

1200V, 2 OHM, DOUBLE SiC CURRENT LIMITING DEVICE WITH STANDARD SHORT-CIRCUIT CAPABILITIES

FEATURES

- ▲ Low Saturation/Nominal current ratio.
- ▲ Bidirectional current limiting operation.
- ▲ Excellent current clamping capabilities (almost flat I-V curve) in forward and reverse modes.
- ▲ Breakdown voltage above 1200V in forward and reverse modes.
- ▲ Short-circuit capability above 250 μ s @ 600V, 80 μ s @ 1200V.
- ▲ Negative temperature coefficient of I_{SAT} .
- ▲ Improved reliability due to monolithic solution.

ADVANTAGES AND BENEFITS

- ▲ Allows huge reduction (7x to 10x) in footprint and weight compared to standard TVS-only or MOV-only protections.
- ▲ Optimal load protection by ensuring the fault current through the load is close to its nominal current (reduced induced fault stress).
- ▲ For long lasting faults, the current decreases over time due to self-heating, thus increasing the level of protection.

DESCRIPTION

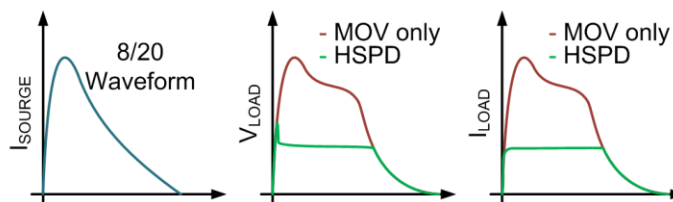
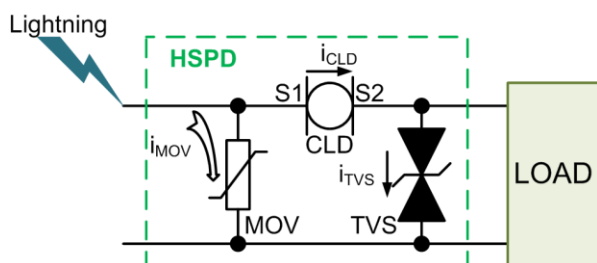
The KE12LSB400 is a 1.2 kV, 2 Ohm double Silicon Carbide (SiC) Current Limiting Device that can be used in unidirectional (S1 connected to S2) or bidirectional (device between S1 and S2) modes, designed to clamp the current at a typical value of 2.5A per device.

Its elevated ruggedness makes it an ideal device to limit the current through a load when in a fault condition, before the fault disappears or a circuit breaker (mechanical or electronic) may react.

APPLICATIONS

- ▲ Lightning protection
- ▲ Short-circuit / overcurrent protection
- ▲ Overvoltage / surge protection
- ▲ Capacitor pre-charging
- ▲ Battery protections
- ▲ DC general purpose protection applications
- ▲ Unidirectional current limitation in AC or DC links
- ▲ Photovoltaic power plant protection
- ▲ Constant-current regulation for battery charging

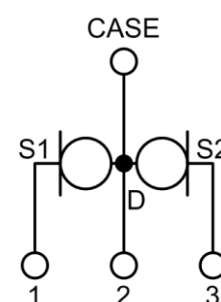
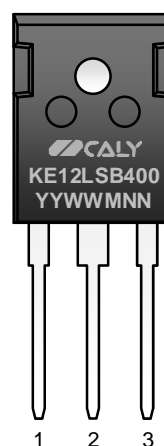
TYPICAL APPLICATION



KEY PERFORMANCE

Parameter	Value
On resistance R_{ON} (one device)	2.0 Ohm
Saturation Current I_{SAT}	4A
Pinch-off Voltage V_P	± 10 V

PACKAGING



QUICK ORDERING INFORMATION

Part Number	Package	Marking
KE12LSB400T47	TO-247-3L	KE12LSB400

Other packages and packaging configurations possible upon request.

ABSOLUTE MAXIMUM RATINGS

Unless otherwise stated, specification applies for $T_c=25^\circ\text{C}$.

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
Saturation current	I_{DS-SAT}			4.0	A	$V_{DS} = 20V$
Pulsed forward maximum voltage	V_{DS-MAX}			1200	V	(Single pulse, $t_{pulse} = 10\mu\text{s}$)
Pulsed reverse Maximum voltage	V_{SD-MAX}			5	V	(Single pulse, $t_{pulse} = 10\mu\text{s}$)
Pulsed reverse Maximum	I_{SD-MAX}			4	A	$V_{SD} = 5V$
Short-circuit time	t_{SC}	100	500	1000	μs	$V_{DS} = 600V$, capacitive discharge

ELECTRICAL CHARACTERISTICS

Unless otherwise stated, specification applies for $-55^{\circ}\text{C} < T < 175^{\circ}\text{C}$.

