Vincotech

10-E107L3A060ME-PM32L18Z
datasheet

flow3xNPFC 1 **650 V / 60 mΩ**

Topology features

- 3xNeutral Boost PFC
- On-board Capacitors
- 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: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Compact housing
- CTI600 housing material
- Thermo-mechanical push-and-pull force relief
- Solder pin

Target applications

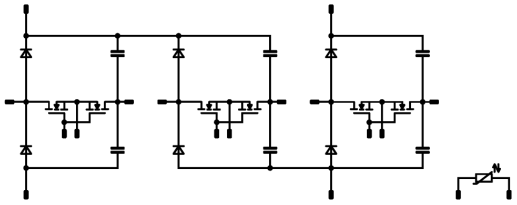
- Embedded Drives
- Heat Pumps
- HVAC
- Industrial Drives

Types

- 10-E107L3A060ME-PM32L18Z

flow E1 12 mm housing

Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Boost Switch				
Drain-source voltage	V_{DSS}		650	V
Drain current (DC current)	I_D	T_j = T_{jmax} T_s = 80 °C	22	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	99	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	47	W
Gate-source voltage	V_{GSS}	static	-4 / 15	V
		dynamic	-8 / 19	V
Maximum Junction Temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	T_j = T_{jmax} T_s = 80 °C	30	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	89	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms T_j = 110 °C	129	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	63	W
Maximum junction temperature	T_{jmax}		175	°C
Capacitor (PFC)				
Maximum DC voltage	V_{MAX}		630	V
Operation Temperature	T_{op}		-55 ... 150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Module Properties				
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…+(T_{jmax} - 25)	°C
Isolation Properties				
Isolation voltage	V_{isol}	DC Test Voltage* t_p = 2 s	6000	V
Creepage distance			>12,7	mm
Clearance			9,1	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		15		13,2	25 125 150	42	77 84,3 87,3	79(1)	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,005	25	1,8	2,6	3,6	V
Gate to Source Leakage Current	I_{GSS}		15	0		25		10	100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	650		25		1	50	µA
Internal gate resistance	r_g							3		Ω
Gate charge	Q_g		-4/15	400	13,2	25		46		nC
Short-circuit input capacitance	C_{iss}	f = 1 Mhz	0	600	0	25		1000		pF
Short-circuit output capacitance	C_{oss}							80		
Reverse transfer capacitance	C_{rss}							9		
Diode forward voltage	V_{SD}		0		6,6	25		5,1		V
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						2,04		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	-4/15	350	16	25 125 150		17,38 16,02 15,71		ns
Rise time	t_r					25 125 150		12,32 11,32 11,13		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		47,28 51,5 52,95		ns
Fall time	t_f					25 125 150		23,05 27,21 21,61		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,157 µC Q_{rFWD}=0,165 µC Q_{rFWD}=0,167 µC				25 125 150		0,118 0,117 0,115		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,022 0,026 0,026		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Diode										
Static										
Forward voltage	V_F				20	25 125 150		1,33 1,54 1,62	2(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25		5	500	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,51		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=1482 A/µs di/dt=1577 A/µs di/dt=1609 A/µs	-4/15	350	16	25 125 150		12,69 13,59 13,92		A
Reverse recovery time	t_{rr}					25 125 150		21,5 20,38 20,1		ns
Recovered charge	Q_r					25 125 150		0,157 0,165 0,167		µC
Reverse recovered energy	E_{rec}					25 125 150		0,025 0,028 0,028		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1057,62 1074,77 1165,22		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Capacitor (PFC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		33		nF
Tolerance							-5		5	%
Thermistor										
Static										
Rated resistance	R					25		5		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 499 Ω				100	3,2		3,3	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,3		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3380		K
Vincotech Thermistor Reference									V	

(1) Value at chip level

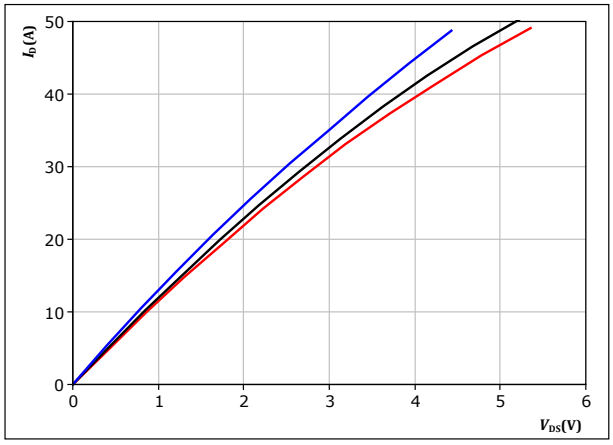
(2) Only valid with pre-applied Vincotech thermal interface material.

