10-EZ12B2A032ME-LQ17L18T
datasheet

***flow*BOOST E1 SiC** **1200 V / 32 mΩ**

Topology features

- Dual Booster
- Integrated DC capacitor
- Kelvin Emitter for improved switching performance
- 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: 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

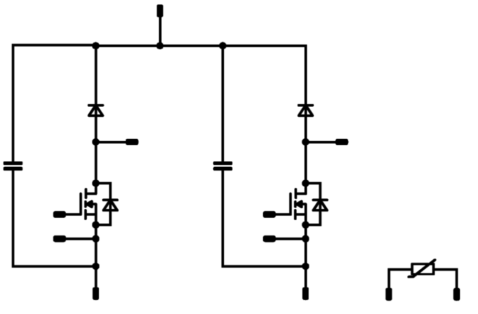
- Charging Stations
- Energy Storage Systems
- Power Supply
- Solar Inverters
- UPS
- Welding & Cutting

Types

- 10-EZ12B2A032ME-LQ17L18T

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}			1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$	T_s = 80 °C	39	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}		120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	74	W
Gate-source voltage	V_{GSS}			-4 / 15	V
		dynamic		-8 / 19	
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	27	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		94	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	142	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	73	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	45	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	270	A
Surge current capability	I^2t			370	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	53	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Capacitor (DC)					
Maximum DC voltage	V_{MAX}			1500	V
Operation Temperature	T_{op}			-55 ... 125	°C
Module Properties					
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
Creepage distance				>12,7	mm
Clearance				8,62	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		15		40	25 125 150	22,4	34,2 42,1 46,4	41,6[1]	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$			0,0115	25	1,8	2,5	3,6	V
Gate to Source Leakage Current	I_{GSS}		15	0		25		10	250	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		1	19	µA
Internal gate resistance	r_g							1,7		Ω
Gate charge	Q_g		-4/15	800	40	25		118		nC
Short-circuit input capacitance	C_{iss}							3357		
Short-circuit output capacitance	C_{oss}	f = 100 kHz	0	1000	0	25		129		pF
Reverse transfer capacitance	C_{rss}							8		
Diode forward voltage	V_{SD}		0		20	25		4,6		V
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,28		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		28,05 22,78 21,58		ns
Rise time	t_r					25 125 150		18,72 16,23 16,11		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	0/15	600	32	25 125 150		140,72 161,13 166,31		ns
Fall time	t_f					25 125 150		9,95 10,66 10,84		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,101 µC Q_{rFWD}=0,118 µC Q_{rFWD}=0,119 µC				25 125 150		0,56 0,48 0,467		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,351 0,349 0,348		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		1,51 2,03 2,13	1,8(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25		60	500	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,3		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=1653 A/µs di/dt=2444 A/µs di/dt=2423 A/µs	0/15	600	32	25 125 150		13,17 15,17 15,42		A
Reverse recovery time	t_{rr}					25 125 150		12,76 12,8 12,73		ns
Recovered charge	Q_r					25 125 150		0,101 0,118 0,119		µC
Reverse recovered energy	E_{rec}					25 125 150		$7{,}049 \times 10^{-3}$ $9{,}369 \times 10^{-3}$ $9{,}671 \times 10^{-3}$		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3530,03 4659,54 5194,64		A/µs

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				5	25 125		0,894 0,774	1,1(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			100 1000	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,31		K/W
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		6,8		nF
Tolerance							-10		10	%
Dissipation factor		f = 1 kHz				25		0,15		%
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

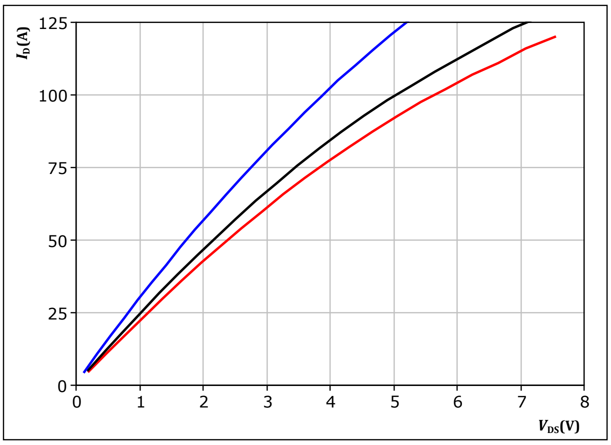
(2) Only valid with pre-applied Vincotech thermal interface material.

Boost Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})



t_p = 250 µs

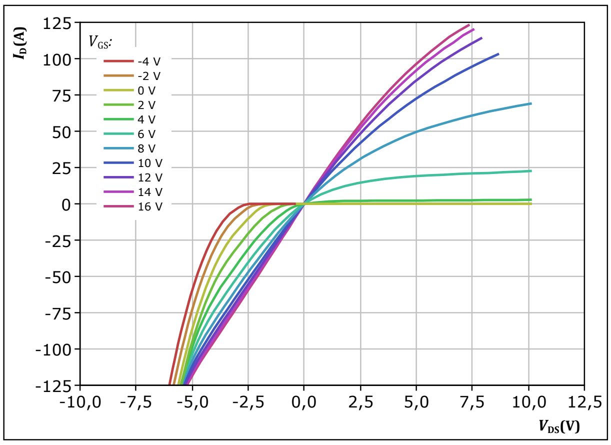
V_{GS} = 14 V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})



