

1200V, 1.5 OHM, DOUBLE SiC CURRENT LIMITING DEVICE WITH EXTENDED SHORT-CIRCUIT CAPABILITIES

FEATURES

- ▲ Low Saturation/Nominal current ratio.
- ▲ Excellent current clamping capabilities (almost flat I-V curve).
- ▲ Breakdown voltage above 1200V in forward mode.
- ▲ Short-circuit capability above 350 μ s @ 600V, 250 μ s @ 1200V.
- ▲ Negative temperature coefficient of I_{DS} .
- ▲ Reverse conduction.

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 KE12LEB150 is a 1500 m Ω 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 4A per device, and able to sustain surge transients up to 1200V. 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.

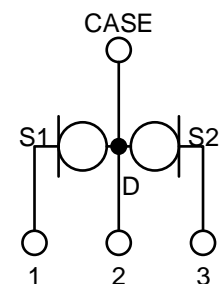
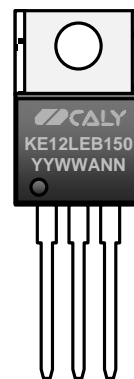
APPLICATIONS

- ▲ Lightning protection
- ▲ Short-circuit / overcurrent protection
- ▲ Overvoltage / surge protection
- ▲ Capacitor pre-charging
- ▲ Resettable fuse
- ▲ 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 or LED driving

KEY PERFORMANCE

Parameter	Value
ON-state Resistance R_{ON}	1.5 Ohms
Nominal Saturation Current $I_{SAT\ NOM}$	3 A
Knee Voltage V_{KNEE}	6 V

PACKAGING



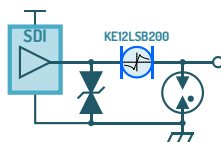
QUICK ORDERING INFORMATION

Part Number	Package	Marking
KE12LEB150T20	TO-220-3L	KE12LEB150

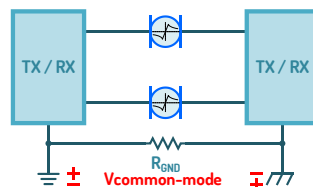
Other packages and packaging configurations possible upon request.

TYPICAL APPLICATION

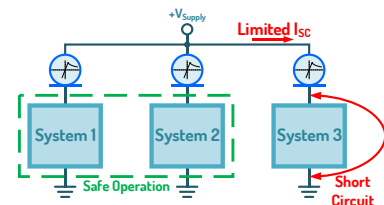
HD-SDI / SDI Protection against Surges and Lightning



Protection against Common-mode Faults in Communication Network



Protection by Isolating Faulty System acting as Resettable Fuse



ABSOLUTE MAXIMUM RATINGS

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

Parameter	Symbol	Values	Unit	Note/Test Condition
Maximum Forward Voltage	$V_{DS\ MAX}$	1200	V	Single pulse, $t_{pulse} = 100\mu s$
Maximum Reverse Voltage	$V_{SD\ MAX}$	5	V	Single pulse, $t_{pulse} = 200\mu s$
Maximum DC Forward Voltage	$V_{DS\ MAX\ DC}$	35	V	TO-220 package
Short-circuit time	$t_{SC\ 600V}$	450	μs	$V_{DS} = 600V$

ELECTRICAL CHARACTERISTICS

Unless otherwise stated, specification applies for $T_{CASE}=25^{\circ}C$ and for one leg.

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
ON-state-Resistance	R_{ON}		1.5	2.0	Ohms	$T_J=25^{\circ}C, V_{DS} = 2V$
			2.5			$T_J=150^{\circ}C, V_{DS} = 2V$
Maximum recommended Operating DC current	I_{DC}	-2		+2	A	TO-220 package
Limiting Current	$I_{LIM\ 1\mu s}$	3.3	4	4.7	A	$t_{pulse} = 1\mu s, V_{DS} = 600V, T_{CASE}=25^{\circ}C$
	$I_{LIM\ 10\mu s}$	2.5	2.9	3.2	A	$t_{pulse} = 10\mu s, V_{DS} = 600V, T_{CASE}=25^{\circ}C$
	$I_{LIM\ 100\mu s}$	1.6	1.7	1.9	A	$t_{pulse} = 100\mu s, V_{DS} = 600V, T_{CASE}=25^{\circ}C$
Operating Junction Temperature	T_J	-55		+175	$^{\circ}C$	
Storage Temperature	T_{STG}	-55		+175	$^{\circ}C$	