Boost Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



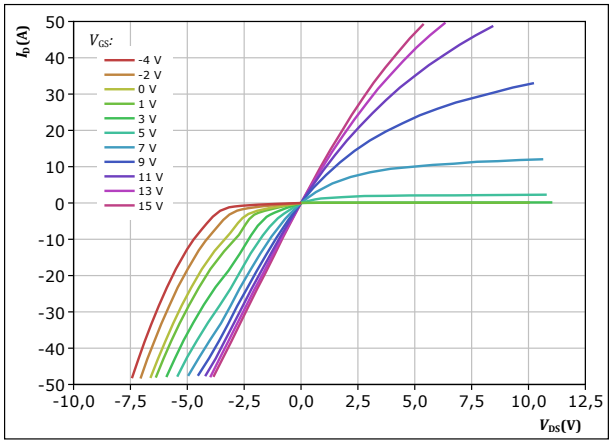
t_p = 250 µs
V_{GS} = 15 V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

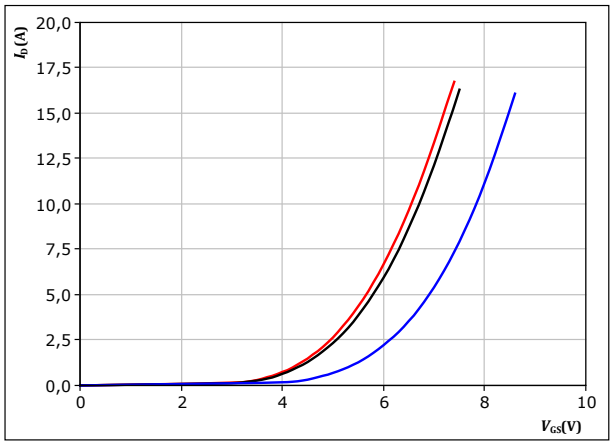


t_p = 250 µs
T_j = 150 °C
V_{GS} from -4 V to 15 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$



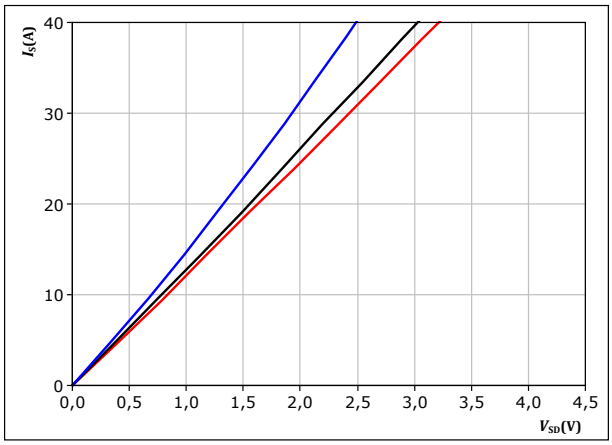
t_p = 250 µs
V_{DS} = 10 V

T_j: 25 °C, 125 °C, 150 °C

figure 4. **MOSFET**

Typical reverse drain current characteristics

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



t_p = 250 µs
V_{GS} = 15 V

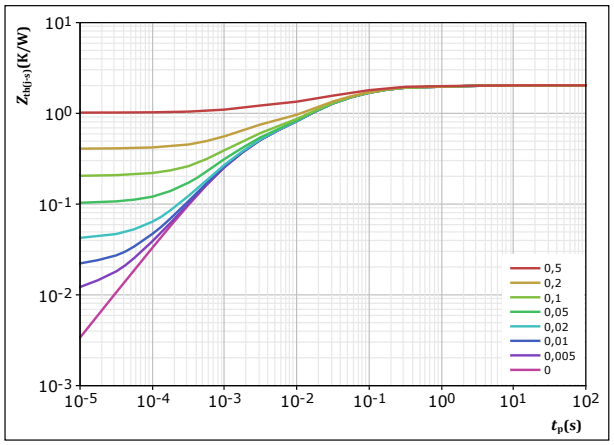
T_j: 25 °C, 125 °C, 150 °C

Boost Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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