t_p = 250 µs

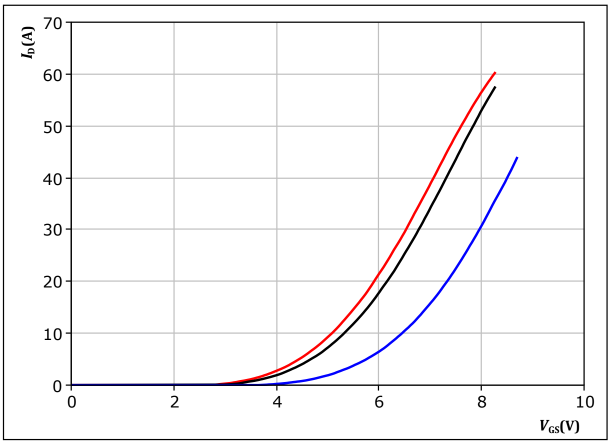
T_j = 150 °C

V_{GS} from -4 V to 16 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} = 14 V

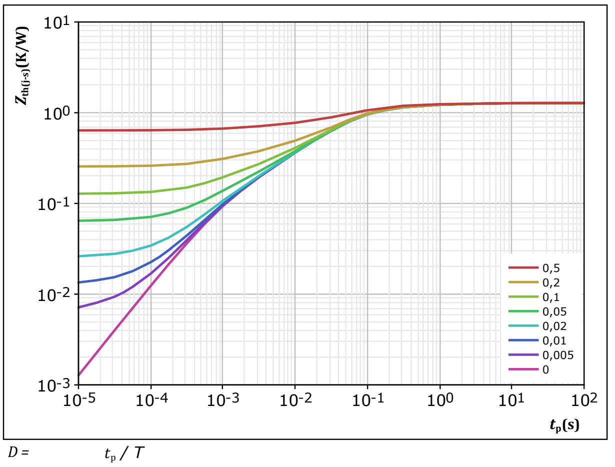
T_j: 25 °C, 125 °C, 150 °C

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	
$R_{th(j-s)}$ =	1,276	K/W

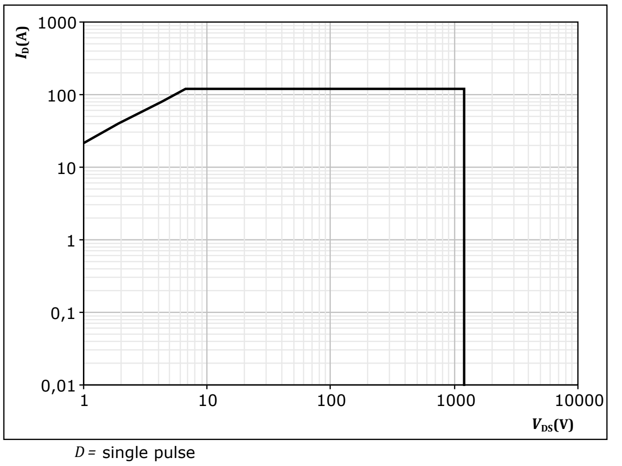
MOSFET thermal model values

R (K/W)	τ (s)
6,59E-02	2,75E+00
1,80E-01	3,21E-01
7,28E-01	5,55E-02
2,13E-01	8,37E-03
8,96E-02	1,01E-03

figure 6. **MOSFET**

Safe operating area

I_D = f(V_{DS})



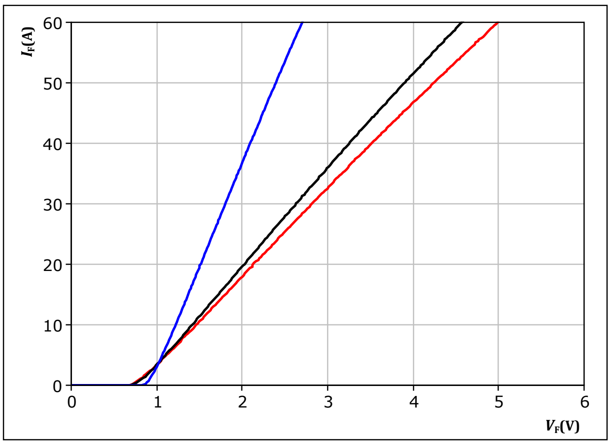
D =	single pulse	
T_s =	80	°C
V_{GS} =	14	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



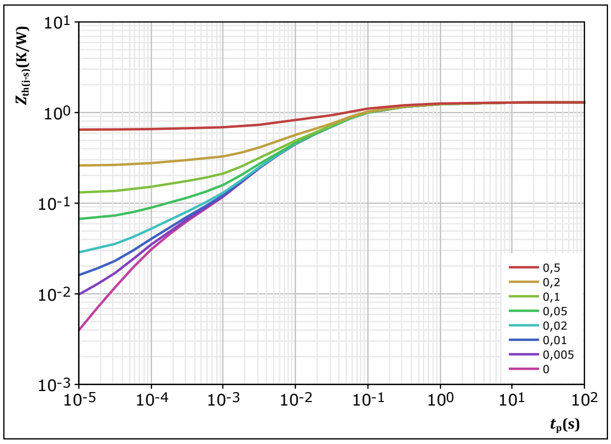
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,296 K/W

