



Vincotech

# 10-EY12NMA016ME-LS28F16T

datasheet

flowMNPC E2

1200 V / 16 m $\Omega$

## 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<sub>2</sub>O<sub>3</sub>
- 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

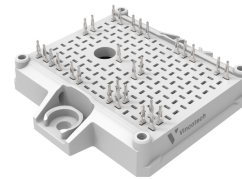
## Target applications

- Charging Stations
- Power Supply
- Solar Inverters
- UPS

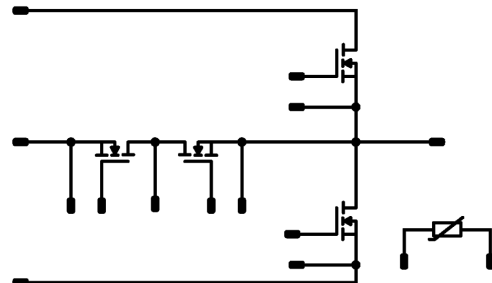
## Types

- 10-EY12NMA016ME-LS28F16T

## flow E2 12 mm housing



## Schematic





Vincotech

**10-EY12NMA016ME-LS28F16T**  
datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Buck Switch</b>				
Drain-source voltage	$V_{DS}$		1200	V
Drain current (DC current)	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	66	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	240	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	106	W
Gate-source voltage	$V_{GS}$	static	-4 / 15	V
		dynamic	-8 / 19	V
Maximum Junction Temperature	$T_{jmax}$		175	°C

## Boost Switch

Drain-source voltage	$V_{DS}$		650	V
Drain current (DC current)	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	85	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	396	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	148	W
Gate-source voltage	$V_{GS}$	static	-4 / 15	V
		dynamic	-8 / 19	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



Vincotech

## 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 <sup>(1)</sup>	$r_{DS(on)}$		15		80	25 175	11,2	16 28,8	20,8	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$			0,023	25	1,8	2,5	3,6	V
Gate to Source Leakage Current	$I_{GSS}$		15	0		25		20	500	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	1200		25		2	38	μA
Internal gate resistance	$r_g$							0,85		Ω
Gate charge	$Q_g$		-4/15	800	80	25		236		nC
Short-circuit input capacitance	$C_{iss}$	$f = 100$ kHz	0	1000	0	25		6714		pF
Short-circuit output capacitance	$C_{oss}$							258		
Reverse transfer capacitance	$C_{rss}$							16		
Diode forward voltage	$V_{SD}$		0		40	25		4,6		V

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,9		K/W
--	---------------	---------------------------------------	--	--	--	--	--	-----	--	-----



Vincotech

## 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	$t_{d(on)}$	$R_{gon} = 1 \Omega$ $R_{goff} = 1 \Omega$	-4/15	350	65	25		22,61		ns	
						125		22,21			
						150		22,18			
Rise time	$t_r$					25		7,66			ns
						125		7,06			
						150		7,15			
Turn-off delay time	$t_{d(off)}$					25		36,52			ns
						125		38,31			
						150		39,01			
Fall time	$t_f$					25		6,25			ns
						125		5,76			
						150		6,23			
Turn-on energy (per pulse)	$E_{on}$	$Q_{rFWD}=0,4 \mu C$ $Q_{rFWD}=0,559 \mu C$ $Q_{rFWD}=0,634 \mu C$	25		0,044			mWs			
			125		0,052						
			150		0,054						
Turn-off energy (per pulse)	$E_{off}$		25		0,123			mWs			
			125		0,12						
			150		0,121						
Peak recovery current	$I_{RRM}$	$di/dt=8852 A/\mu s$ $di/dt=9229 A/\mu s$ $di/dt=9270 A/\mu s$	25		40,8			A			
			125		46,35						
			150		49,51						
Reverse recovery time	$t_{rr}$		25		16,67			ns			
			125		18,06						
			150		18,79						
Recovered charge	$Q_r$		25		0,4			$\mu C$			
			125		0,559						
			150		0,634						
Reverse recovered energy	$E_{rec}$	25		0,068			mWs				
		125		0,1							
		150		0,114							
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		5287,07			A/ $\mu s$				
		125		9658,07							
		150		9884,44							





Vincotech

## 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 <sup>(1)</sup>	$r_{DS(on)}$		15		52,8	25 175		15 20	20	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$			0,01452	25	1,8	2,6	3,6	V
Gate to Source Leakage Current	$I_{GSS}$		15	0		25		30	300	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	650		25		3	96	μA
Internal gate resistance	$r_g$							1		Ω
Gate charge	$Q_g$		-4/15	400	52,8	25		189		nC
Short-circuit input capacitance	$C_{iss}$	$f = 1 \text{ Mhz}$	0	600	0	25		4800		pF
Short-circuit output capacitance	$C_{oss}$							300		
Reverse transfer capacitance	$C_{rss}$							24		
Diode forward voltage	$V_{SD}$		0		26,4	25		4,8		V

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,64		K/W
--	---------------	---	--	--	--	--	--	------	--	-----



Vincotech

# 10-EY12NMA016ME-LS28F16T

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	
Dynamic										
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 1\ \Omega$ $R_{goff} = 1\ \Omega$	-4/15	350	75	25 125 150		13,09 12,49 12,54		ns
Rise time	$t_r$					25 125 150		9,61 9,74 9,41		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		27,84 28,96 29,27		ns
Fall time	$t_f$					25 125 150		5,24 4,37 4,87		ns
Turn-on energy (per pulse)	$E_{on}$	$Q_{tFWD}=0,569\ \mu C$ $Q_{tFWD}=1,13\ \mu C$ $Q_{tFWD}=1,38\ \mu C$				25 125 150		0,029 0,027 0,024		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		0,071 0,067 0,062		mWs
Peak recovery current	$I_{RRM}$	$di/dt=6161\ A/\mu s$ $di/dt=5425\ A/\mu s$ $di/dt=5605\ A/\mu s$				25 125 150		58,09 75,33 82,21		A
Reverse recovery time	$t_{rr}$					25 125 150		16,6 23,72 26,14		ns
Recovered charge	$Q_r$					25 125 150		0,569 1,13 1,38		$\mu C$
Reverse recovered energy	$E_{rec}$					25 125 150		0,144 0,275 0,339		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		10658,36 9474,49 10741,36		A/ $\mu s$



Vincotech

## 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	

<sup>(1)</sup> Value at chip level

<sup>(2)</sup> Only valid with pre-applied Vincotech thermal interface material.



Vincotech

# 10-EY12NMA016ME-LS28F16T

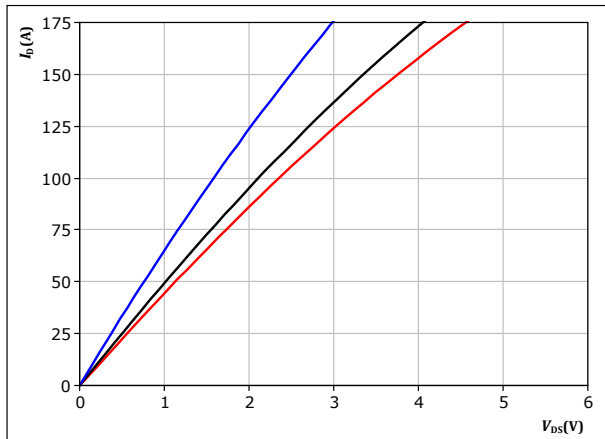
datasheet

## Buck Switch Characteristics

figure 1. MOSFET

Typical output characteristics including  $R_{DS(on)}$  +  $R_{SS}$

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



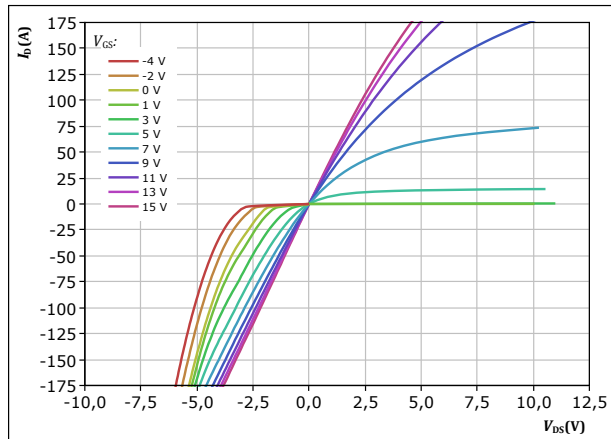
$t_p = 250 \mu s$   
 $V_{GS} = 15 V$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 2. MOSFET

