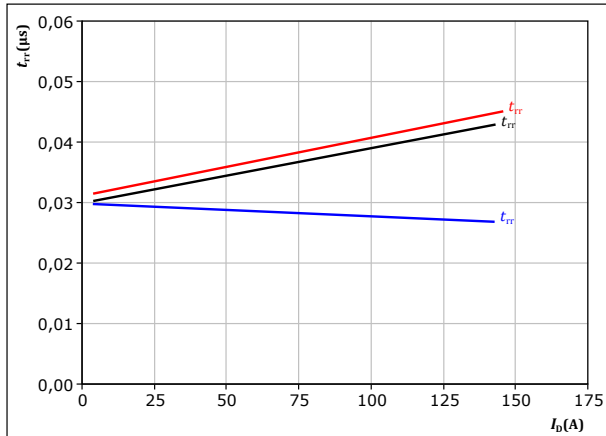
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A

figure 20.

MOSFET

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

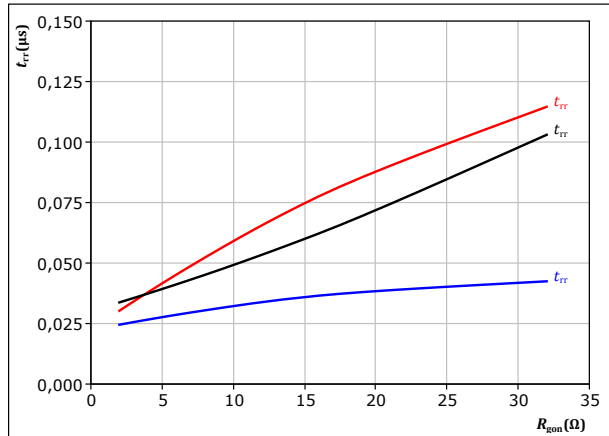


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 21.