FWD thermal model values

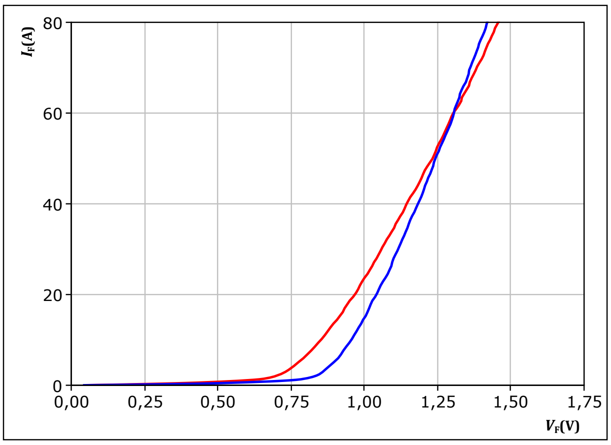
R (K/W)	τ (s)
6,22E-02	4,27E+00
2,36E-01	2,99E-01
6,69E-01	4,31E-02
2,88E-01	4,14E-03
4,04E-02	1,25E-04

Boost Sw. Protection Diode Characteristics

figure 9. **Rectifier**

Typical forward characteristics

I_F = f(V_F)



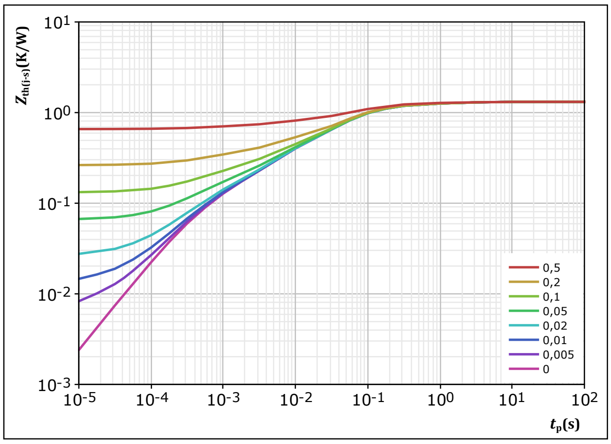
t_p = 250 µs

T_j: 25 °C, 125 °C

figure 10. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,314 K/W

Rectifier thermal model values

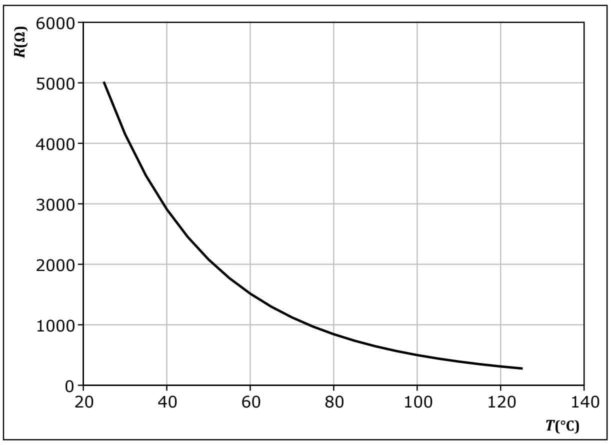
R (K/W)	τ (s)
8,85E-02	1,99E+00
2,65E-01	1,87E-01
6,64E-01	4,96E-02
2,12E-01	5,03E-03
8,48E-02	4,58E-04

Thermistor Characteristics

figure 11. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

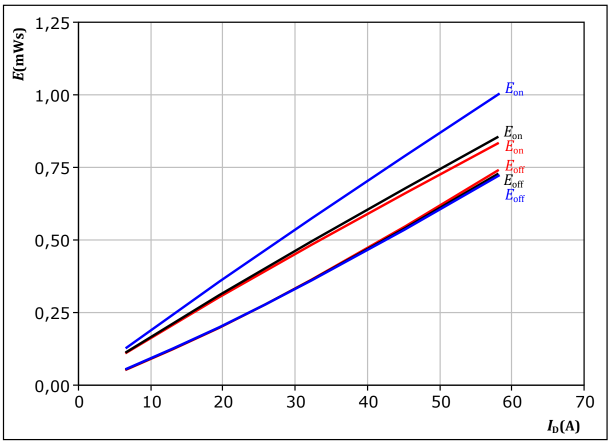


Boost Switching Characteristics

figure 12. **MOSFET**

Typical switching energy losses as a function of drain current

E = f(I_D)



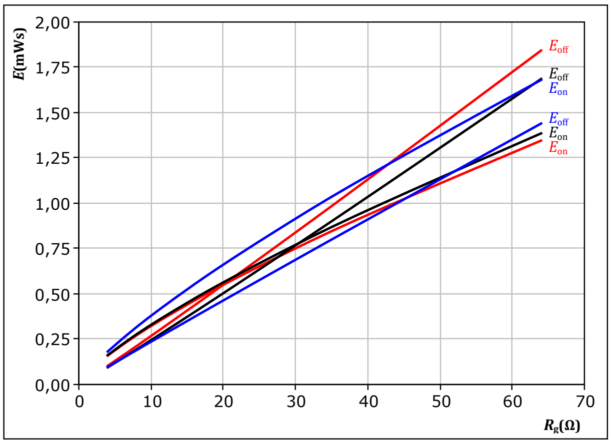
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
R_{gon} =	16	Ω		150 °C
R_{goff} =	16	Ω		

figure 13. **MOSFET**

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

E = f(R_g)



