

1200V, 1.5 OHM, 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 KE12LE150 is a 1500 m Ω Silicon Carbide (SiC) unidirectional Current Limiting Device, designed to clamp 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.

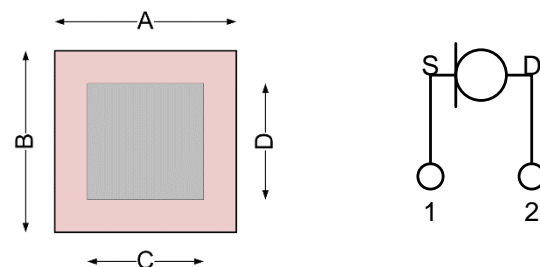
APPLICATIONS

- ▲ 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

CHIP OUTLINE



1 : Source on Top Side
2 : Drain on Back Side

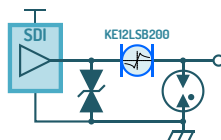
QUICK ORDERING INFORMATION

Part Number	Package	Marking
KE12LE150B	Bare die	

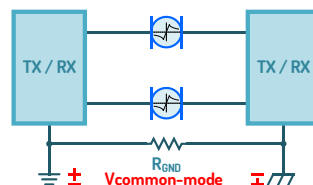
Other packages and packaging configurations possible upon request.

TYPICAL APPLICATION

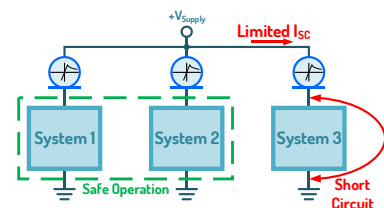
HD-SDI / SDI Protection against Surges and Lightning



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	$^{\circ}C$	

TYPICAL PERFORMANCE

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

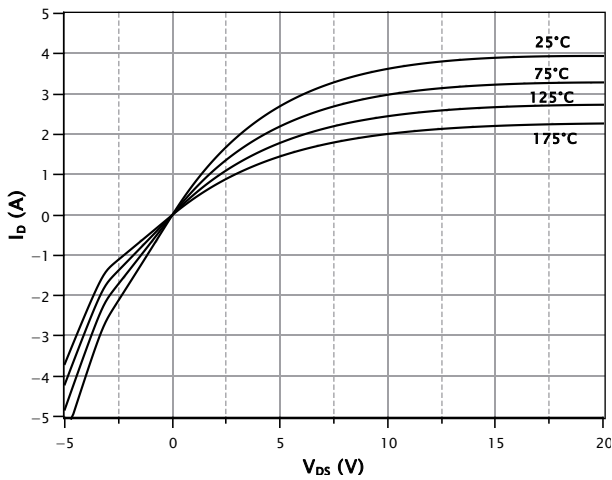


Fig 1. Pulsed IV curve ($t_{pulse}=200\mu s$) in forward ($V_{DS}>0V$) and reverse ($V_{DS}<0V$) modes, for different T_{CASE} .

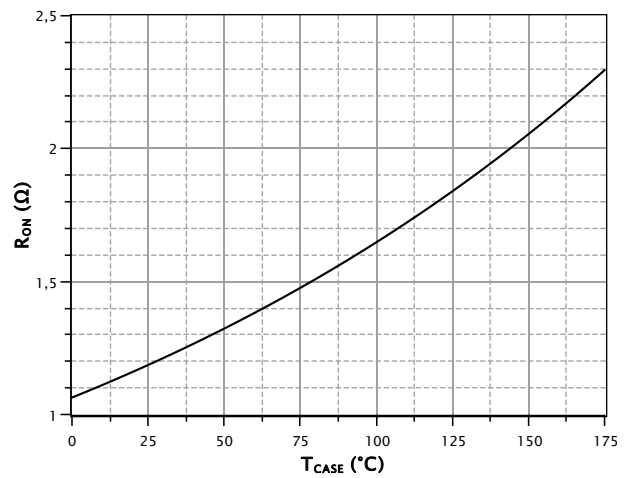


Fig 2. ON-state resistance evolution with case temperature at $I_{DC} = 100mA$.