MOSFET

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



At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

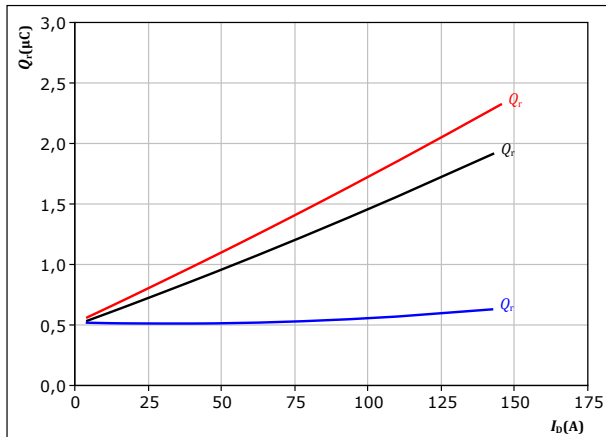


Buck Switching Characteristics

figure 22. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

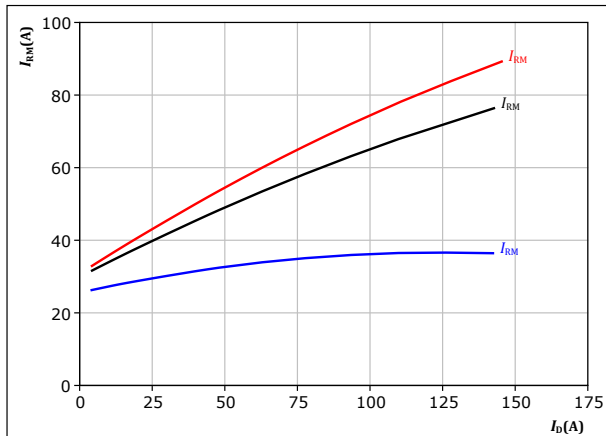


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 24. MOSFET

Typical peak reverse recovery current as a function of drain current

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

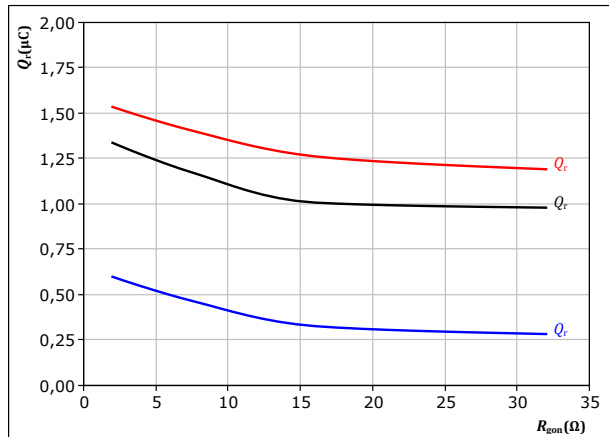


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 23. MOSFET

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

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

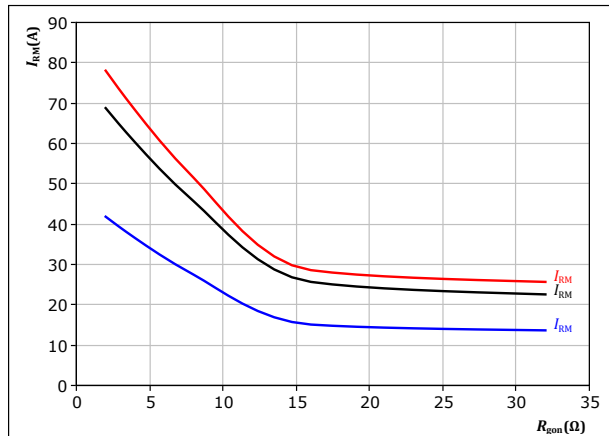


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 T_j : 25 °C
125 °C
150 °C

figure 25. 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
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 T_j : 25 °C
125 °C
150 °C

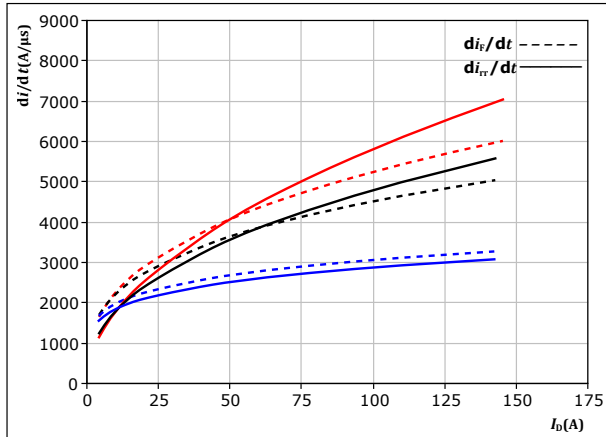


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Buck Switching Characteristics

figure 26. MOSFET

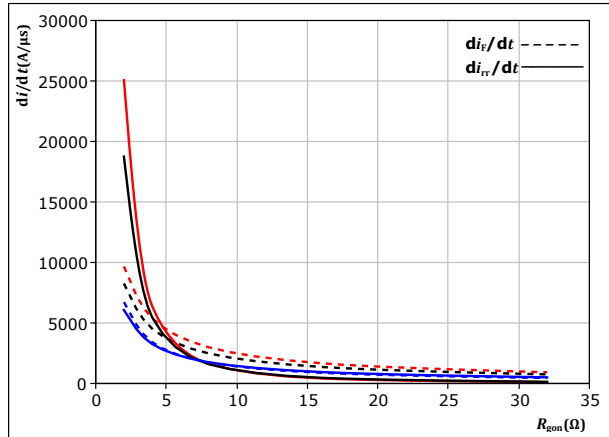
Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_r/dt = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 $T_j = 25$ °C
 $T_j = 125$ °C
 $T_j = 150$ °C

figure 27. MOSFET

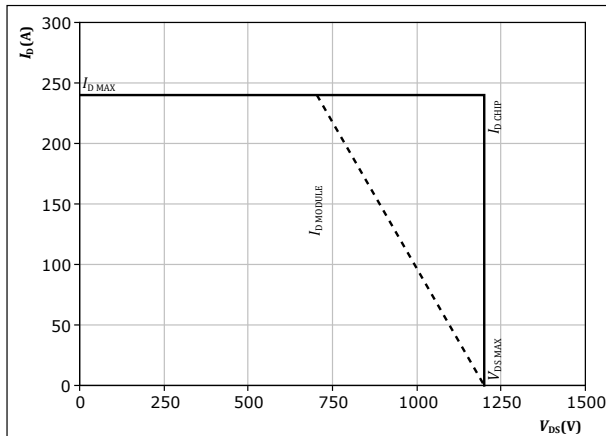
Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 $T_j = 25$ °C
 $T_j = 125$ °C
 $T_j = 150$ °C