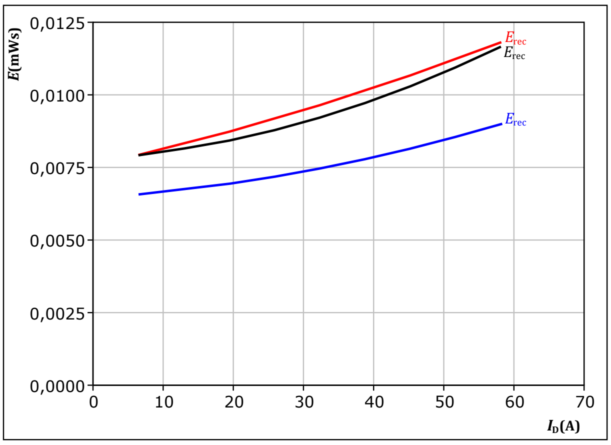
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
I_D =	32	A		150 °C

figure 14. **FWD**

Typical reverse recovered energy loss as a function of drain current

E_{rec} = f(I_D)



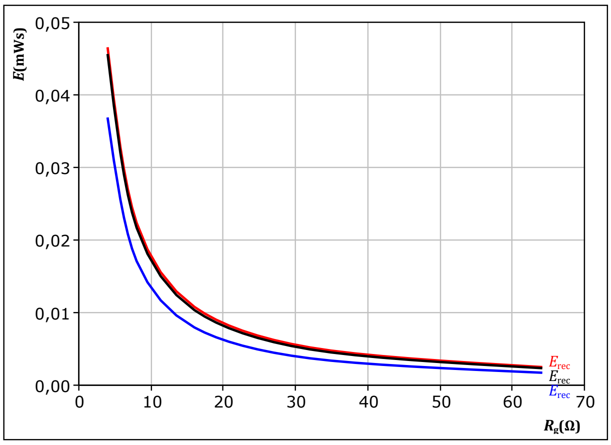
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 15. **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

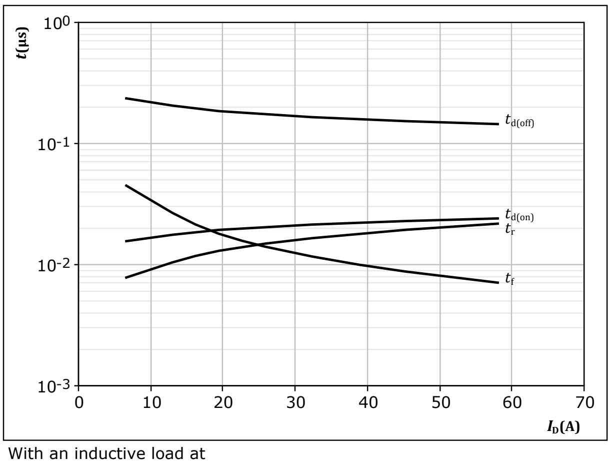
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
I_D =	32	A		150 °C

Boost Switching Characteristics

figure 16. MOSFET

Typical switching times as a function of drain current

$t = f(I_D)$



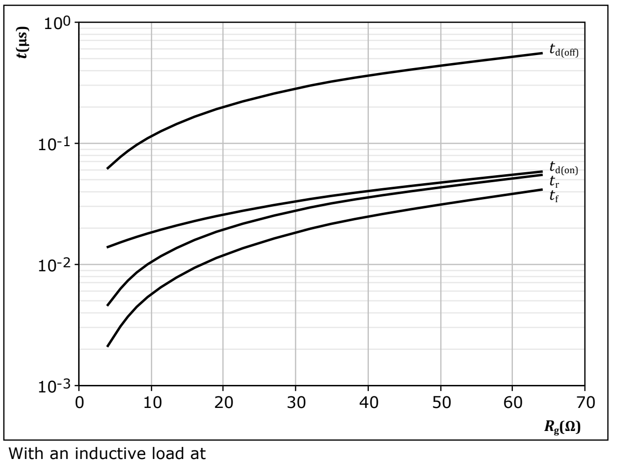
With an inductive load at

T_j =	150	°C
V_{DS} =	600	V
V_{GS} =	0/15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 17. MOSFET