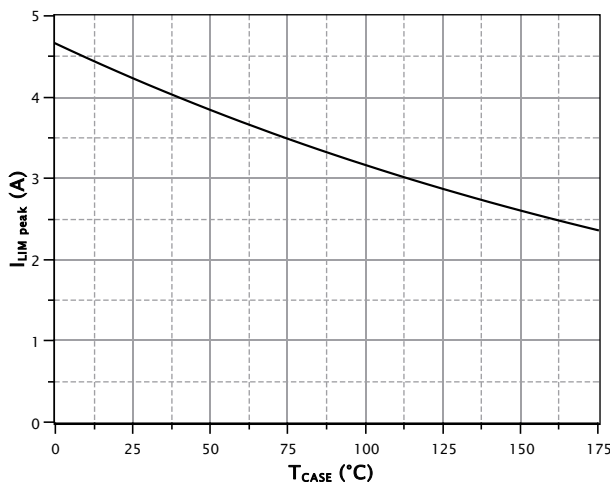


Fig 3. Peak limiting current evolution with case temperature ($t_{pulse} = 10\mu s, V_{DS} = 20V$).

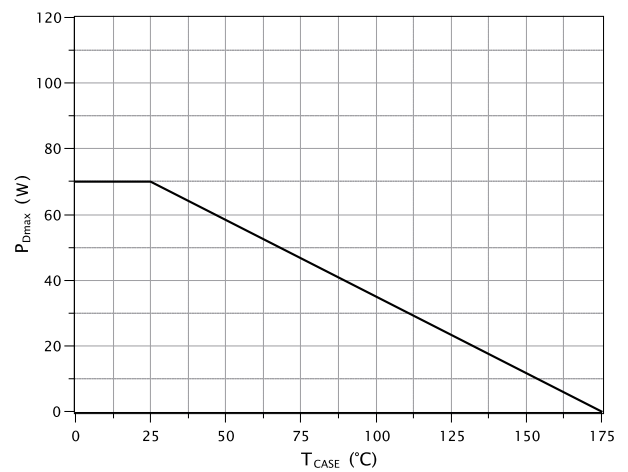


Fig 4. DC Power dissipation derating curve.

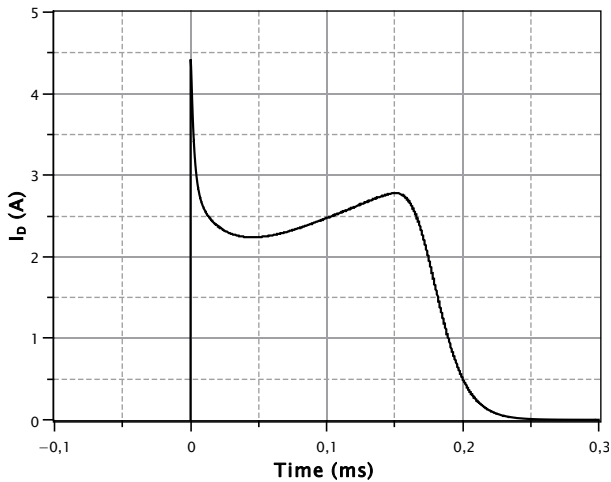


Fig 5. Typical 1.2/50µs, 1000V/500A CLD current response.