$D =$ t_p / T

$R_{th(j-s)} =$ 2,036 K/W

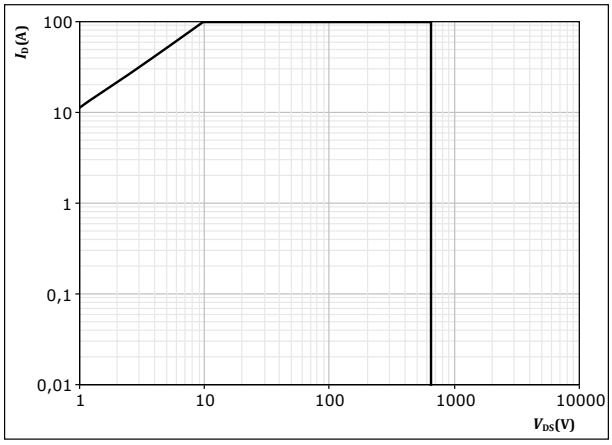
MOSFET thermal model values

R (K/W)	τ (s)
1,74E-02	8,78E+00
1,01E-01	1,50E+00
6,98E-01	9,13E-02
8,28E-01	1,78E-02
3,92E-01	1,37E-03

figure 6. MOSFET

Safe operating area

$I_D = f(V_{DS})$



$D =$ single pulse

$T_s =$ 80 °C

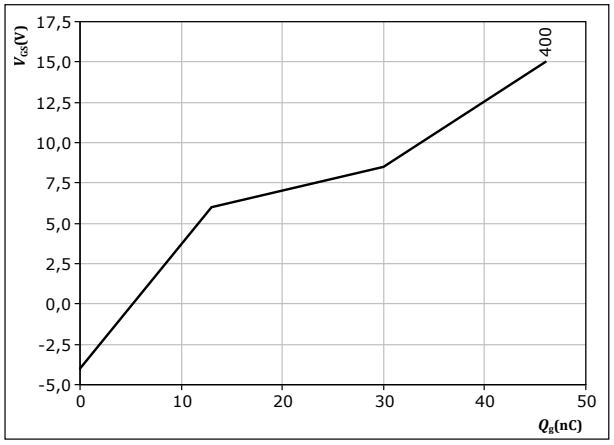
$V_{GS} =$ 15 V

$T_j =$ T_{jmax}

figure 7. MOSFET

Gate voltage vs gate charge

$V_{GS} = f(Q_g)$



$I_D =$ 13.2 A

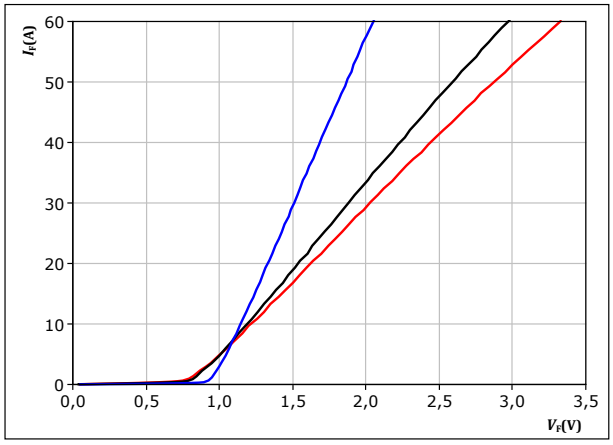
$T_j =$ 25 °C

Boost Diode Characteristics

figure 8. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



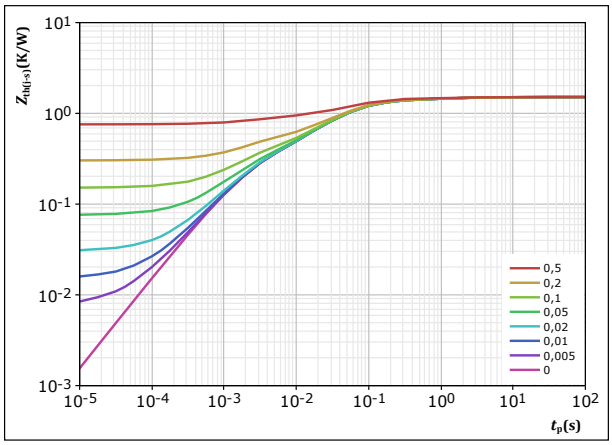
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 9. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,512 K/W

FWD thermal model values

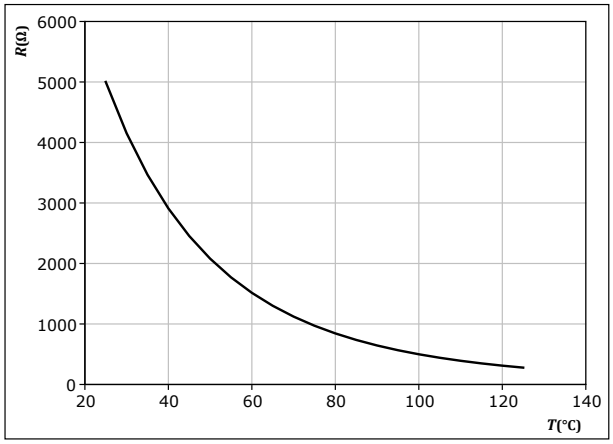
R (K/W)	τ (s)
1,90E-02	7,99E+00
1,12E-01	1,12E+00
4,92E-01	9,11E-02
6,45E-01	2,72E-02
2,44E-01	1,93E-03