THERMAL CHARACTERISTICS

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
Junction-Case Thermal Resistance	R_{TH-JC}	1.7	2	2.3	$^{\circ}C/W$	For one leg or two in series
Junction-Case Thermal Resistance	R_{TH-JC}	0.9	1	1.2	$^{\circ}C/W$	For both leg in parallel

TYPICAL PERFORMANCE

Unless otherwise stated, measurements performed at $T_{CASE}=25^{\circ}C$, and for one device

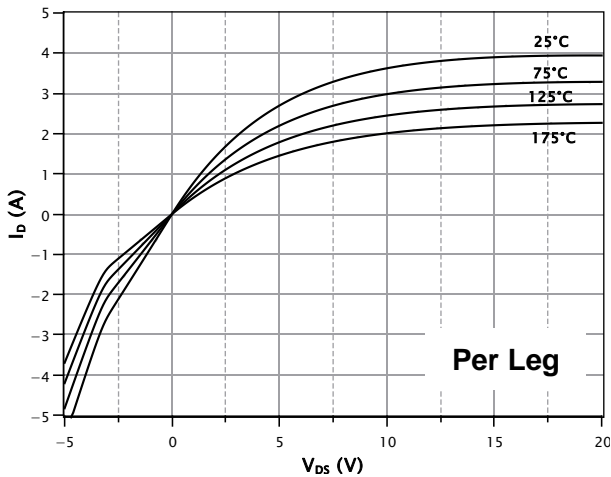


Fig 1. Pulsed IV curve ($t_{pulse}=200\mu s$) in forward ($V_{DS}>0V$) and reverse ($V_{DS}<0V$) modes, for different T_{CASE} .

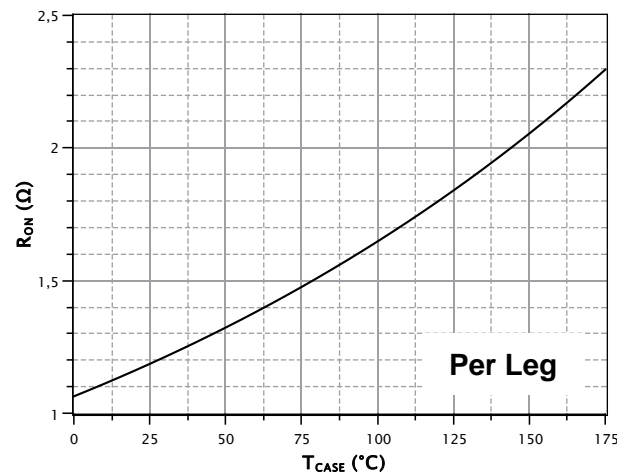


Fig 2. ON-state resistance evolution with case temperature at $I_{DC} = 100mA$.

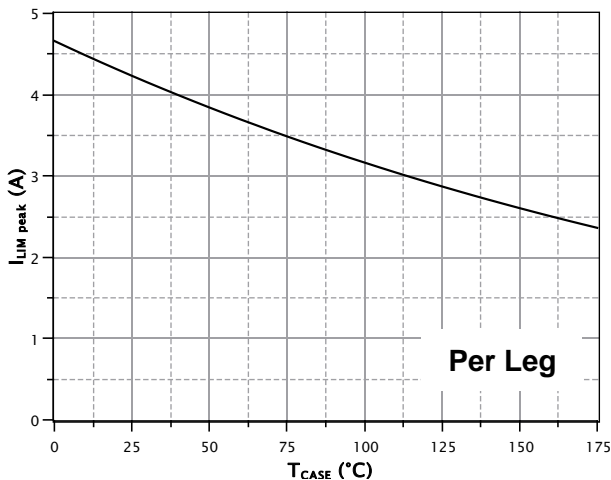


Fig 3. Peak limiting current evolution with case temperature ($t_{pulse} = 10\mu s, V_{DS} = 20V$).