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

$t = f(R_g)$



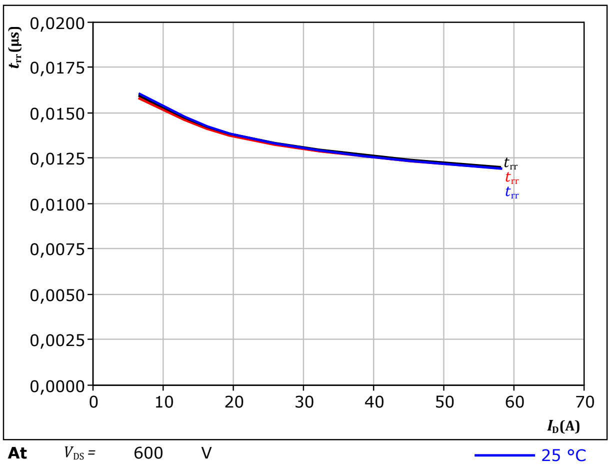
With an inductive load at

T_j =	150	°C
V_{DS} =	600	V
V_{GS} =	0/15	V
I_D =	32	A

figure 18. FWD

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



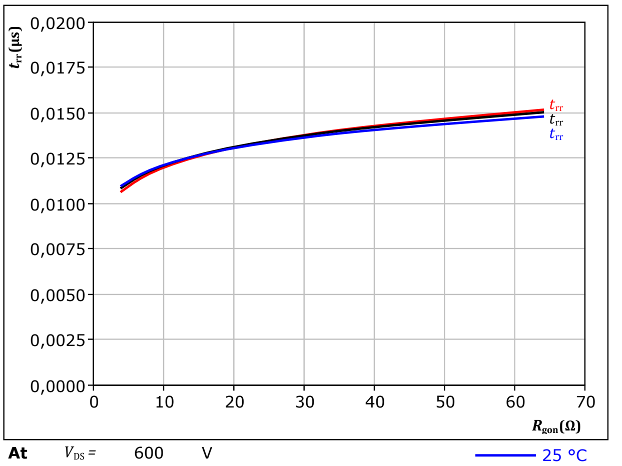
At	V_{DS} =	600	V
	V_{GS} =	0/15	V
	R_{gon} =	16	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 19. FWD

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} =	0/15	V
	I_D =	32	A

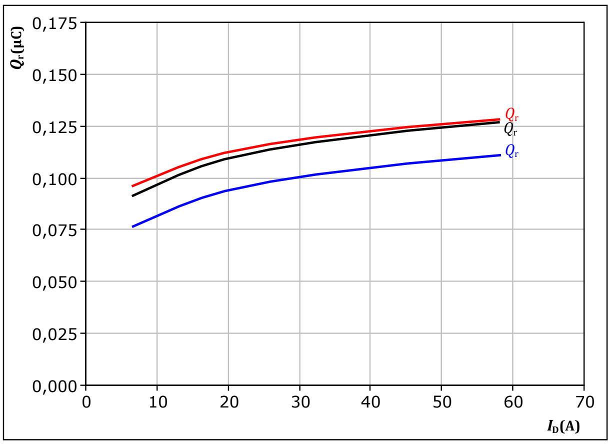
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 20. FWD

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$



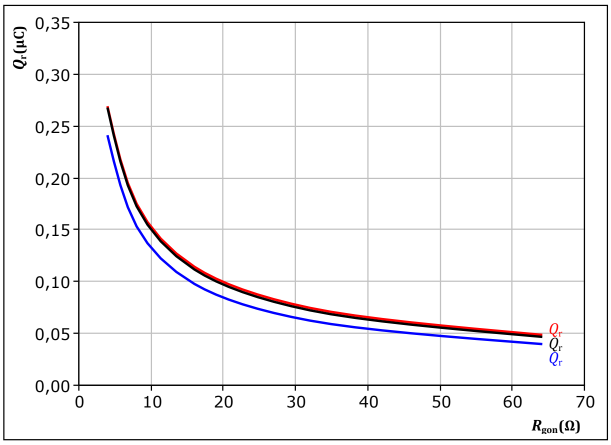
At V_{DS} = 600 V, V_{GS} = 0/15 V, R_{gon} = 16 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 21. FWD

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

$Q_r = f(R_{gon})$



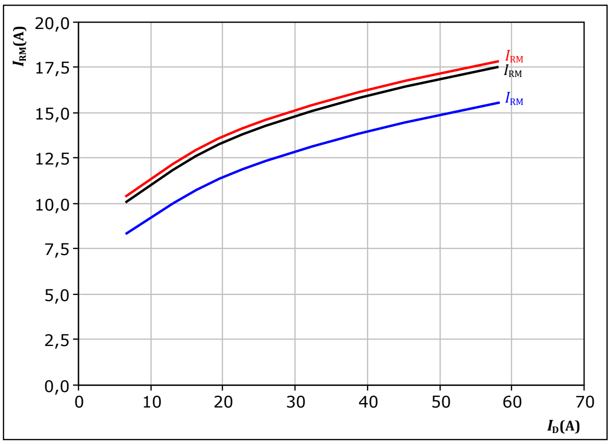
At V_{DS} = 600 V, V_{GS} = 0/15 V, I_D = 32 A

T_j: 25 °C, 125 °C, 150 °C

figure 22. FWD

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$



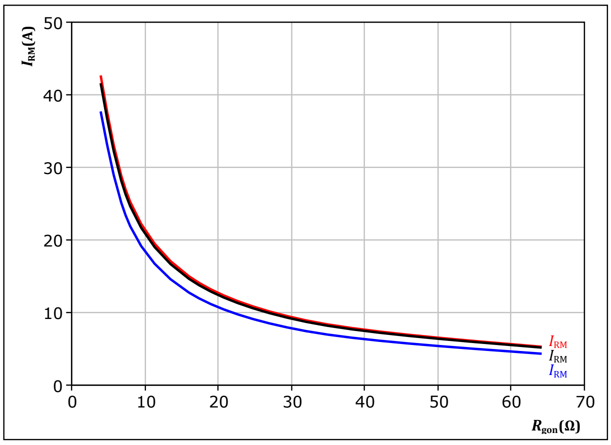
At V_{DS} = 600 V, V_{GS} = 0/15 V, R_{gon} = 16 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 23. FWD