Thermistor Characteristics

figure 10. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

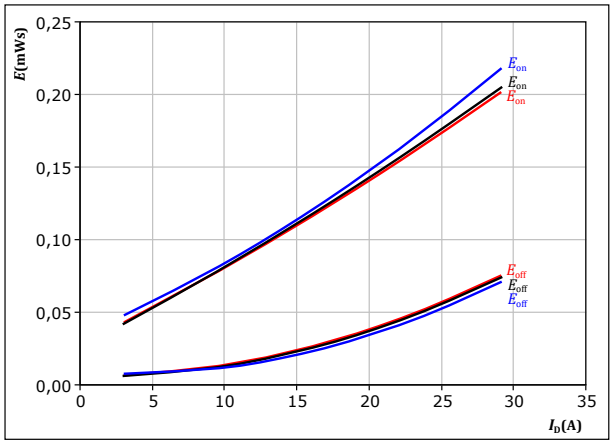


Boost Switching Characteristics

figure 11. **MOSFET**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



With an inductive load at

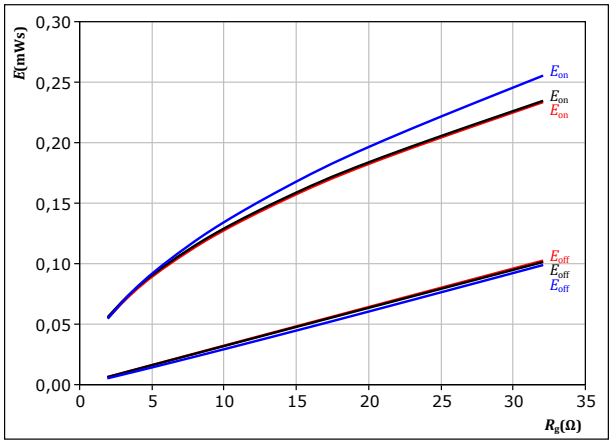
V_{DS} =	350	V	
V_{GS} =	-4/15	V	
R_{gon} =	8	Ω	
R_{goff} =	8	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 12. **MOSFET**

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

$E = f(R_g)$



With an inductive load at

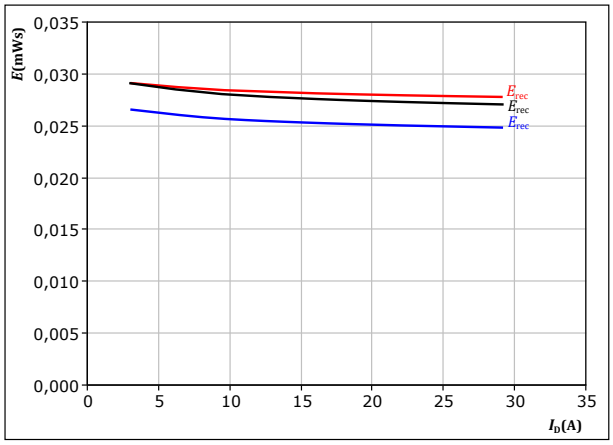
V_{DS} =	350	V	
V_{GS} =	-4/15	V	
I_D =	16	A	

T_j: 25 °C, 125 °C, 150 °C

figure 13. **FWD**

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



With an inductive load at

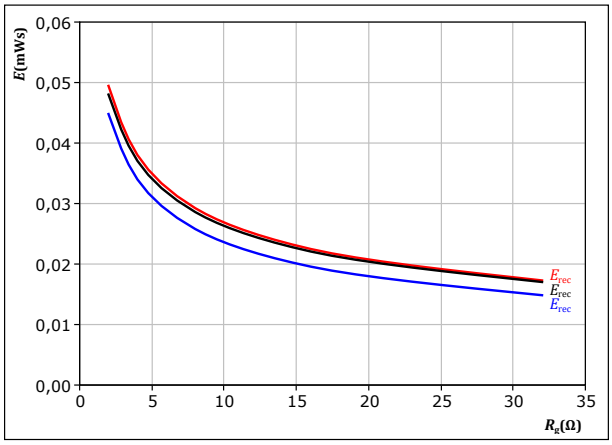
V_{DS} =	350	V	
V_{GS} =	-4/15	V	
R_{gon} =	8	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 14. **FWD**

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 =	16	A	

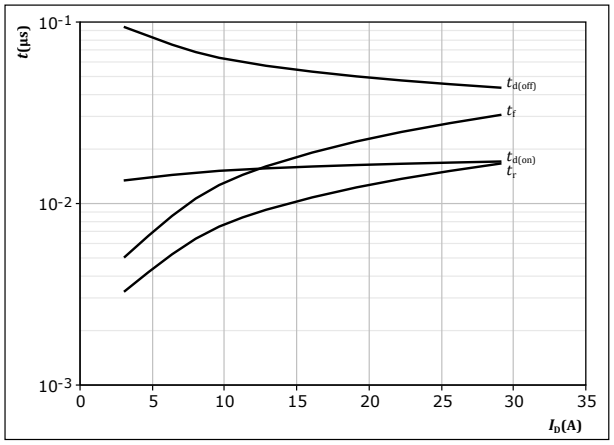
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 15. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



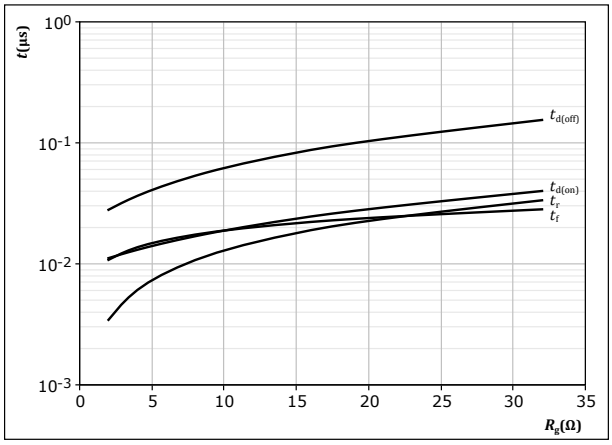
With an inductive load at

T_j =	150	°C
V_{DS} =	350	V
V_{GS} =	-4/15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 16. **MOSFET**