figure 28. MOSFET

Reverse bias safe operating area
 $I_D = f(V_{DS})$



At $T_j = 150$ °C
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω



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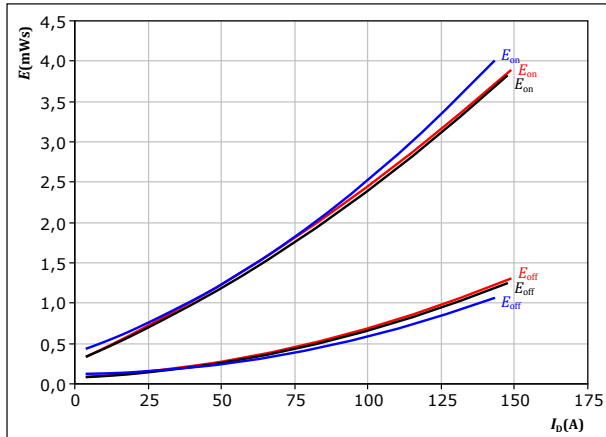
Boost Switching Characteristics

figure 29.

MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



With an inductive load at

$V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/15 \text{ V}$
 $R_{gon} = 4 \text{ } \Omega$
 $R_{goff} = 4 \text{ } \Omega$

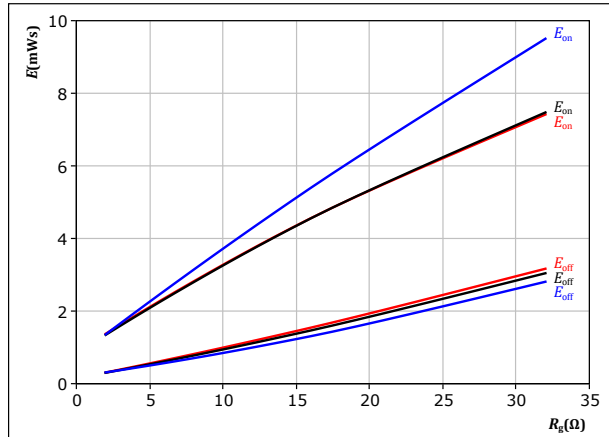
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 30.

MOSFET

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

$$E = f(R_g)$$



With an inductive load at

$V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/15 \text{ V}$
 $I_D = 80 \text{ A}$

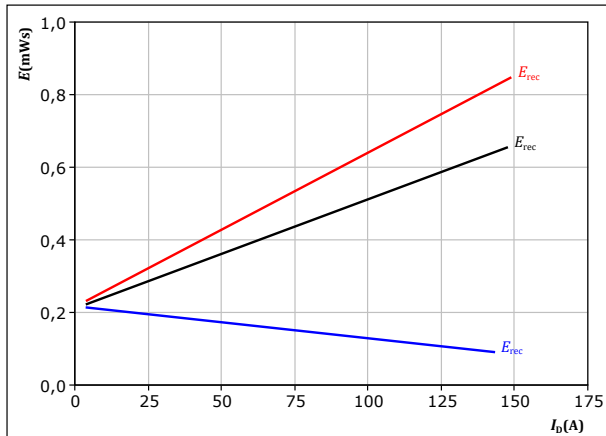
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 31.

MOSFET

Typical reverse recovered energy loss as a function of drain current

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



With an inductive load at

$V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/15 \text{ V}$
 $R_{gon} = 4 \text{ } \Omega$

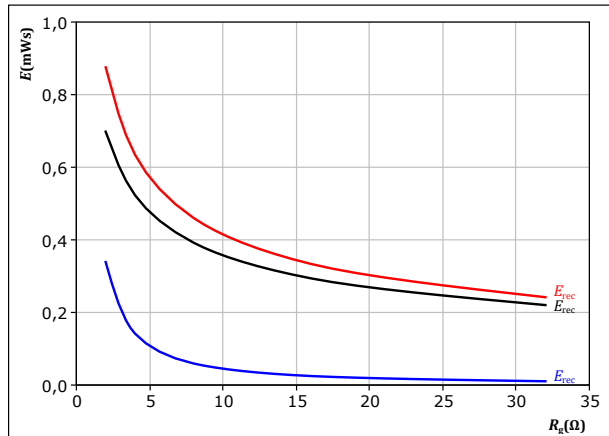
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 32.