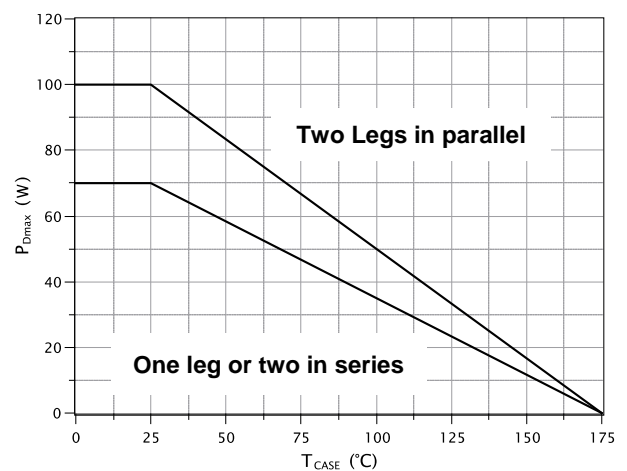


Fig 4. DC Power dissipation derating curve.

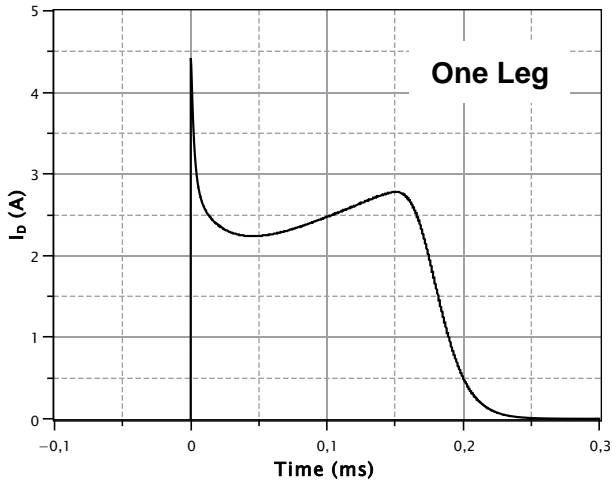


Fig 5. Typical 1.2/50µs, 1000V/500A CLD current response.

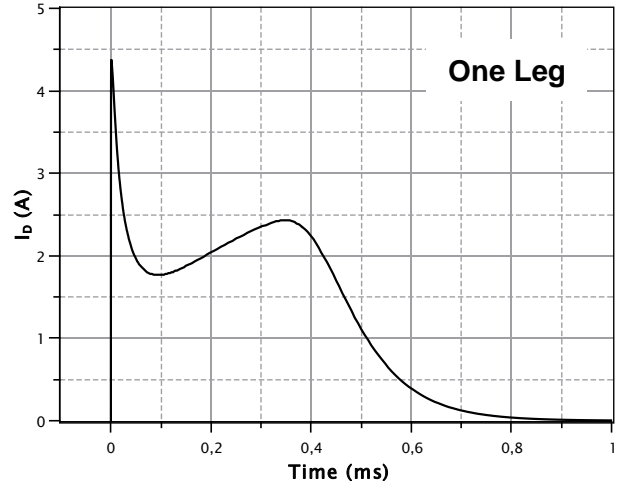


Fig 6. Typical 40/120µs, 750V/750A CLD current response.

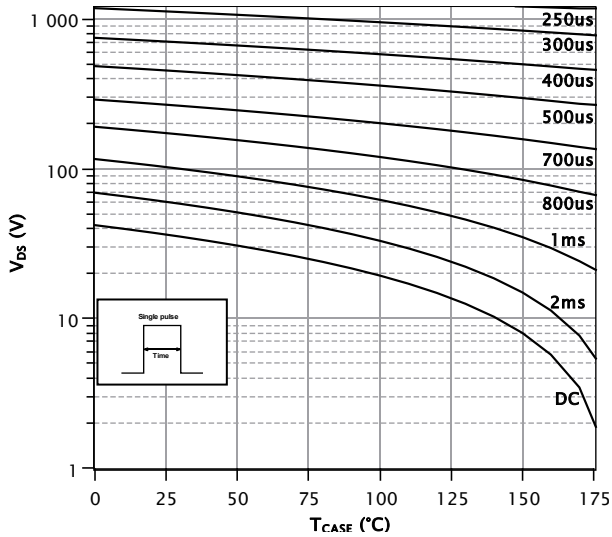


Fig 7. Safe Operating Area for square pulse per leg.