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

$t = f(R_g)$



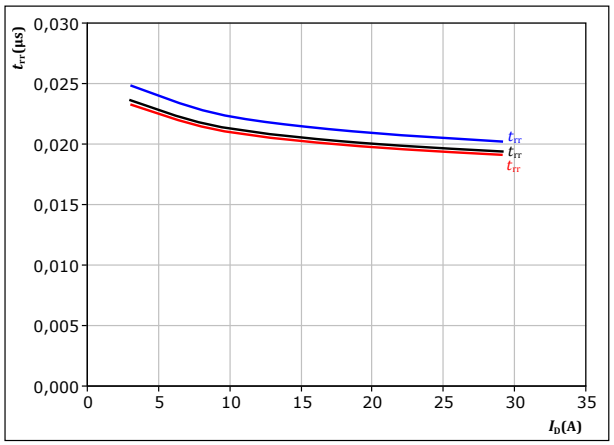
With an inductive load at

T_j =	150	°C
V_{DS} =	350	V
V_{GS} =	-4/15	V
I_D =	16	A

figure 17. **FWD**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



At

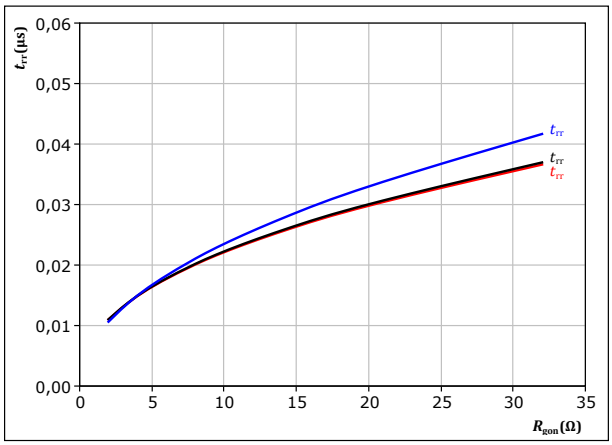
V_{DS} =	350	V
V_{GS} =	-4/15	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 18. **FWD**

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 =	16	A

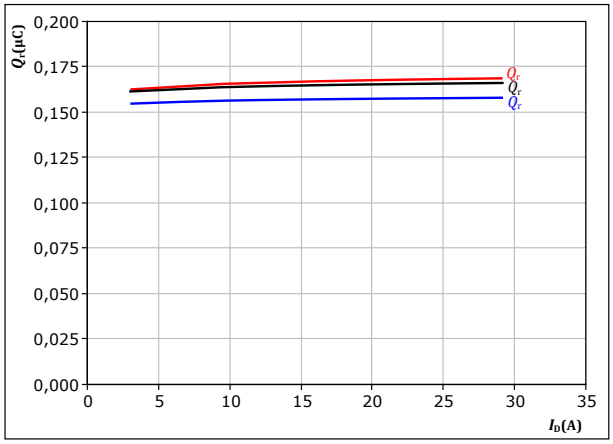
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 19. **FWD**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

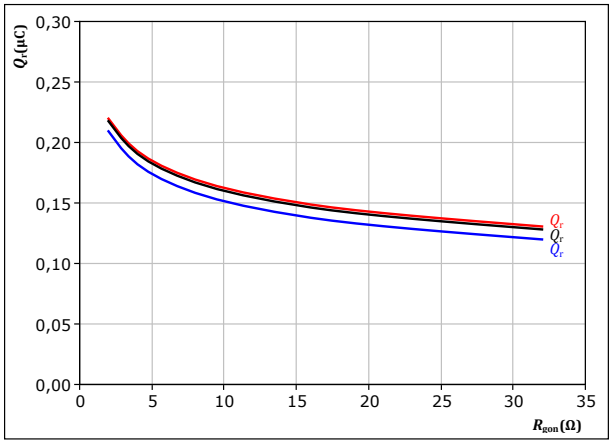


At				
V_{DS} =	350	V		
V_{GS} =	-4/15	V	T_j:	25 °C
R_{gon} =	8	Ω		125 °C
				150 °C