Typical output characteristics including  $R_{DS(on)}$  +  $R_{SS}$

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

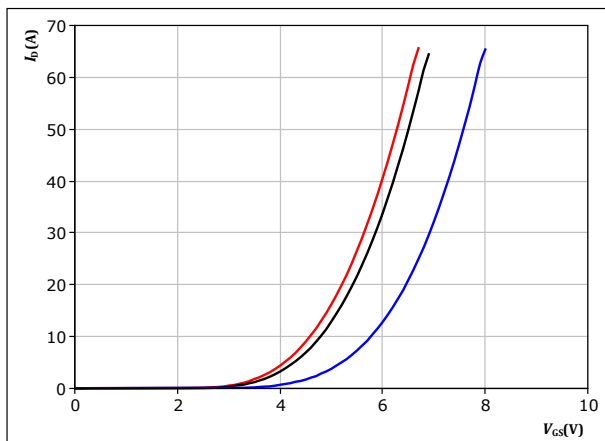


$t_p = 250 \mu s$   
 $T_j = 150 ^\circ C$   
 $V_{GS}$  from -4 V to 15 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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



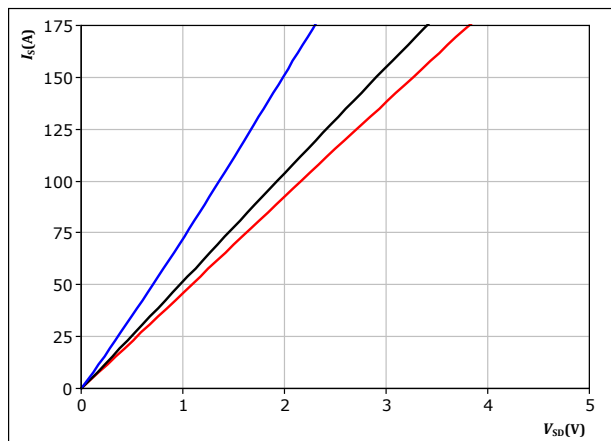
$t_p = 250 \mu s$   
 $V_{DS} = 10 V$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 4. MOSFET

Typical reverse drain current characteristics including  $R_{DS(on)}$  +  $R_{SS}$

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



$t_p = 250 \mu s$   
 $V_{GS} = 15 V$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

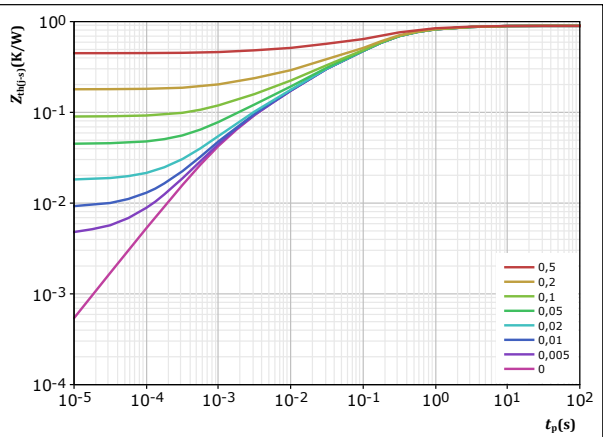


Buck Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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

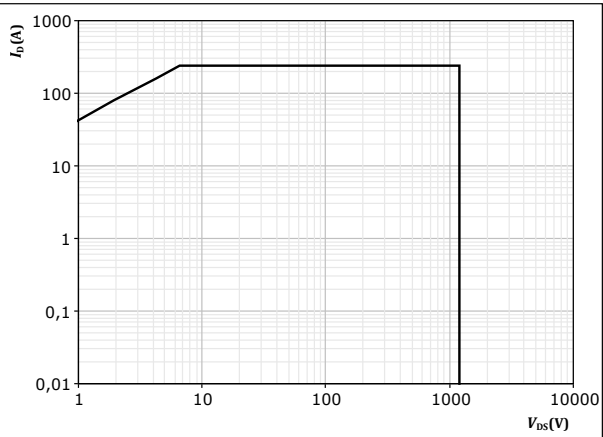


$D =$	$t_p / T$
$R_{th(j-a)} =$	0,898 K/W
MOSFET thermal model values	
$R$ (K/W)	$\tau$ (s)
5,87E-02	3,51E+00
1,94E-01	5,46E-01
4,24E-01	1,38E-01
1,67E-01	1,40E-02
5,45E-02	1,40E-03

figure 6. MOSFET

Safe operating area

$I_D = f(V_{DS})$



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



Vincotech

# 10-EY12NMA016ME-LS28F16T

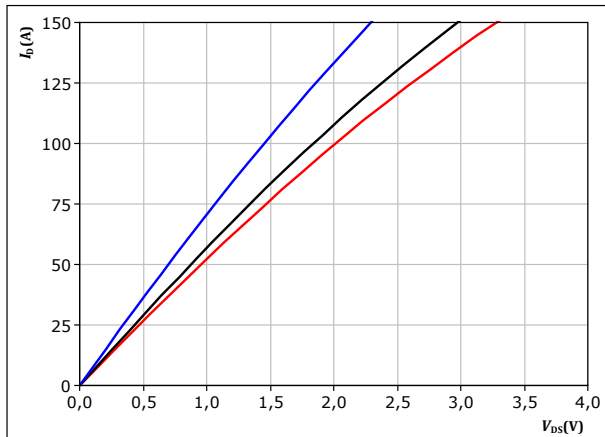
datasheet

## Boost Switch Characteristics

figure 7. MOSFET

Typical output characteristics including  $R_{DS(on)} + R_{DS}$

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

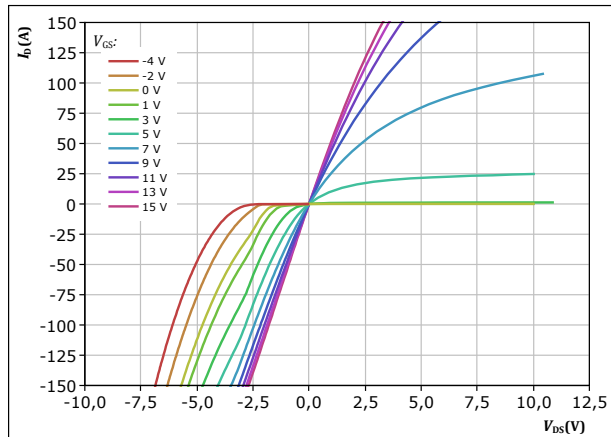


$t_p = 250 \mu s$   
 $V_{GS} = 15 V$   
 $T_j: 25 \text{ } ^\circ C$   
 $125 \text{ } ^\circ C$   
 $150 \text{ } ^\circ C$

figure 8. MOSFET

Typical output characteristics including  $R_{DS(on)} + R_{DS}$

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

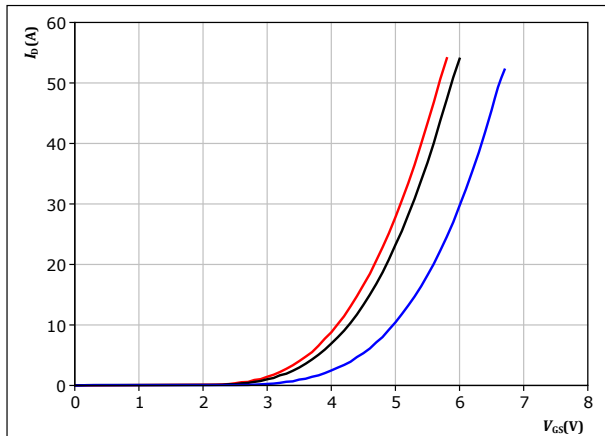


$t_p = 250 \mu s$   
 $T_j = 150 \text{ } ^\circ C$   
 $V_{GS}$  from -4 V to 15 V in steps of 2 V