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

$V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/15 \text{ V}$
 $I_D = 80 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



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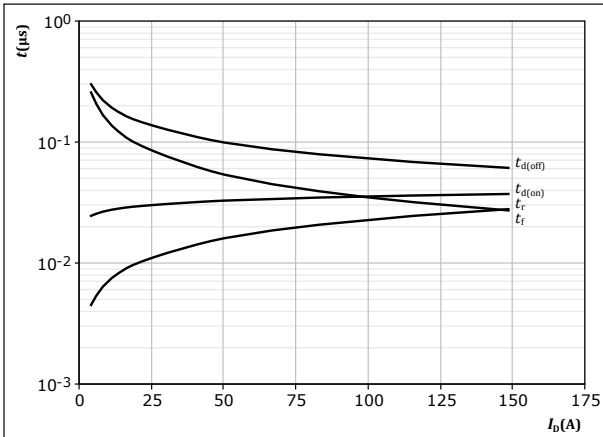
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Boost Switching Characteristics

figure 33.

MOSFET

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



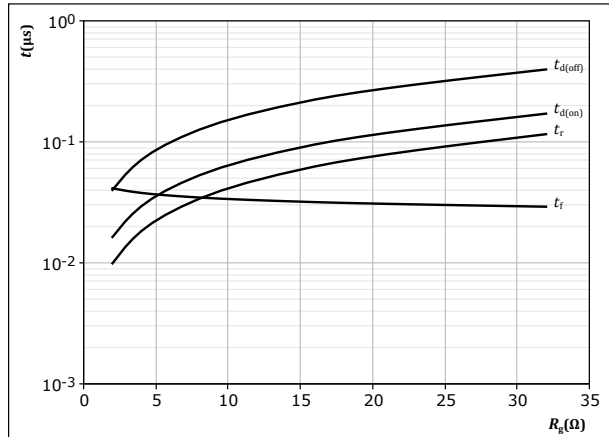
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 34.

MOSFET

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



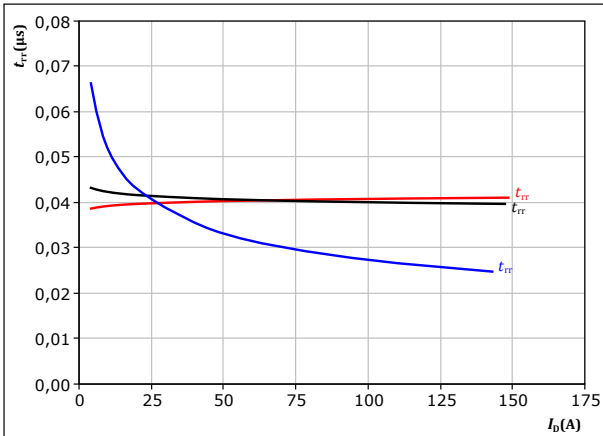
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A

figure 35.

MOSFET

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

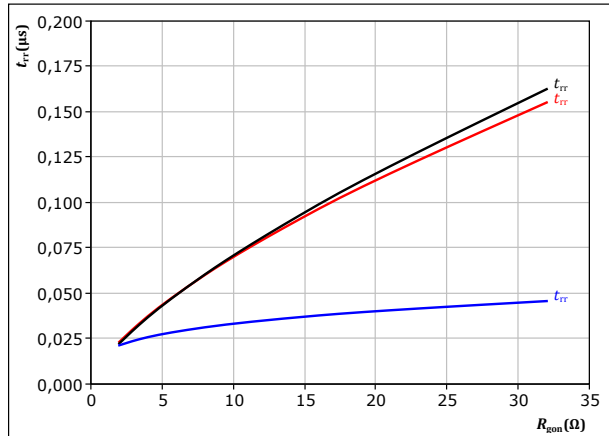


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 36.

MOSFET

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



At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)



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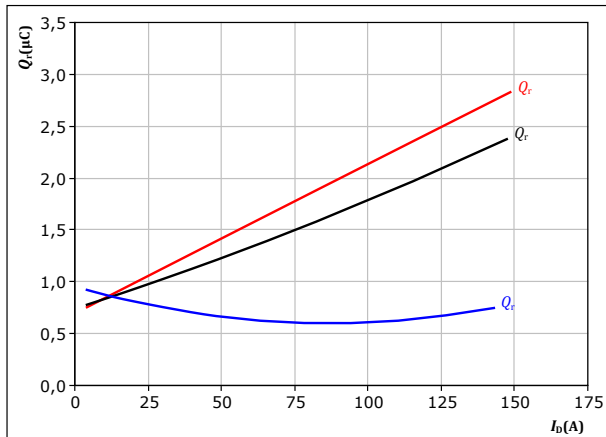
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datasheet