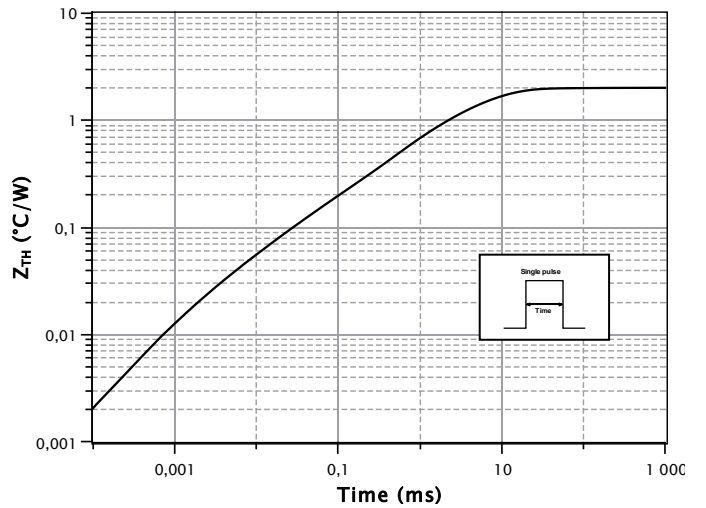


Fig 8. Typical transient thermal impedance per leg.

DETAILED ORDERING INFORMATION

K ↓ Source K = CALY Technologies	E ↓ Temperature range: E = -55°C to +175°C	12 ↓ Rated Voltage: 12 = 1200V	LEB ↓ Device / Type LEB = Current Limiting Device	150 ↓ Rated Resistance: 150 = 1500 mOhm	T20 ↓ Package: T20 = TO-220-3L
--	--	--	---	---	--

Part Number	Temperature Range	Package	Pin Count	Marking
KE12LEB150T20	-55°C to +175°C	TO-220-3L	2	KE12LEB150

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

PACKAGE OUTLINES

TO-220-3L

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.32	4.57	0.170	0.180
A1	2.59	2.74	0.102	0.108
A2	1.14	1.40	0.045	0.055
b	0.87	1.00	0.034	0.039
b1	1.23	1.36	0.048	0.054
c	0.36	0.40	0.014	0.016
D	14.71	15.31	0.579	0.603
D1	8.51	8.76	0.335	0.345
D2	12.34	12.45	0.486	0.490
E	10.13	10.24	0.399	0.403
E1	7.57	7.68	0.298	0.302
E2		0.76		0.030
E3	6.45	6.56	0.254	0.258
e	2.54 BSC		0.100 BSC	
e1	5.03	5.13	0.198	0.202
H1	6.20	6.55	0.244	0.258
L	13.72	14.22	0.540	0.560
L1	3.10	3.85	0.122	0.152
Φ P	3.71	3.96	0.146	0.156
S	2.54	2.79	0.100	0.110

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	2019-Feb-01	First issue
2A	2019-Apr-30	Major revision, SOA & ZTH added
2B	2019-May-17	Amended typos in figures.

IMPORTANT NOTICE & DISCLAIMER

Information in this document supersedes and replaces all information previously supplied. Information in this document is provided solely in connection with CALY Technologies products.

The information contained herein is believed to be reliable. CALY Technologies makes no warranties regarding the information contained herein. CALY Technologies assumes no responsibility or liability whatsoever for any of the information contained herein. CALY Technologies assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. CALY Technologies reserves the right to make changes, corrections, modifications or improvements to this document and the information herein without notice. Customers should obtain and verify the latest relevant information before placing orders for CALY Technologies products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

Unless expressly approved in writing by an authorized representative of CALY Technologies, CALY Technologies products are not designed, authorized or warranted for use in military, aircraft, space, life-saving, or life-sustaining applications, nor in products or systems where failure or malfunction may result in personal injury, death, or property or environmental damage.

General Sales Terms & Conditions apply.

CONTACT US

For more information on CALY Technologies' products, technical support or ordering:

Website: caly-technologies.com

Email: sales@caly-technologies.com
info@caly-technologies.com

CALY Technologies SAS

CS52132

56 Bd Niels Bohr, Bat CEI2

69603 Villeurbanne Cedex

France