figure 20. **FWD**

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

$Q_r = f(R_{gon})$

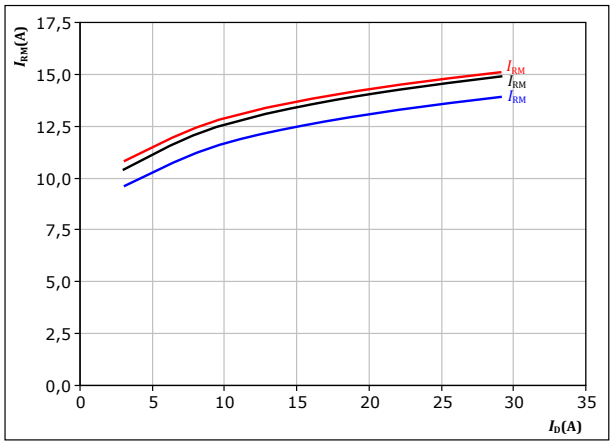


At				
V_{DS} =	350	V		
V_{GS} =	-4/15	V	T_j:	25 °C
I_D =	16	A		125 °C
				150 °C

figure 21. **FWD**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

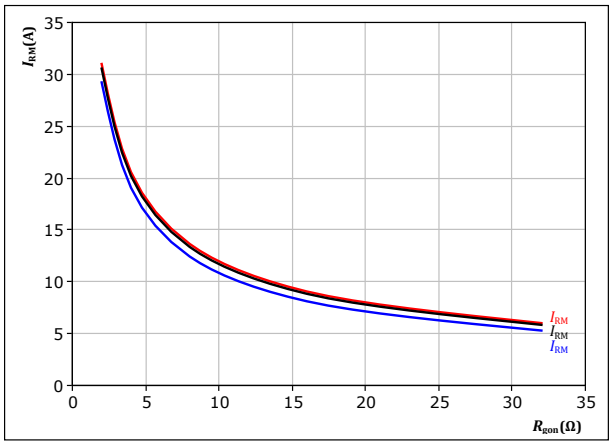


At				
V_{DS} =	350	V		
V_{GS} =	-4/15	V	T_j:	25 °C
R_{gon} =	8	Ω		125 °C
				150 °C

figure 22. **FWD**

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

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



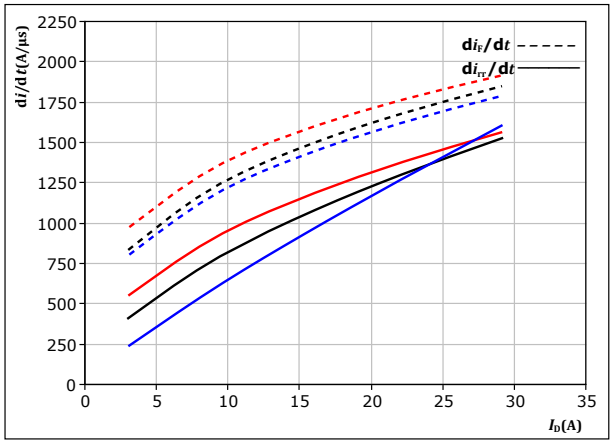
At				
V_{DS} =	350	V		
V_{GS} =	-4/15	V	T_j:	25 °C
I_D =	16	A		125 °C
				150 °C

Boost Switching Characteristics

figure 23. **FWD**

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)

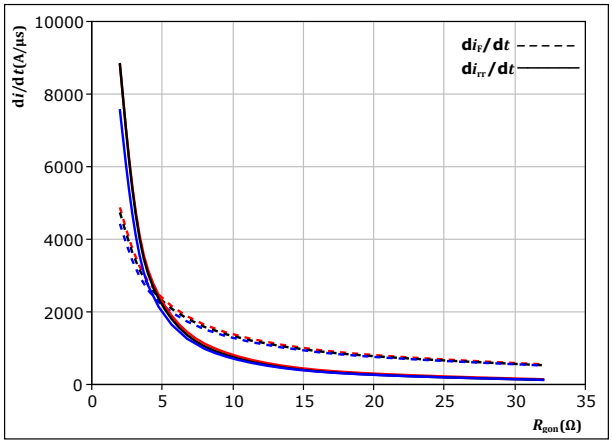


At				
V_{DS} =	350	V		
V_{GS} =	-4/15	V	T_j:	25 °C
R_{gon} =	8	Ω		125 °C
				150 °C

figure 24. **FWD**

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

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

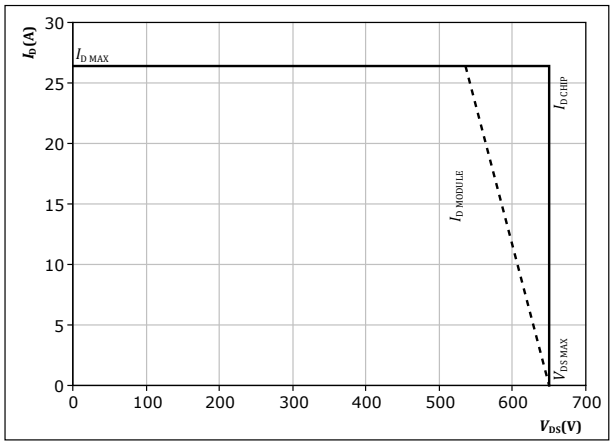


At				
V_{DS} =	350	V		
V_{GS} =	-4/15	V	T_j:	25 °C
I_D =	16	A		125 °C
				150 °C

figure 25. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At			
T_j =	150	°C	
R_{gon} =	8	Ω	
R_{goff} =	8	Ω	