Boost Switching Characteristics

figure 37. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

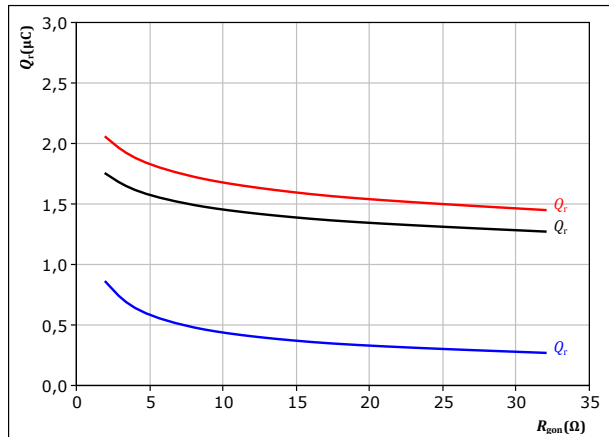


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 38. MOSFET

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

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

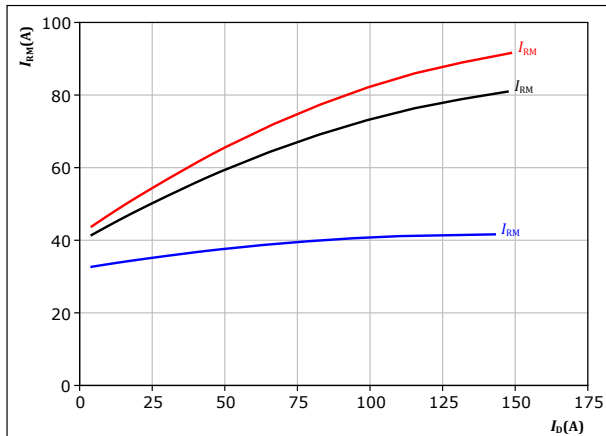


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 T_j : 25 °C
125 °C
150 °C

figure 39. MOSFET

Typical peak reverse recovery current as a function of drain current

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

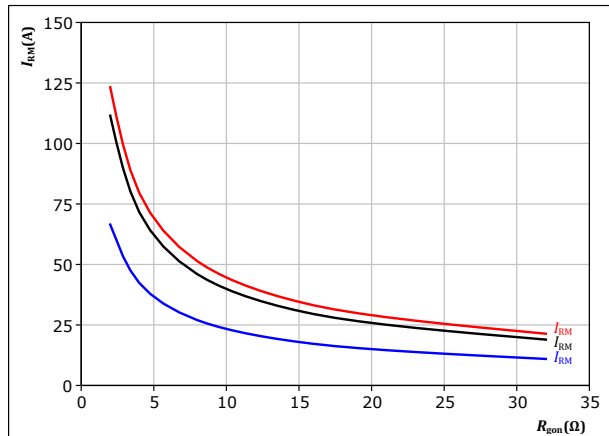


At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 40. 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
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 T_j : 25 °C
125 °C
150 °C

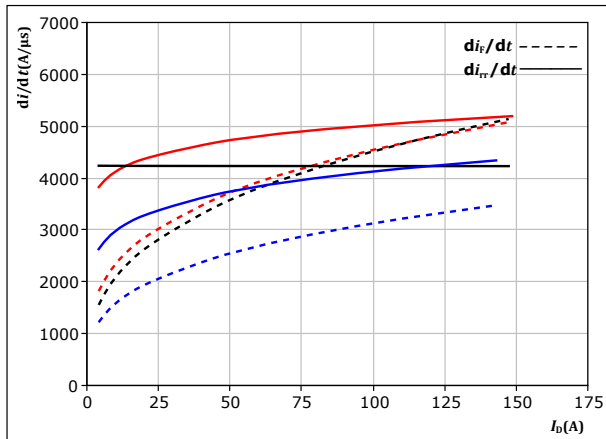


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Boost Switching Characteristics

figure 41. MOSFET

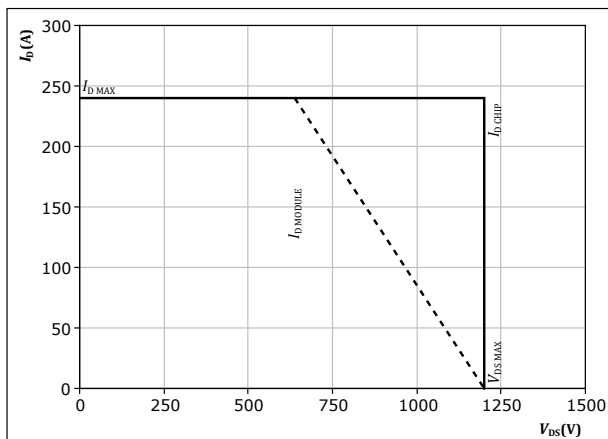
Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_{rr}/dt = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 $T_j = 25$ °C
 $T_j = 125$ °C
 $T_j = 150$ °C