figure 9. MOSFET

Typical transfer characteristics

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

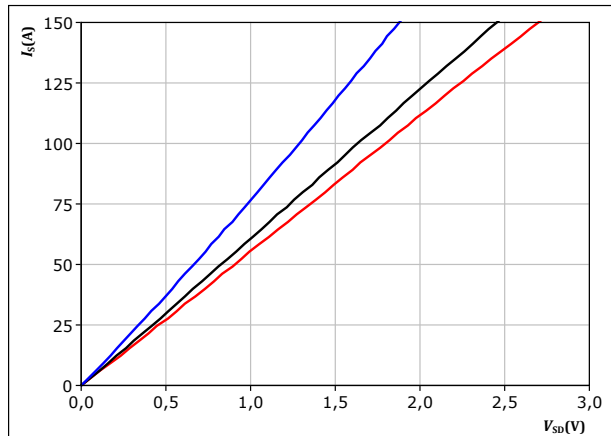


$t_p = 250 \mu s$   
 $V_{DS} = 10 V$   
 $T_j: 25 \text{ } ^\circ C$   
 $125 \text{ } ^\circ C$   
 $150 \text{ } ^\circ C$

figure 10. MOSFET

Typical reverse drain current characteristics including  $R_{DS(on)} + R_{DS}$

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



$t_p = 250 \mu s$   
 $V_{GS} = 15 V$   
 $T_j: 25 \text{ } ^\circ C$   
 $125 \text{ } ^\circ C$   
 $150 \text{ } ^\circ C$



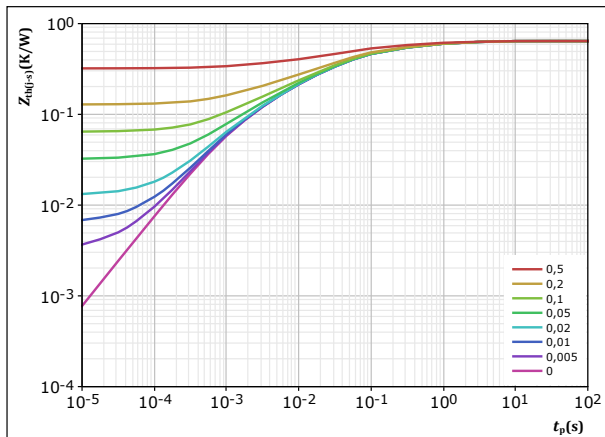
Vincotech

## Boost Switch Characteristics

figure 11. MOSFET

Transient thermal impedance as a function of pulse width

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



$D =$	$t_p / T$
$R_{th(j-a)} =$	0,642 K/W
MOSFET thermal model values	
$R$ (K/W)	$\tau$ (s)
5,60E-02	2,26E+00
1,32E-01	3,14E-01
2,58E-01	4,60E-02
1,37E-01	7,57E-03
5,91E-02	1,11E-03

figure 12. MOSFET

Safe operating area

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

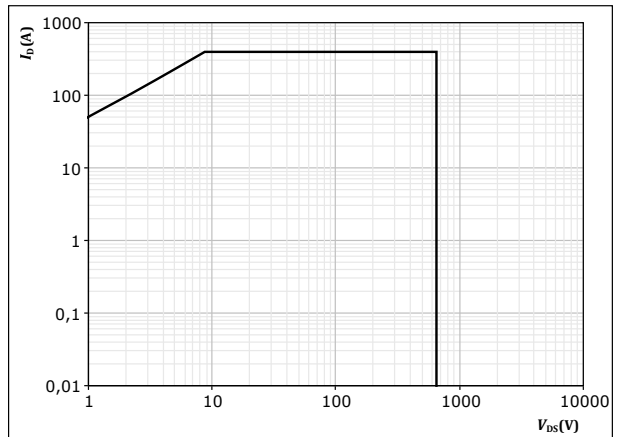
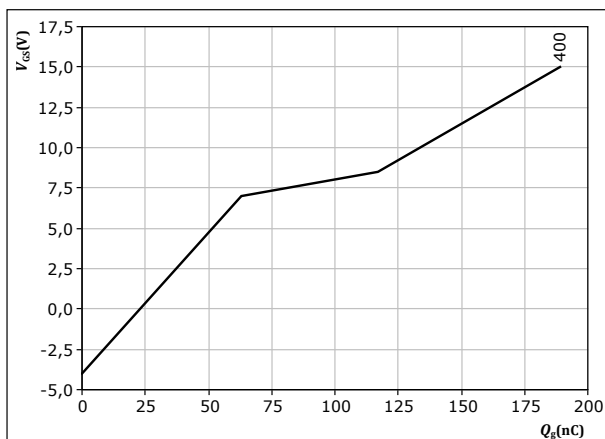


figure 13. MOSFET

Gate voltage vs gate charge

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



$I_D =$	52.8	A
$T_j =$	25	°C



Vincotech

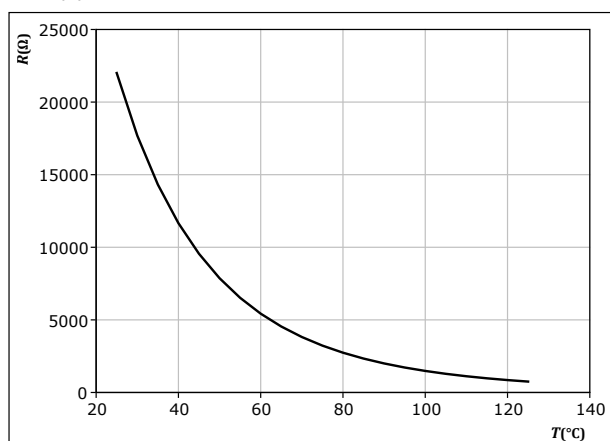
**10-EY12NMA016ME-LS28F16T**  
datasheet

## Thermistor Characteristics

**figure 14.** Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$







Vincotech

# 10-EY12NMA016ME-LS28F16T datasheet

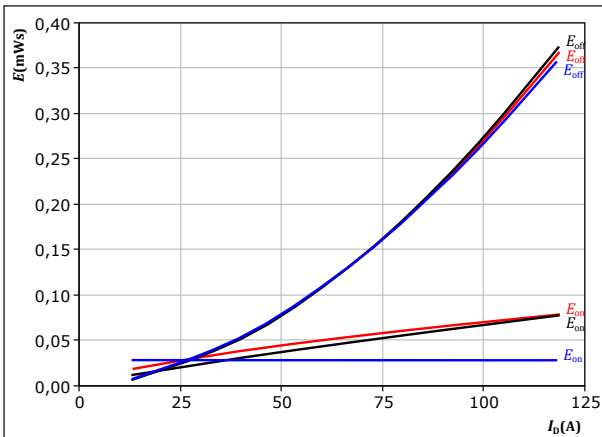
## Buck Switching Characteristics

figure 15.

MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



With an inductive load at

$V_{DS} = 350 \text{ V}$   
 $V_{GS} = -4/15 \text{ V}$   
 $R_{gon} = 1 \text{ } \Omega$   
 $R_{goff} = 1 \text{ } \Omega$

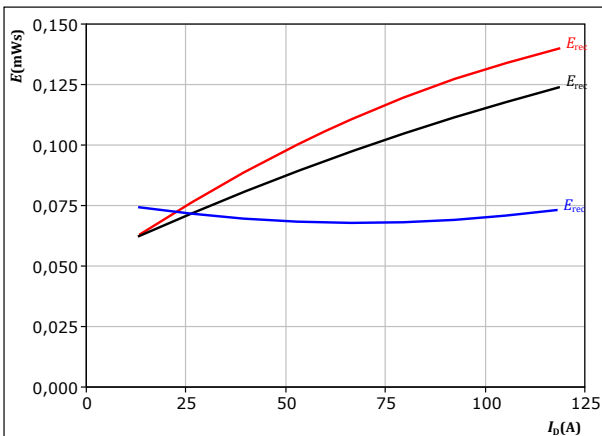
$T_j$ : 25 °C  
125 °C  
150 °C

figure 17.