Boost Switching Definitions

figure 26. MOSFET

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

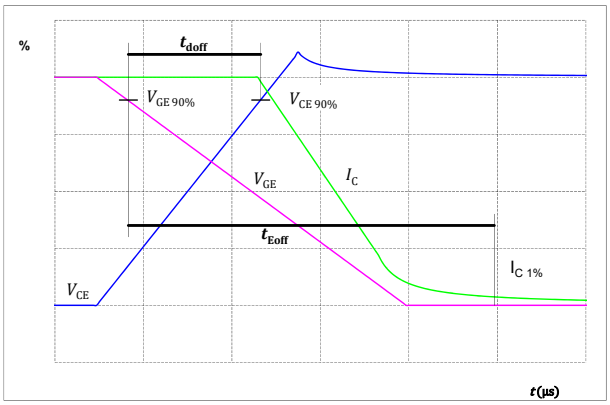


figure 27. MOSFET

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

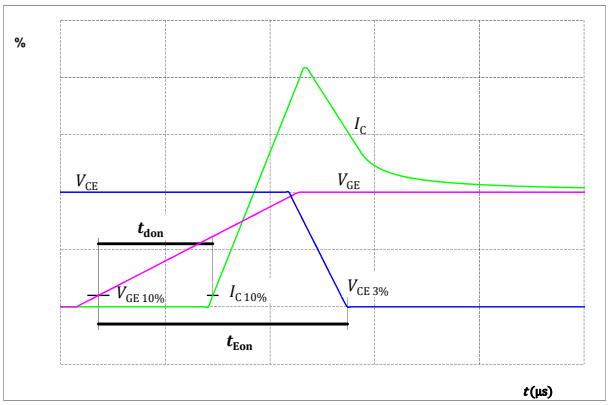


figure 28. MOSFET

Turn-off Switching Waveforms & definition of t_f

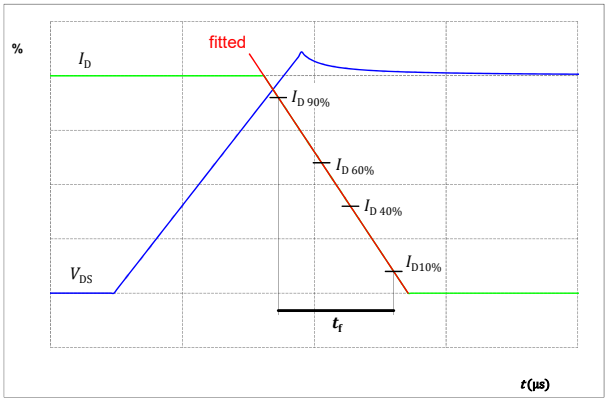
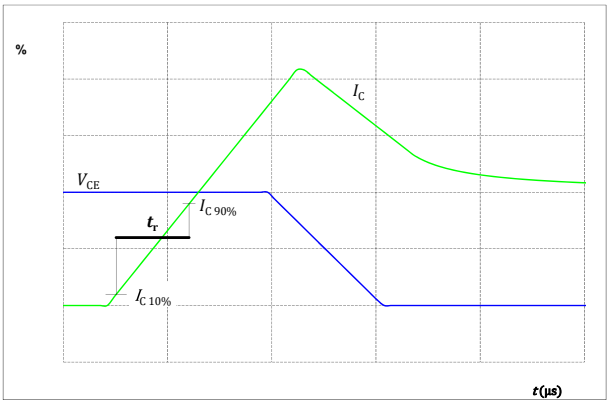


figure 29. MOSFET

Turn-on Switching Waveforms & definition of t_r



Boost Switching Definitions

figure 30. **FWD**

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

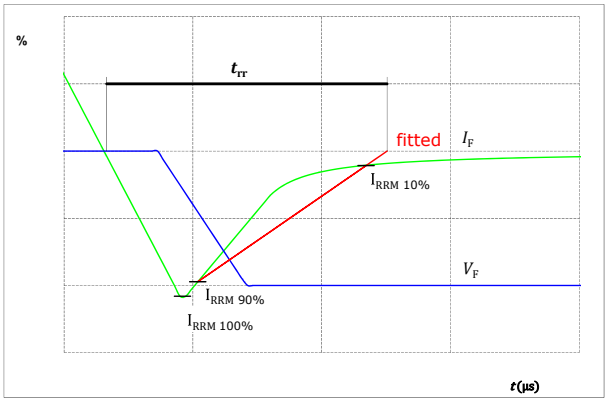


figure 31. **FWD**

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

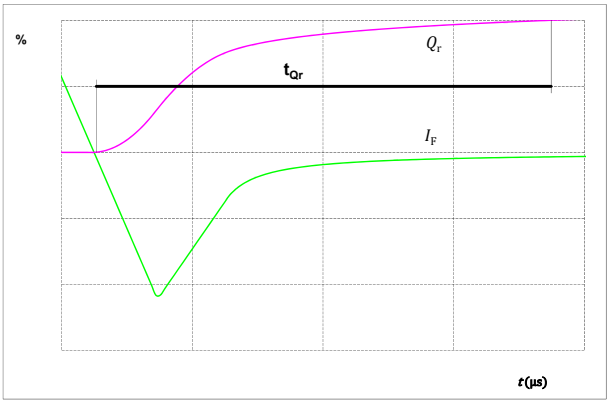
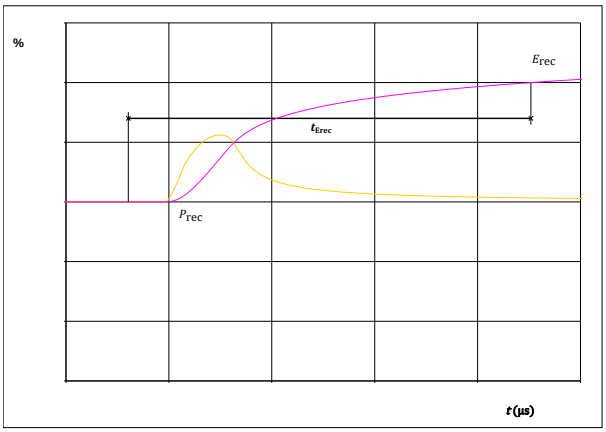