figure 43. MOSFET

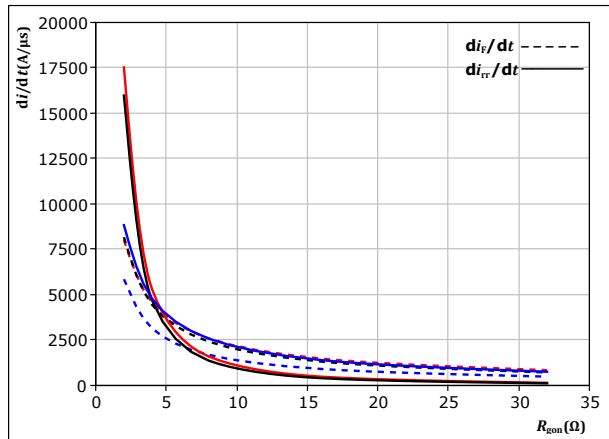
Reverse bias safe operating area
 $I_D = f(V_{DS})$



At $T_j = 150$ °C
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 42. 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 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 80$ A
 $T_j = 25$ °C
 $T_j = 125$ °C
 $T_j = 150$ °C



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Switching Definitions

figure 44. MOSFET
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})

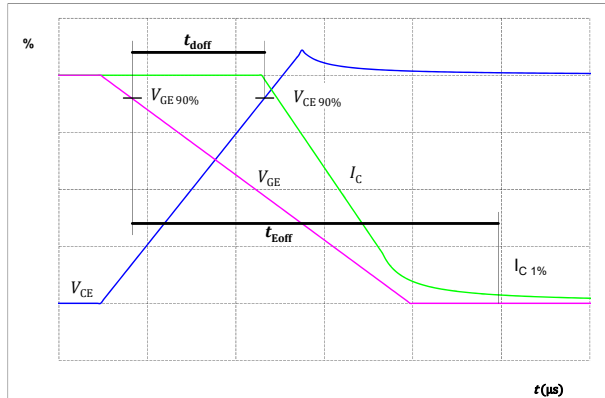


figure 45. MOSFET
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})

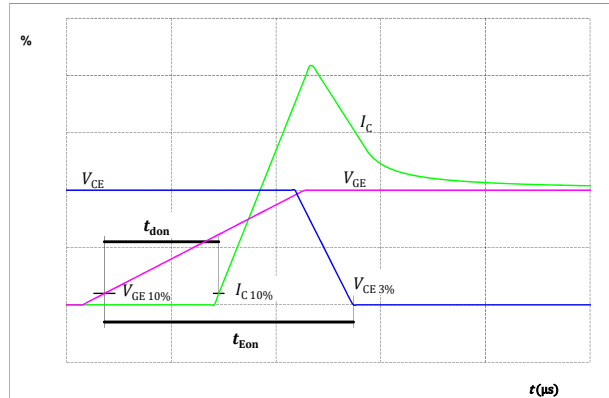


figure 46. MOSFET
Turn-off Switching Waveforms & definition of t_f

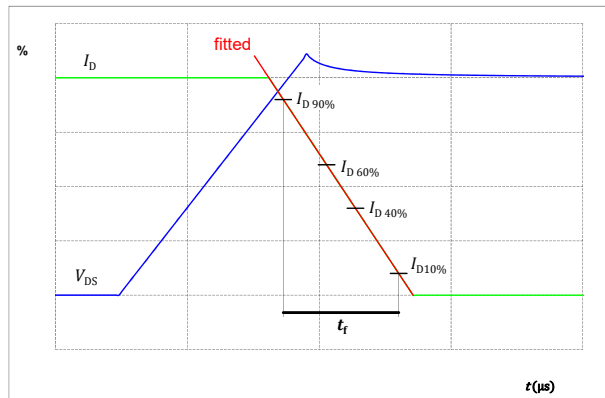
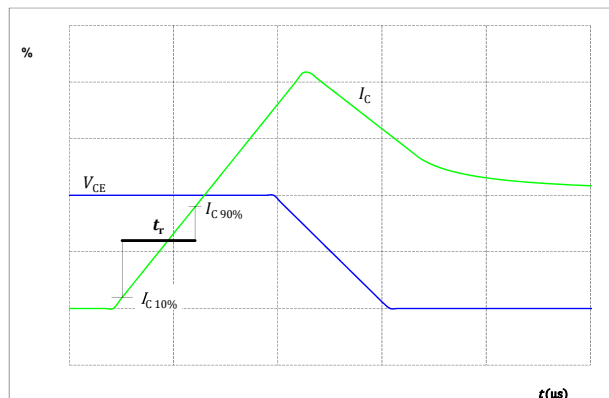