MOSFET

Typical reverse recovered energy loss as a function of drain current

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



With an inductive load at

$V_{DS} = 350 \text{ V}$   
 $V_{GS} = -4/15 \text{ V}$   
 $R_{gon} = 1 \text{ } \Omega$

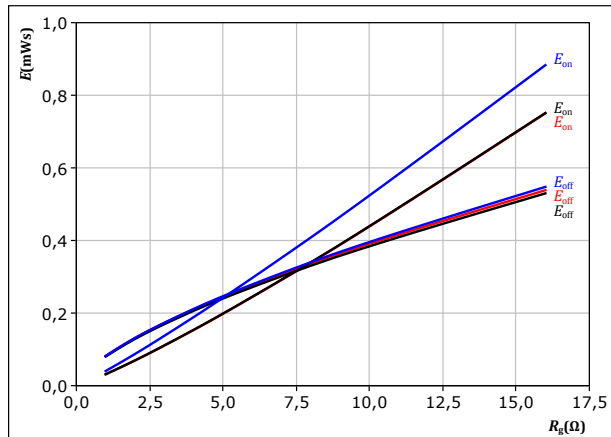
$T_j$ : 25 °C  
125 °C  
150 °C

figure 16.

MOSFET

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

$$E = f(R_g)$$



With an inductive load at

$V_{DS} = 350 \text{ V}$   
 $V_{GS} = -4/15 \text{ V}$   
 $I_D = 65 \text{ A}$

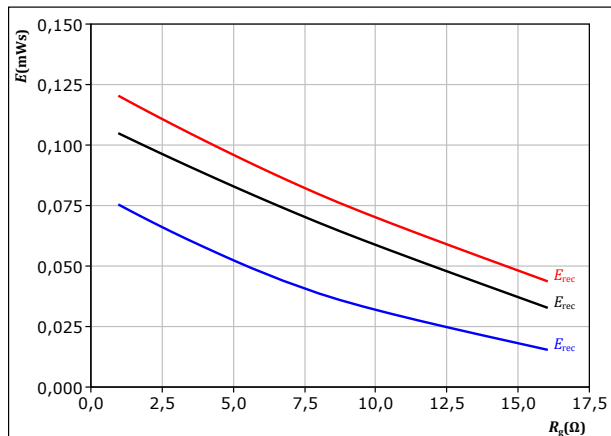
$T_j$ : 25 °C  
125 °C  
150 °C

figure 18.

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

$V_{DS} = 350 \text{ V}$   
 $V_{GS} = -4/15 \text{ V}$   
 $I_D = 65 \text{ A}$

$T_j$ : 25 °C  
125 °C  
150 °C



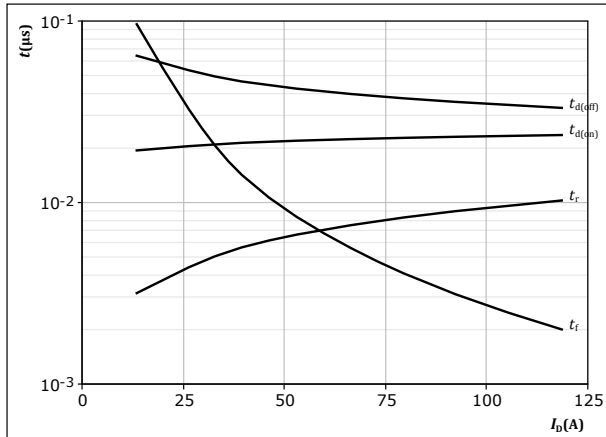
Vincotech

# 10-EY12NMA016ME-LS28F16T datasheet

## Buck Switching Characteristics

figure 19. MOSFET

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

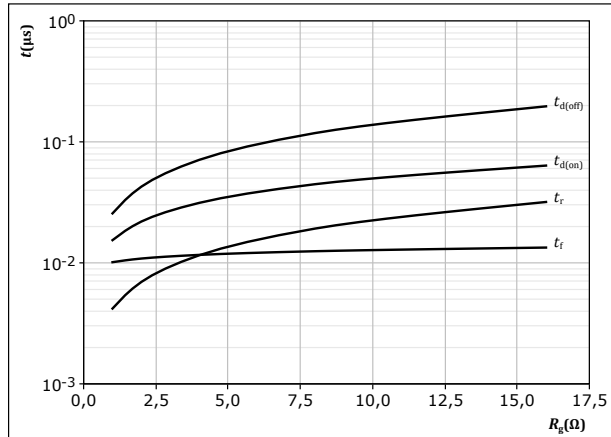


With an inductive load at

$T_j = 150$  °C  
 $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$  Ω  
 $R_{goff} = 1$  Ω

figure 20. MOSFET

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

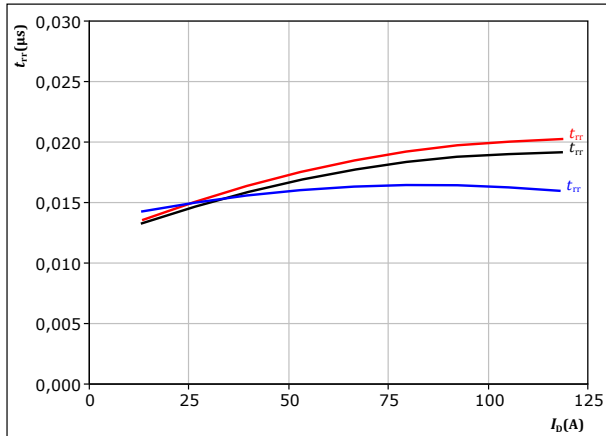


With an inductive load at

$T_j = 150$  °C  
 $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 65$  A

figure 21. MOSFET

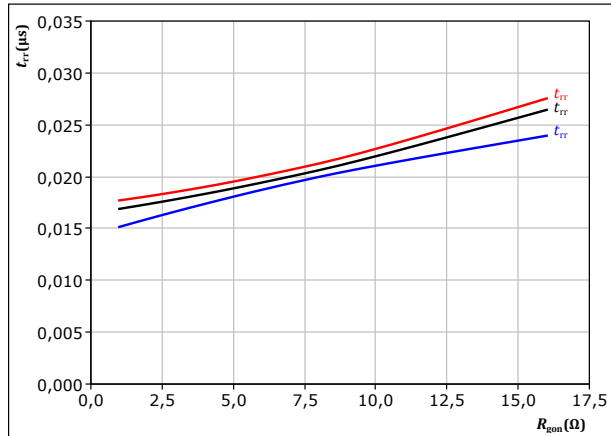
Typical reverse recovery time as a function of drain current  
 $t_{rr} = f(I_D)$



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$  Ω  
 $T_j: 25$  °C (blue)  
 $125$  °C (black)  
 $150$  °C (red)

figure 22. MOSFET

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



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 65$  A  
 $T_j: 25$  °C (blue)  
 $125$  °C (black)  
 $150$  °C (red)



Vincotech

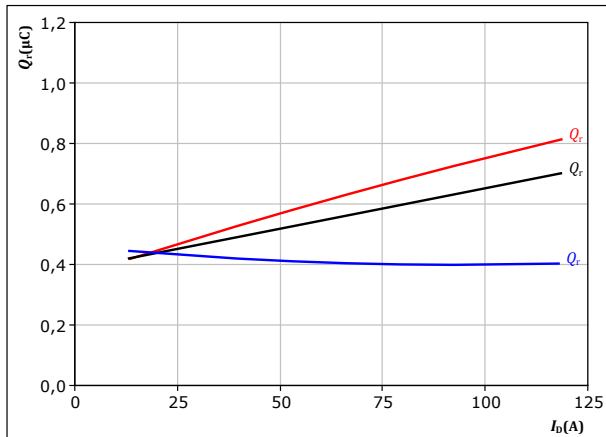
## Buck Switching Characteristics

figure 23.

MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



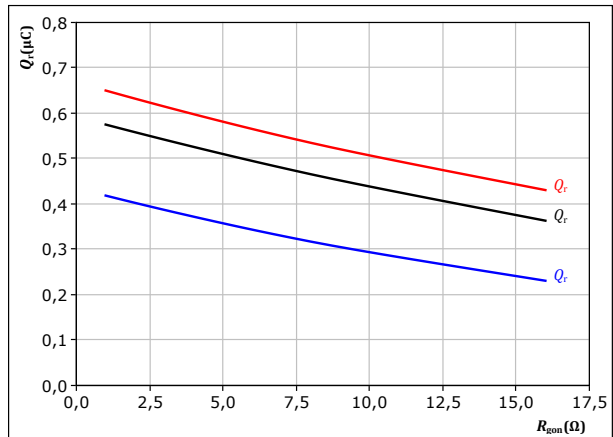
At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$   $\Omega$   
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 24.

MOSFET

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

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



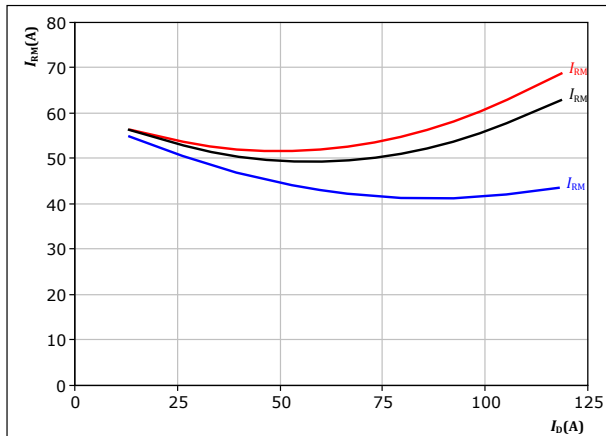
At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 65$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 25.

MOSFET

Typical peak reverse recovery current as a function of drain current

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



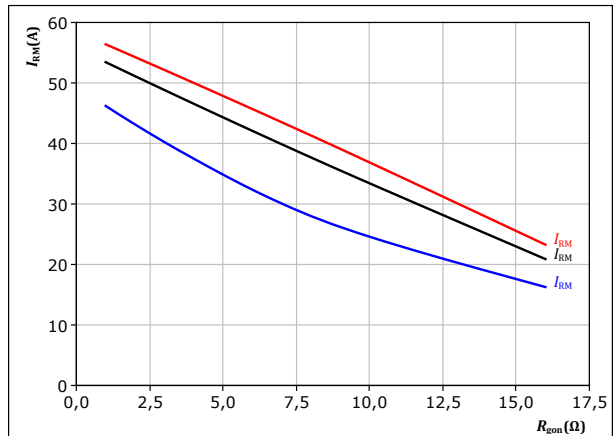
At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$   $\Omega$   
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 26.

MOSFET

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

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



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 65$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

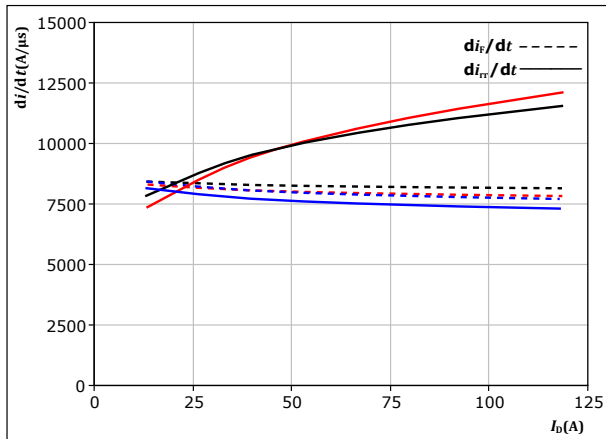


Vincotech

## Buck Switching Characteristics

figure 27. MOSFET

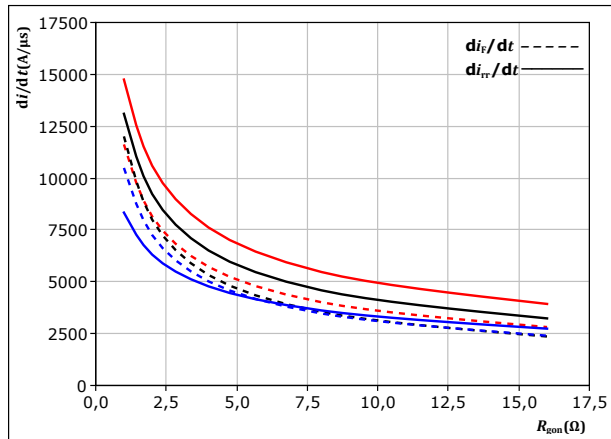
Typical rate of fall of forward and reverse recovery current as a function of drain current  
 $di_f/dt, di_r/dt = f(I_D)$



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$   $\Omega$   
 $T_j:$  25 °C (blue), 125 °C (black), 150 °C (red)

figure 28. MOSFET

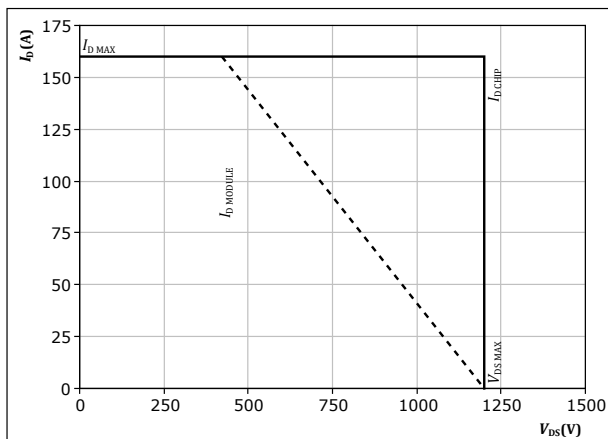
Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor  
 $di_f/dt, di_r/dt = f(R_{gon})$



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 65$  A  
 $T_j:$  25 °C (blue), 125 °C (black), 150 °C (red)

figure 29. MOSFET

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



At  $T_j = 150$  °C  
 $R_{gon} = 1$   $\Omega$   
 $R_{goff} = 1$   $\Omega$



Vincotech

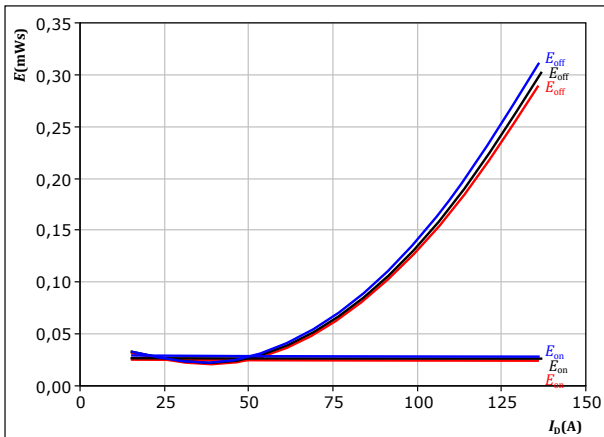
10-EY12NMA016ME-LS28F16T  
datasheet

## Boost Switching Characteristics

figure 30. MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



With an inductive load at

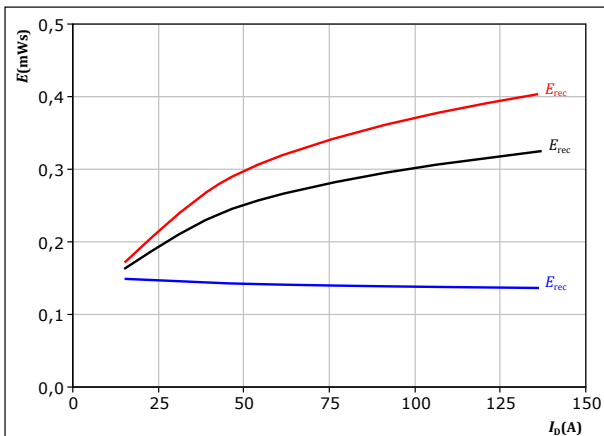
$V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$   $\Omega$   
 $R_{goff} = 1$   $\Omega$