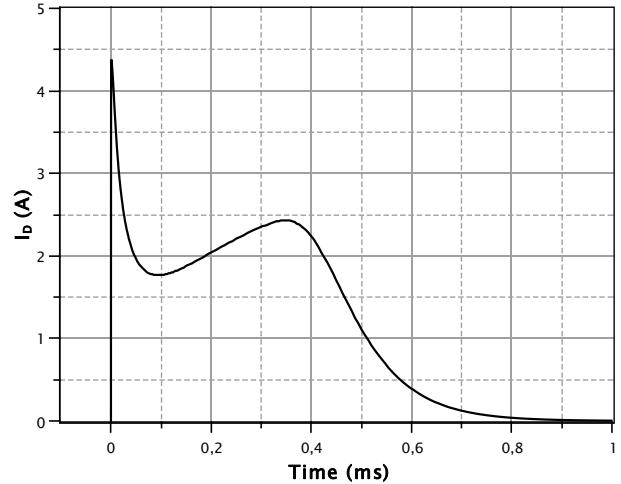


Fig 6. Typical 40/120µs, 750V/750A CLD current response.

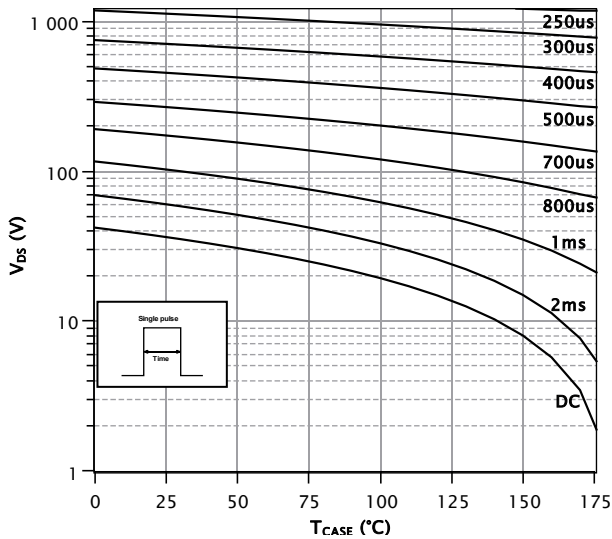


Fig 7. Safe Operating Area for square pulse.

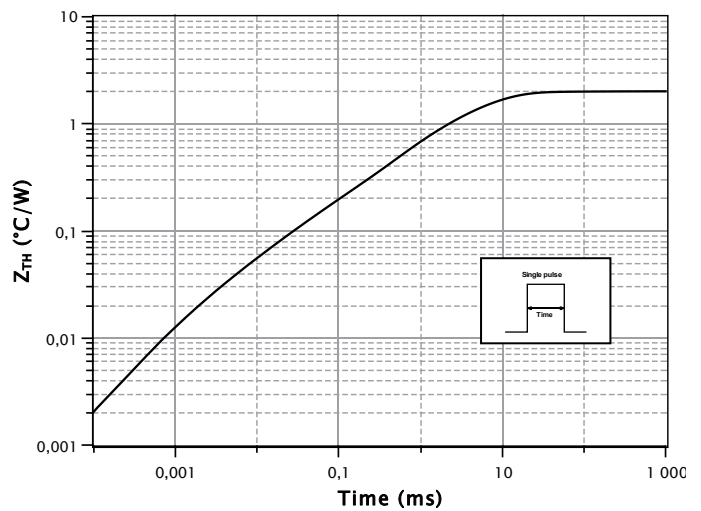


Fig 8. Typical transient thermal impedance.

DETAILED ORDERING INFORMATION

K
↓
Source
K = CALY Technologies

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

12
↓
Rated Voltage:
12 = 1200V

LE
↓
Device / Type
LE = Current Limiting Device, extended capability

150
↓
Rated Resistance:
150 = 1500 mOhm

B
↓
Package:
B = Bare die

Part Number	Temperature Range	Package	Pin Count	Marking
KE12LE150B	-55°C to +175°C	Bare die		
KE12LEB150T20	-55°C to +175°C	TO-220-3L	2	KE12LEB150

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

BARE DIE INFORMATION

	Ref.	Dimensions	
		Millimeters	Inches
	A	2.0	0.079
	B	2.0	0.079
	C	1.4	0.055
	D	1.4	0.055
	Top	AlCu0.5%	
Bottom	Ti/Ni/Au		

REVISION HISTORY

Revision	Date	Description
1A	2019-May-17	First release

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