figure 47. MOSFET
Turn-on Switching Waveforms & definition of t_r





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Switching Definitions

figure 48. FWD

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

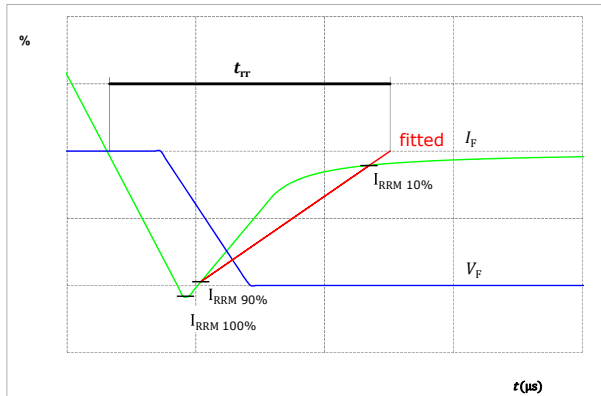


figure 49. FWD

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

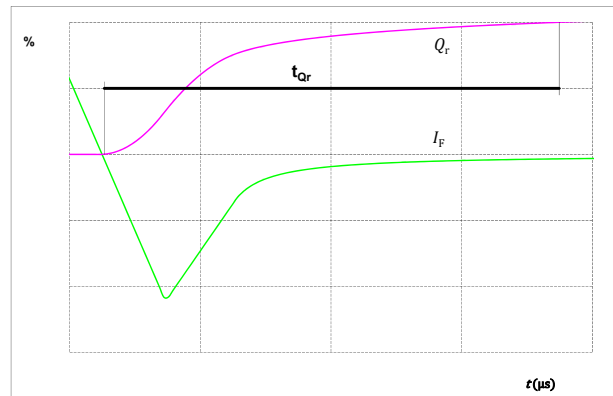
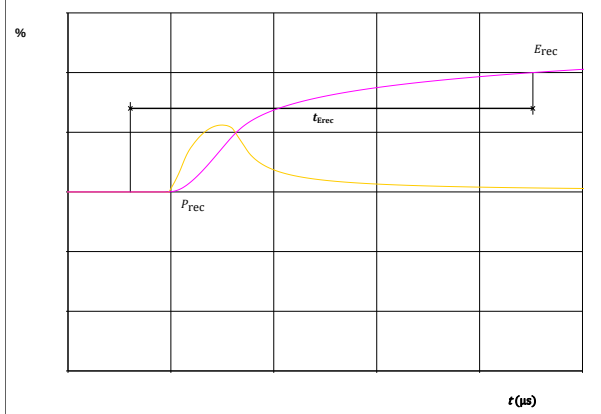


figure 50. FWD

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-EY12NMA010MS-LS28F76T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EY12NMA010MS-LS28F76T-/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	32	3,2	S11
2	32	0	G11
3	3,2	0	DC+
4	0	0	DC+
5	3,2	3,2	DC+
6	0	3,2	DC+
7	3,2	12,8	GND
8	0	12,8	GND
9	3,2	16	GND
10	0	16	GND
11	0	28,8	S14
12	0	32	G14
13	0	38,4	DC-
14	0	41,6	DC-
15	0	44,8	DC-
16	0	48	DC-
17	19,2	48	S12
18	22,4	48	G12
19	32	48	Therm1
20	32	44,8	Therm2
21	32	38,4	Ph
22	32	35,2	Ph
23	32	32	Ph
24	32	19,2	Ph
25	32	16	Ph
26	32	12,8	Ph
27	16	19,2	S13
28	12,8	19,2	G13
29	16	28,8	CC

center of press-fit pin head
pin head type: TP, PCB plated through-hole Ø1mm ±0.09 / -0.06
for further PCB design rules refer to the latest handling instruction