$T_j$ : 25 °C  
125 °C  
150 °C

figure 32. MOSFET

Typical reverse recovered energy loss as a function of drain current

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



With an inductive load at

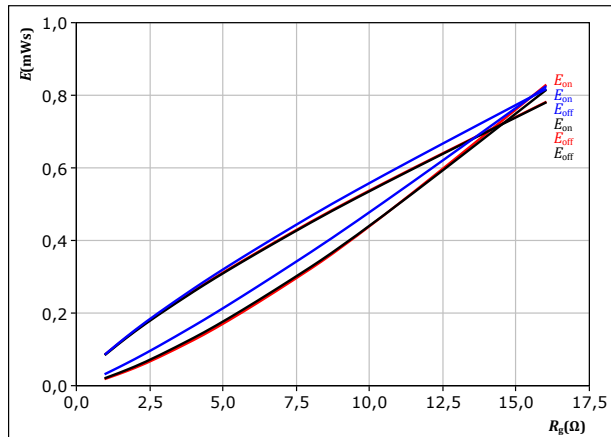
$V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$   $\Omega$

$T_j$ : 25 °C  
125 °C  
150 °C

figure 31. MOSFET

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

$$E = f(R_g)$$



With an inductive load at

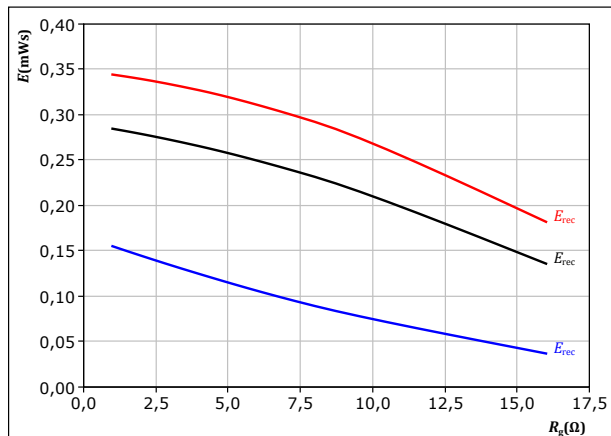
$V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 75$  A

$T_j$ : 25 °C  
125 °C  
150 °C

figure 33. 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

$V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 75$  A

$T_j$ : 25 °C  
125 °C  
150 °C



Vincotech

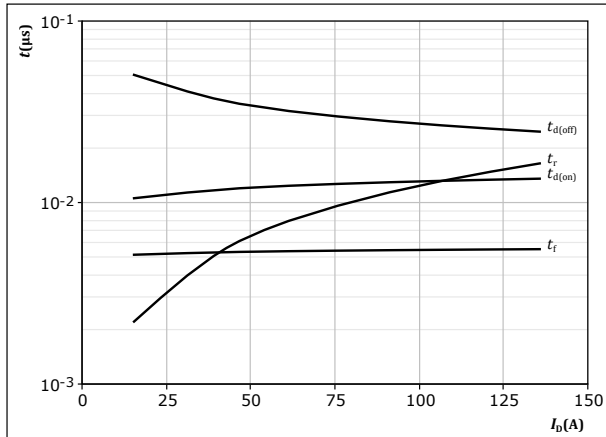
# 10-EY12NMA016ME-LS28F16T

datasheet

## Boost Switching Characteristics

figure 34. MOSFET

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

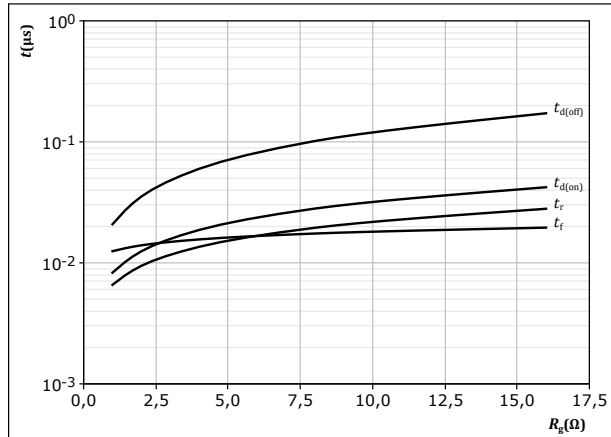


With an inductive load at

$T_j = 150$  °C  
 $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$  Ω  
 $R_{goff} = 1$  Ω

figure 35. MOSFET

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

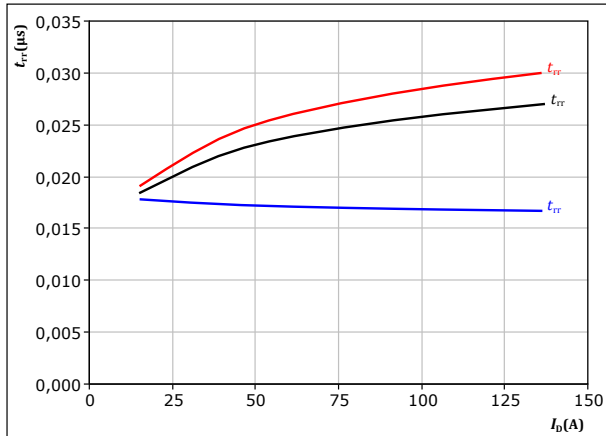


With an inductive load at

$T_j = 150$  °C  
 $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 75$  A

figure 36. MOSFET

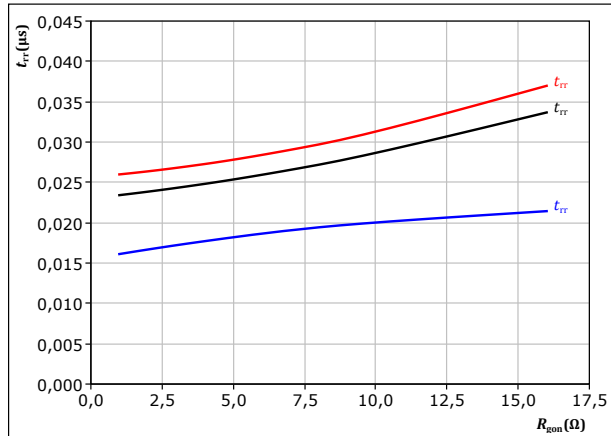
Typical reverse recovery time as a function of drain current  
 $t_{rr} = f(I_D)$



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$  Ω  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 37. MOSFET

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



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 75$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)



Vincotech

10-EY12NMA016ME-LS28F16T  
datasheet

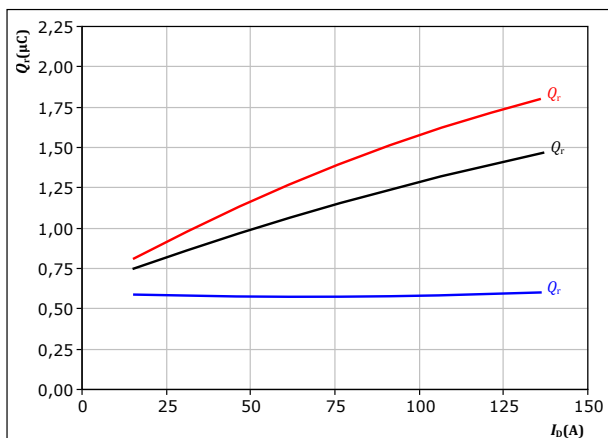
## Boost Switching Characteristics

figure 38.

MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



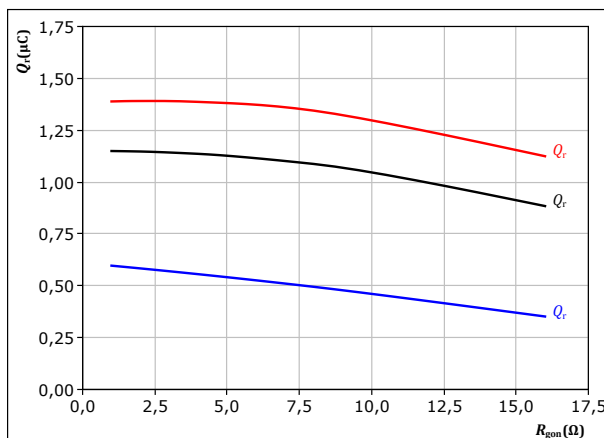
At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$  Ω  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 39.