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} = 0/15 V, I_D = 32 A

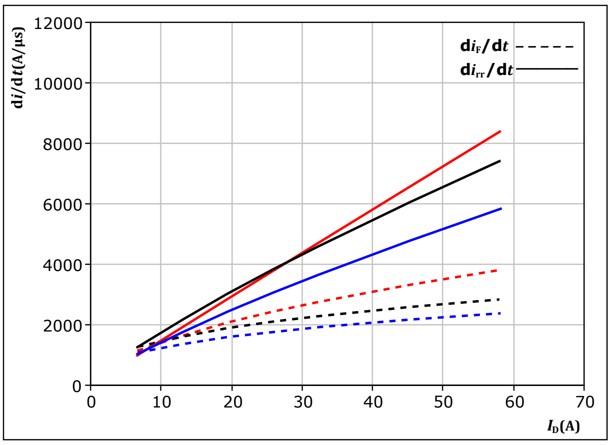
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 24. **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)

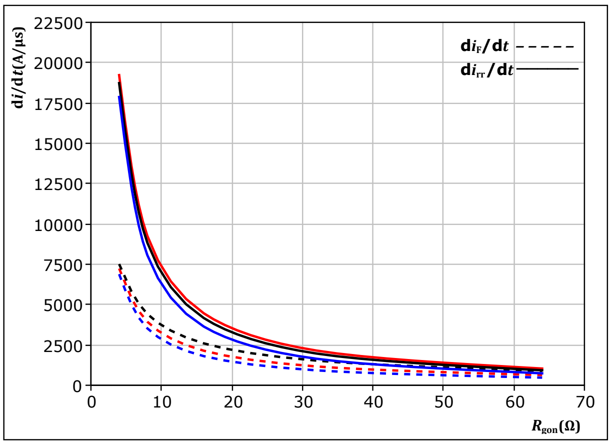


At					
	V_{DS} =	600	V		25 °C
	V_{GS} =	0/15	V	T_j:	125 °C
	R_{gon} =	16	Ω		150 °C

figure 25. **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})

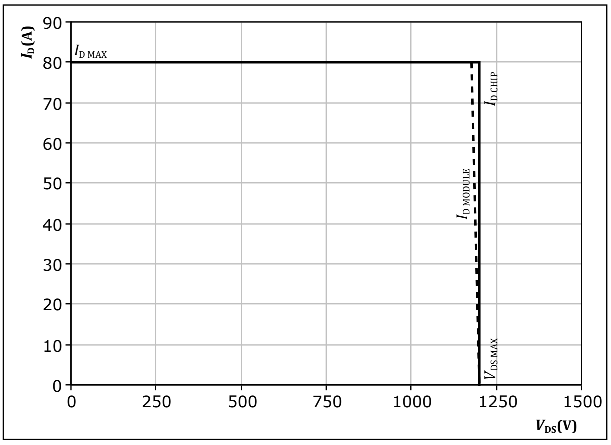


At					
	V_{DS} =	600	V		25 °C
	V_{GS} =	0/15	V	T_j:	125 °C
	I_D =	32	A		150 °C

figure 26. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At			
	T_j =	150	°C
	R_{gon} =	16	Ω
	R_{goff} =	16	Ω