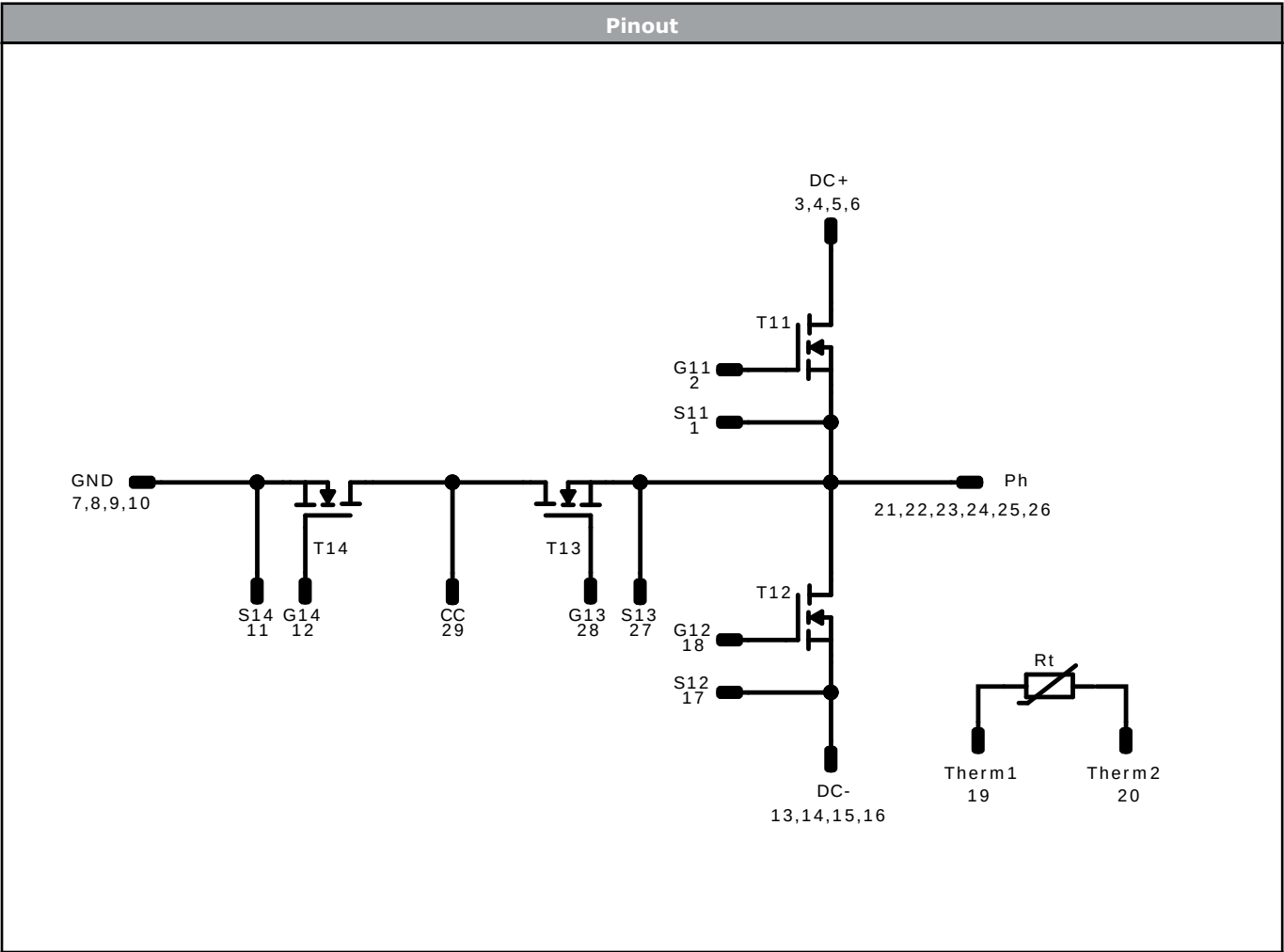
50.0 ± 0.1
3.0 ± 0.1

Tolerance of prepositions: ±0.05mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



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datasheet



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	MOSFET	1200 V	10 mΩ	Buck Switch	
T13, T14	MOSFET	1200 V	10 mΩ	Boost Switch	
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</i> E2 packages see vincotech.com website.				
Package data				
Package data for <i>flow</i> E2 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-EY12NMA010MS-LS28F76T-D1-14	20 Nov. 2025	Initial Release	

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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.