MOSFET

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

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



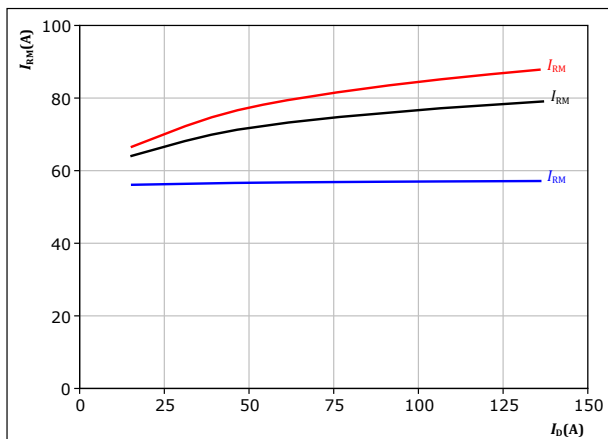
At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 75$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 40.

MOSFET

Typical peak reverse recovery current as a function of drain current

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



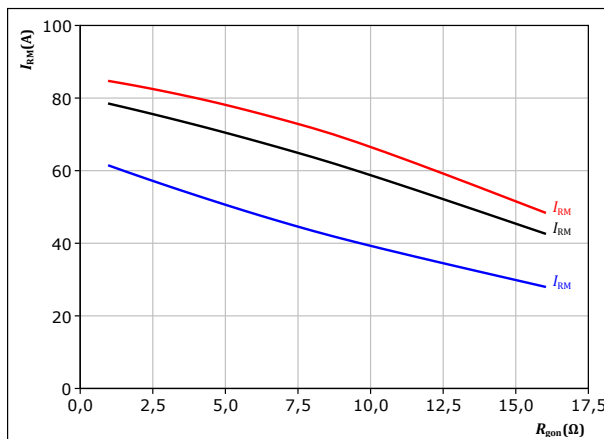
At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$  Ω  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 41.

MOSFET

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

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



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 75$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)



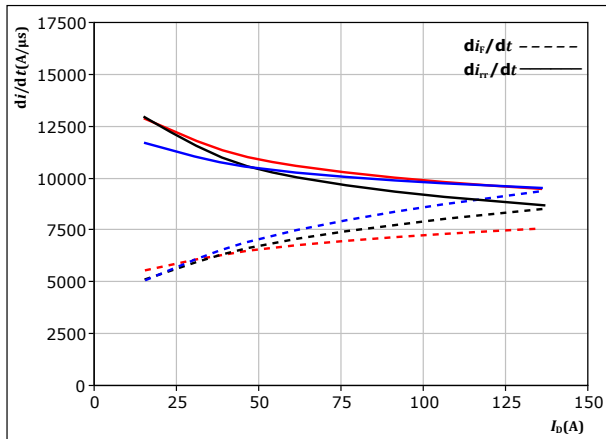
Vincotech

# 10-EY12NMA016ME-LS28F16T datasheet

## Boost Switching Characteristics

figure 42. MOSFET

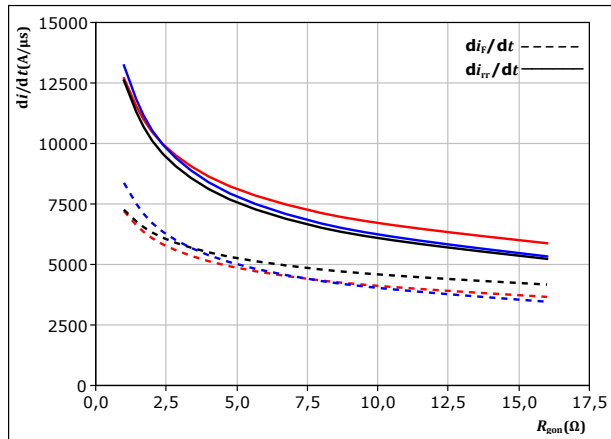
Typical rate of fall of forward and reverse recovery current as a function of drain current  
 $di_f/dt, di_r/dt = f(I_D)$



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 1$   $\Omega$   
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 43. MOSFET

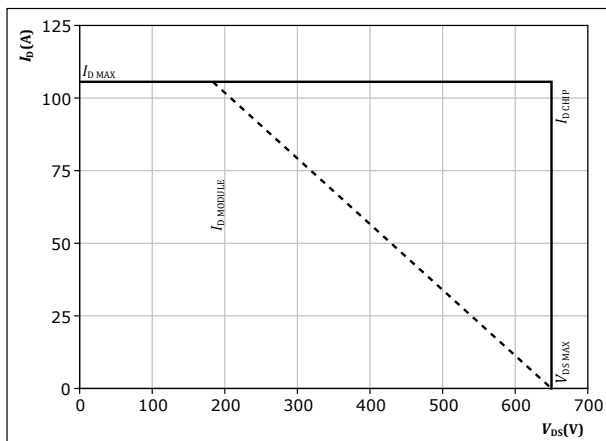
Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor  
 $di_f/dt, di_r/dt = f(R_{gon})$



At  $V_{DS} = 350$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 75$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 44. MOSFET

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



At  $T_j = 150$  °C  
 $R_{gon} = 1$   $\Omega$   
 $R_{goff} = 1$   $\Omega$





Vincotech

# 10-EY12NMA016ME-LS28F16T datasheet

## Switching Definitions

figure 45. MOSFET

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

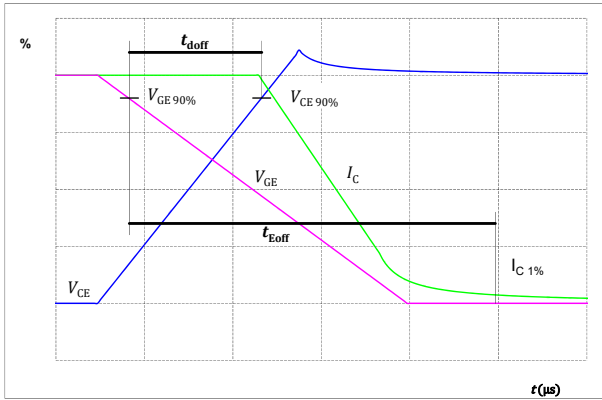


figure 46. MOSFET

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

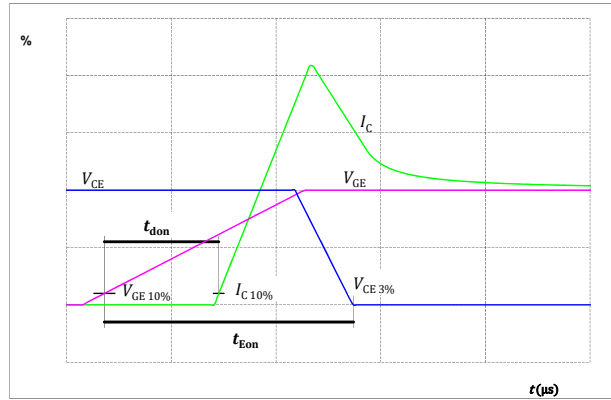


figure 47. MOSFET

Turn-off Switching Waveforms & definition of  $t_f$

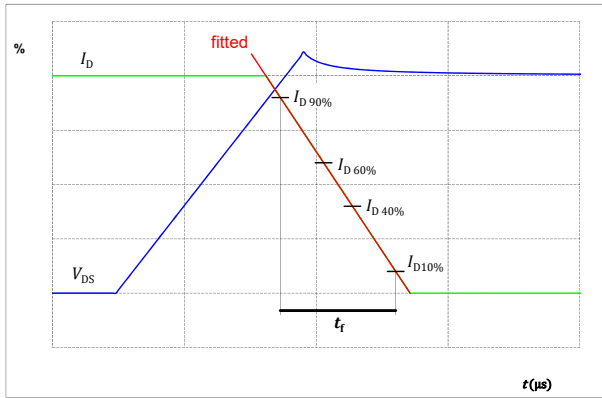
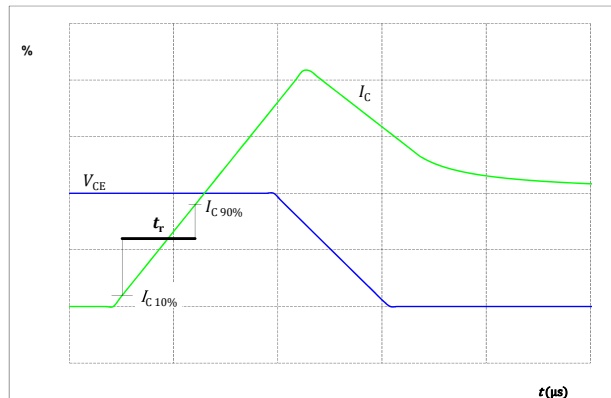