figure 32. **FWD**

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



Ordering Code

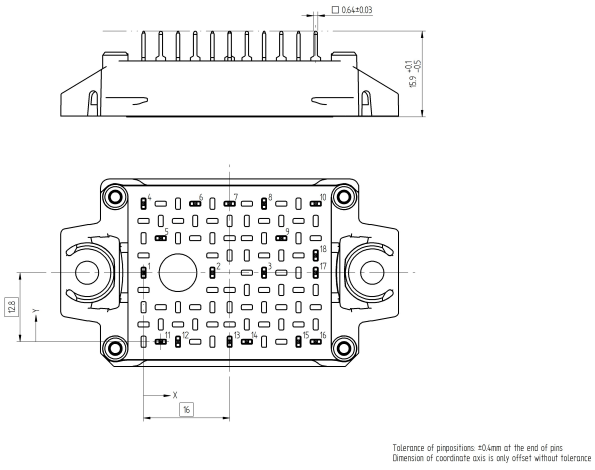
Version	Ordering Code
Without thermal paste	10-E107L3A060ME-PM32L18Z
With thermal paste (5,2 W/mK, PTM6000HV)	10-E107L3A060ME-PM32L18Z-/7/

Marking

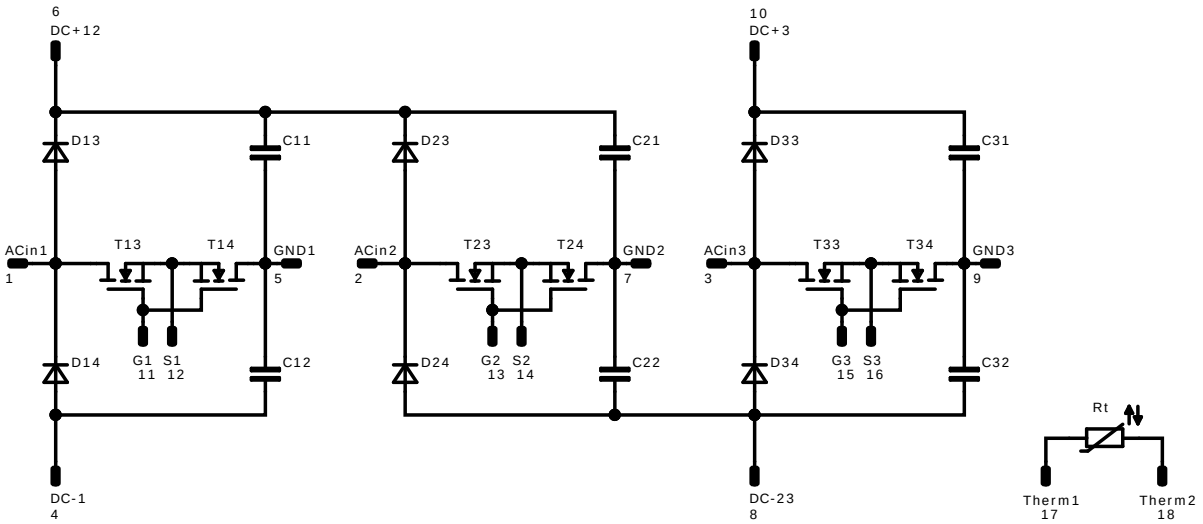
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	0	12,8	ACIn1
2	12,8	12,8	ACIn2
3	22,4	12,8	ACIn3
4	0	25,6	DC-1
5	3,2	19,2	GND1
6	9,6	25,6	DC+12
7	16	25,6	GND2
8	22,4	25,6	DC-23
9	25,6	19,2	GND3
10	32	25,6	DC+3
11	3,2	0	G1
12	6,4	0	S1
13	16	0	G2
14	19,2	0	S2
15	28,8	0	G3
16	32	0	S3
17	32	12,8	Therm1
18	32	16	Therm2



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
C11, C12, C13, C14, C15, C16	Capacitor	630 V		Capacitor (PFC)	
T13, T14, T23, T24, T33, T34	MOSFET	650 V	60 mΩ	Boost Switch	
D13, D14, D23, D24, D33, D34	FWD	1200 V	20 A	Boost Diode	
Rt	Thermistor			Thermistor	

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

Handling instruction
Handling instructions for *flow* E1 packages see vincotech.com website.

Package data
Package data for *flow* E1 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 $T_{j,op}$=175°C and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-E107L3A060ME-PM32L18Z-D2-14	21 May. 2025	Change Housing	