Boost Switching Definitions

figure 27. **MOSFET**

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

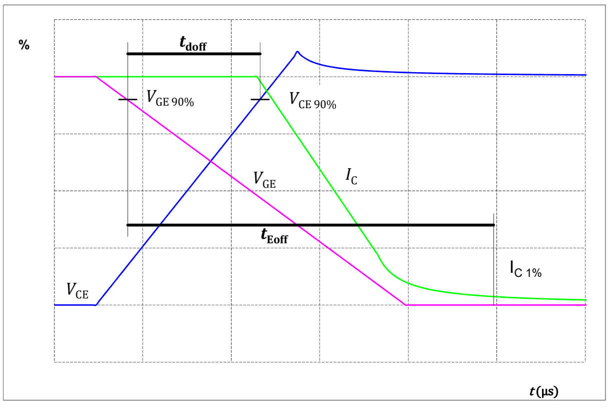


figure 28. **MOSFET**

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

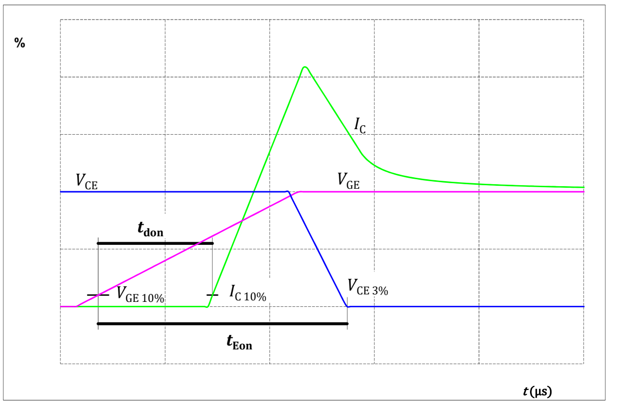


figure 29. **MOSFET**

Turn-off Switching Waveforms & definition of t_f

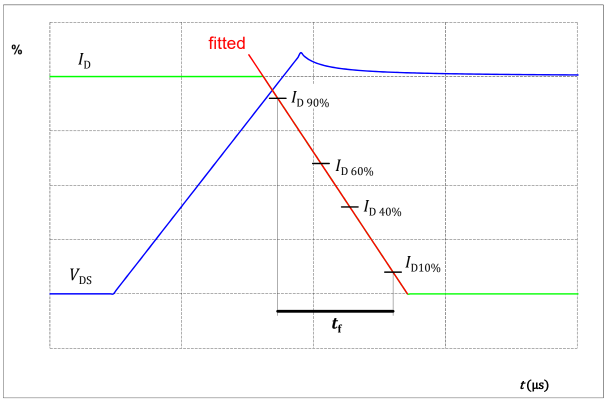
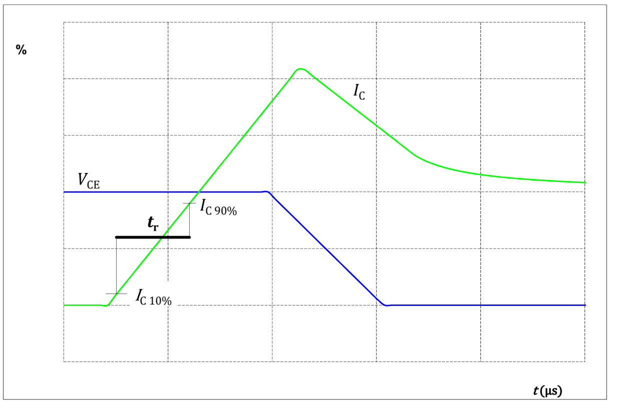


figure 30. **MOSFET**

Turn-on Switching Waveforms & definition of t_r



Boost Switching Definitions

figure 31. **FWD**

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

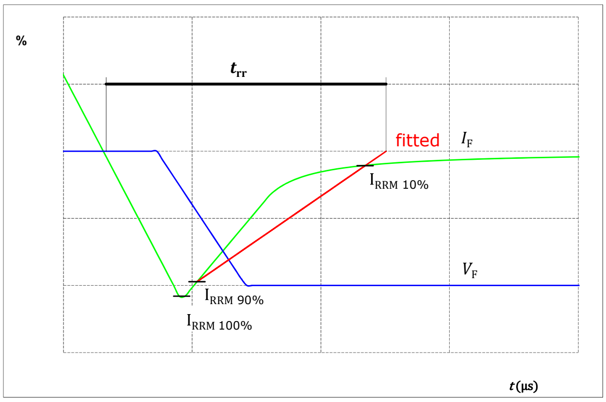


figure 32. **FWD**

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

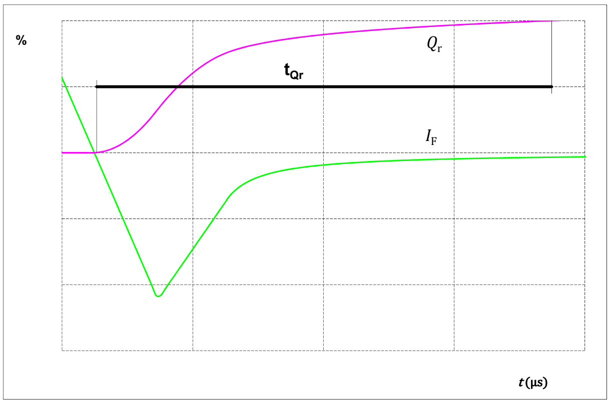
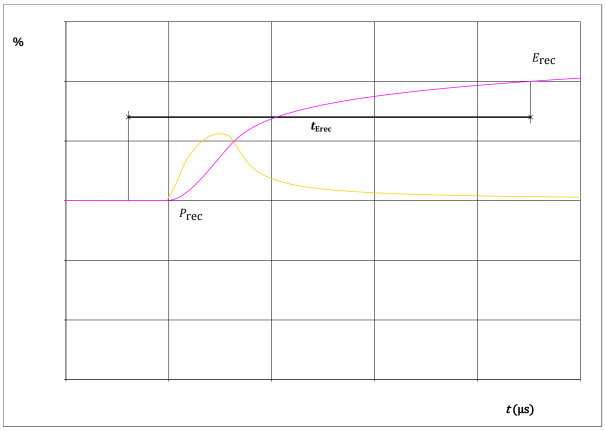