figure 48. MOSFET

Turn-on Switching Waveforms & definition of  $t_r$





Vincotech

## Switching Definitions

figure 49. FWD

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

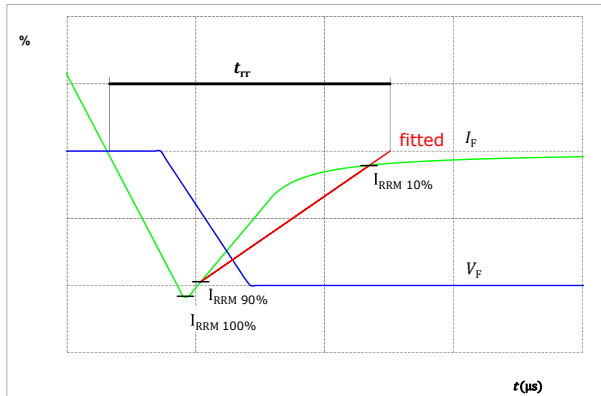


figure 50. FWD

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

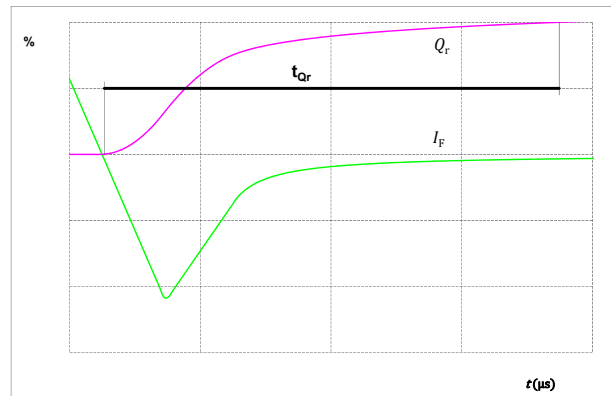
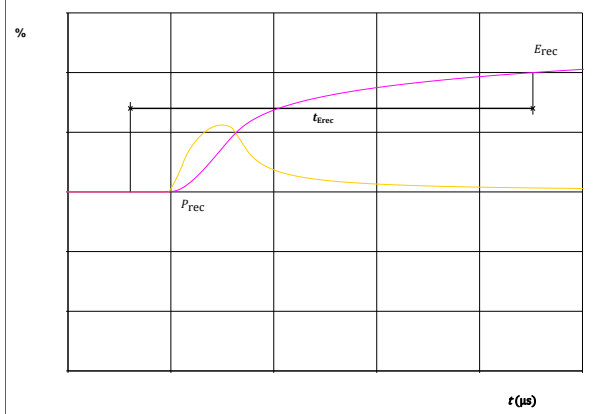


figure 51. FWD


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-EY12NMA016ME-LS28F16T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EY12NMA016ME-LS28F16T-/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-PB pushed through-hole Ø1mm ±0.09 / -0.06  
for further PCB design rules refer to the latest handling instruction

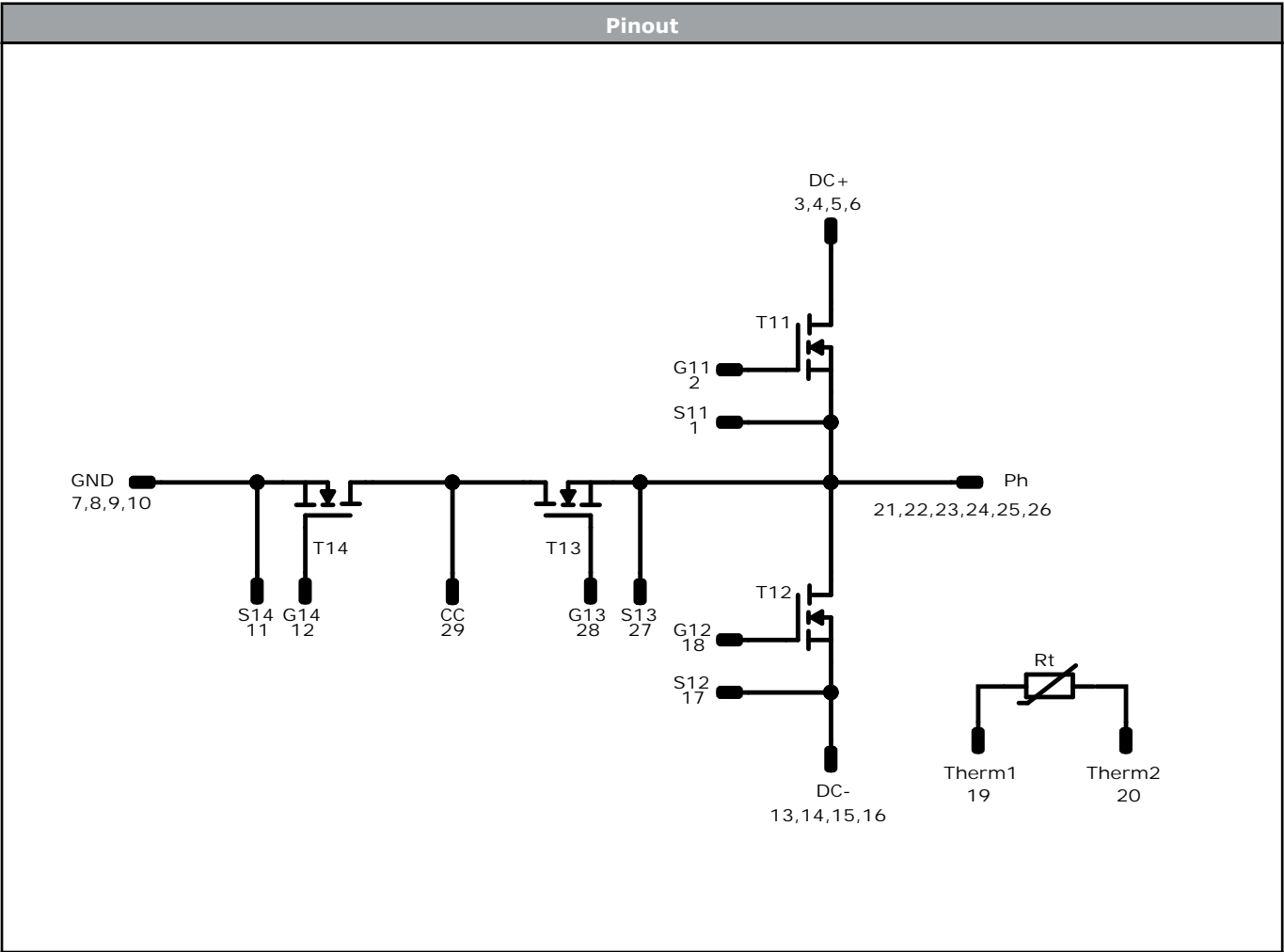
50.0 ± 0.1  
3.0 ± 0.1

Tolerance of presspositions ±0.1mm at the end of pins  
Dimension of coordinate axis is only offset without tolerance



Vincotech

10-EY12NMA016ME-LS28F16T  
datasheet



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	MOSFET	1200 V	16 mΩ	Buck Switch	
T13, T14	MOSFET	650 V	15 mΩ	Boost Switch	
Rt	Thermistor			Thermistor	



Vincotech

**10-EY12NMA016ME-LS28F16T**  
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-EY12NMA016ME-LS28F16T-D2-14	17 Apr. 2024	Change of Buck and Boost Switch static characteristics	
10-EY12NMA016ME-LS28F16T-D3-14	23 Jun. 2026	Dynamic characteristic with new conditions Module is unchanged	

**DISCLAIMER**

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

**LIFE SUPPORT POLICY**

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.