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
On-resistance	R_{ON}	1	2	4	Ohm	25°C, one device
Continuous max. DC current	I_{NOM_Max}	0.4	0.5	1	A	25°C
Saturation current	I_{SAT}	1	2.5	4	A	25°C
Operating temperature	T_{OPT}	-55	25	175	°C	
Storage temperature	T_{STJ}	-55	25	175	°C	

THERMAL CHARACTERISTICS

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
Junction-case Thermal Resistance	R_{TH-JC}			3	°C/W	TO-247

TYPICAL PERFORMANCE

Unless otherwise stated, measurements performed at 25°C.

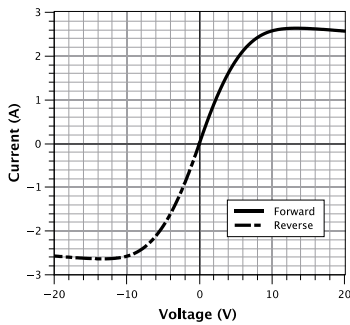


Fig 1. Pulsed IV characteristics ($t_p=400\mu\text{s}$) in forward ($V_{DS}>0$) and reverse ($V_{DS}<0$) modes. Devices connected in bidirectional (tail to tail) mode.

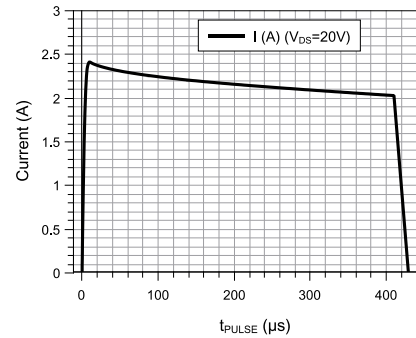


Fig 2. Current waveform (20V / 400 μs forward pulse voltage). Devices connected in bidirectional (tail to tail) mode.

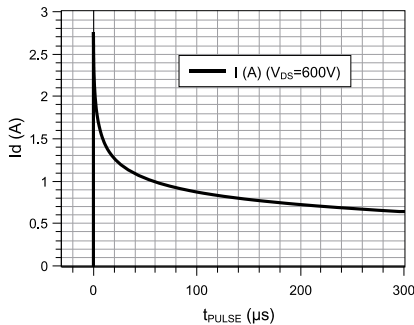


Fig 3. CLD current waveform (600V/100 μs short-circuit). Devices connected in bidirectional (tail to tail) mode.

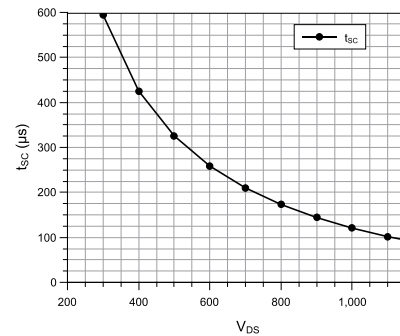


Fig 4. Critical short-circuit time as function of DC bus voltage.

DETAILED ORDERING INFORMATION

K
↓
Source
K = CALY Technologies

E
↓
Temperature range:
E = -55°C to +175°C

12
↓
Rated Voltage:
12 = 1200V

LSB
↓
Device / Type
LSB = Bidirectional Current Limiting Device

400
↓
Rated Resistance:
400 = 2 x 2 Ohm

T47
↓
Package:
T47 = TO247

Part Number	Temperature Range	Package	Pin Count	Marking
KE12LSB400T47	-55°C to +175°C	TO-247-3L	3	KE12LSB400

Other packages and packaging configurations possible upon request. MOQ may apply.

PACKAGE OUTLINE

TO247-3

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	0.190	0.205
A1	2.29	2.54	0.090	0.100
A2	1.91	2.16	0.075	0.085
b	1.07	1.32	0.042	0.052
b1	1.88	2.13	0.074	0.084
b2	2.92	3.20	0.115	0.126
c	0.51	0.66	0.020	0.026
D	20.80	20.90	0.819	0.823
D1	16.56	17.83	0.652	0.702
D2	0.51	1.35	0.020	0.053
E	15.49	16.26	0.610	0.640
e	5.44 BSC		0.214 BSC	
E1	13.46	14.02	0.530	0.552
E2	4.27	4.52	0.168	0.178
E3	1.40	1.65	0.055	0.065
L	19.30	19.81	0.760	0.780
L1	4.14	4.39	0.163	0.173
Φ P	3.51	3.56	0.138	0.140
Φ P1	7.06	7.32	0.278	0.288
Q	5.46	5.64	0.215	0.225
S	6.15 BSC		0.242 BSC	

M3 Screw: 1Nm (8.8lbf-in)

Unique Lot Assembly Code

YY	Last two digits of assembly year (e.g. 16 = 2016).
WW	Assembly week (01 to 52).
M	Assembly location code.
NN	Assembly lot code (01 to 99).

REVISION HISTORY

Revision	Date	Description
1A	2018-Aug-10	First issue

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