figure 33. **FWD**

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



Ordering Code

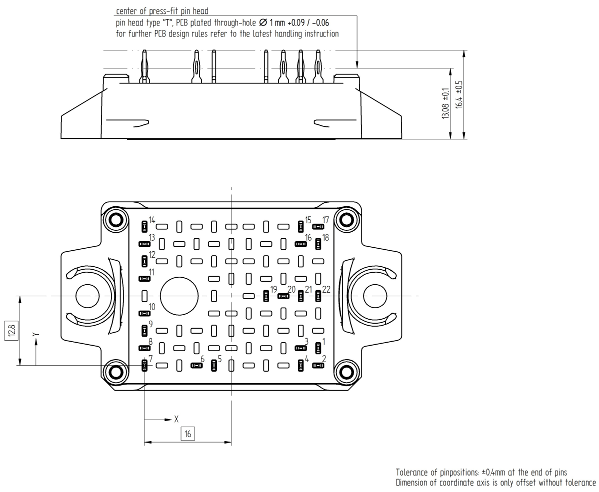
Version	Ordering Code
Without thermal paste	10-EZ12B2A032ME-LQ17L18T
With thermal paste (3,4 W/mK, PSX-P7)	10-EZ12B2A032ME-LQ17L18T-/3/

Marking

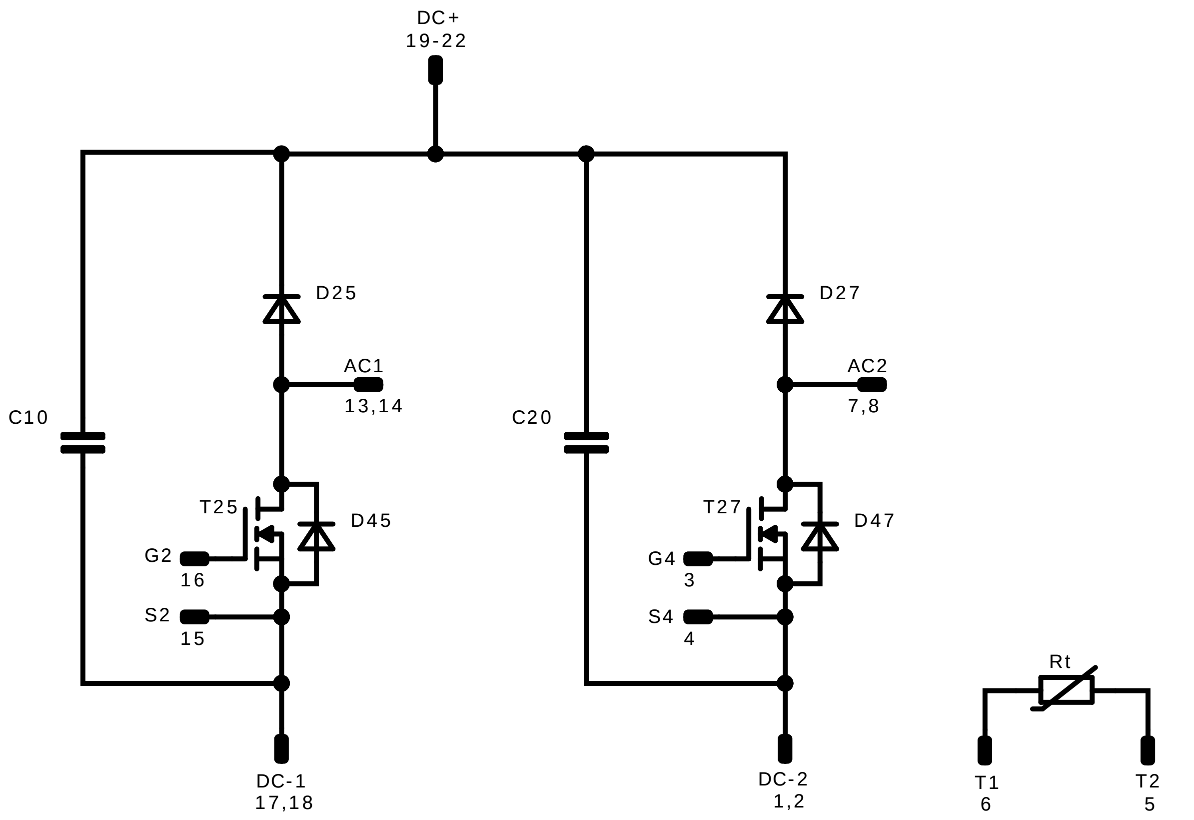
	**Text**	**Name**		**Date code**	**UL & VIN**	**Lot**	**Serial**
		NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	32	3,2	DC-2
2	32	0	DC-2
3	28,8	3,2	G4
4	28,8	0	S4
5	12,8	0	T2
6	9,6	0	T1
7	0	0	AC2
8	0	3,2	AC2
9	0	6,4	S3
10	0	9,6	G3
11	0	16	G1
12	0	19,2	S1
13	0	22,4	AC1
14	0	25,6	AC1
15	28,8	25,6	S2
16	28,8	22,4	G2
17	32	25,6	DC-1
18	32	22,4	DC-1
19	22,4	12,8	DC+
20	25,6	12,8	DC+
21	28,8	12,8	DC+
22	32	12,8	DC+



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T25, T27	MOSFET	1200 V	32 mΩ	Boost Switch	
D25, D27	FWD	1200 V	20 A	Boost Diode	
D45, D47	Rectifier	1600 V	28 A	Boost Sw. Protection Diode	
C25, C27	Capacitor	1500 V		Capacitor (DC)	
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-EZ12B2A032ME-LQ17L18T-D1-14	30 Jul. 2024	Initial Release	