

1200V, 600 mOHM, 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} .
- ▲ Bidirectional 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 KE12LEB060 is a 600 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 3A 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.

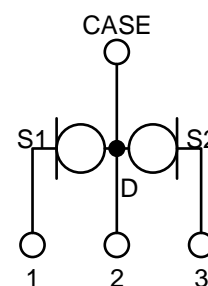
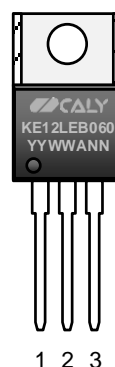
APPLICATIONS

- ▲ Lightning protection
- ▲ Short-circuit / overcurrent protection
- ▲ Overvoltage / surge protection
- ▲ Capacitor pre-charging
- ▲ Resettable fuse
- ▲ Battery protections
- ▲ DC general purpose protection applications
- ▲ 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}	0.6 Ohms
Nominal Saturation Current $I_{SAT\ NOM}$	10 A
Knee Voltage V_{KNEE}	10 V

PACKAGING



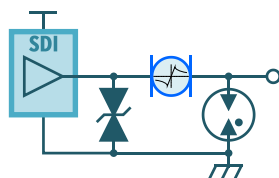
QUICK ORDERING INFORMATION

Part Number	Package	Marking
KE12LEB060T20	TO-220-3L	KE12LEB060

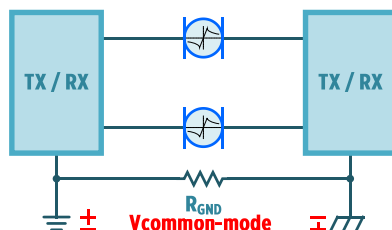
Other packages and packaging configurations possible upon request.

TYPICAL APPLICATIONS

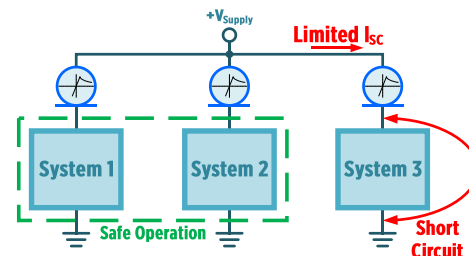
HD-SDI / SDI Surge/Lightning Protection



Data Lines Protection against Common-mode Currents



Protection by Isolating Faulty System



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

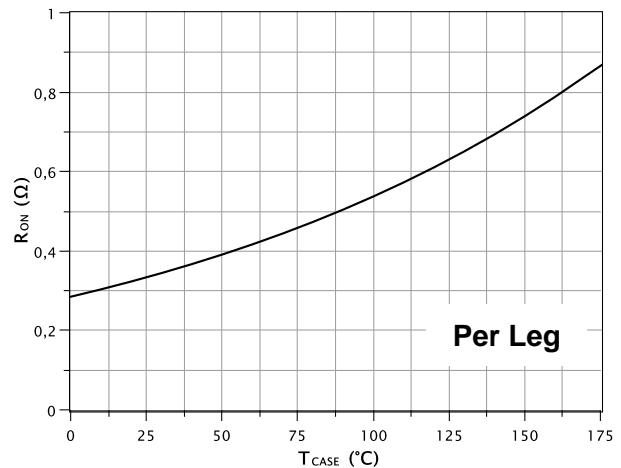
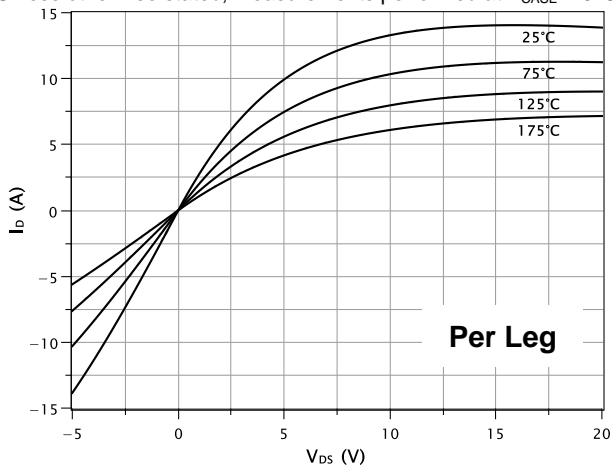
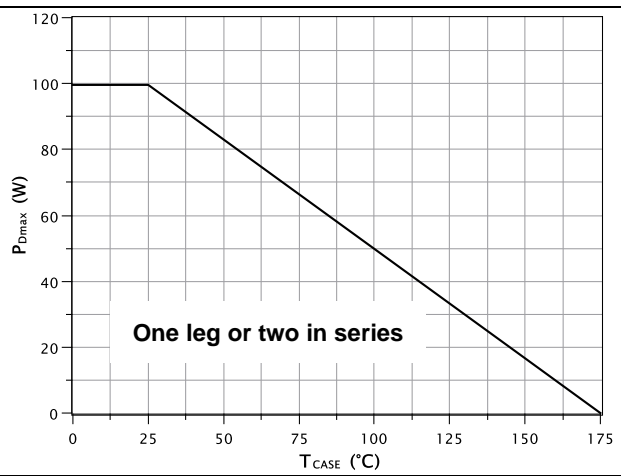
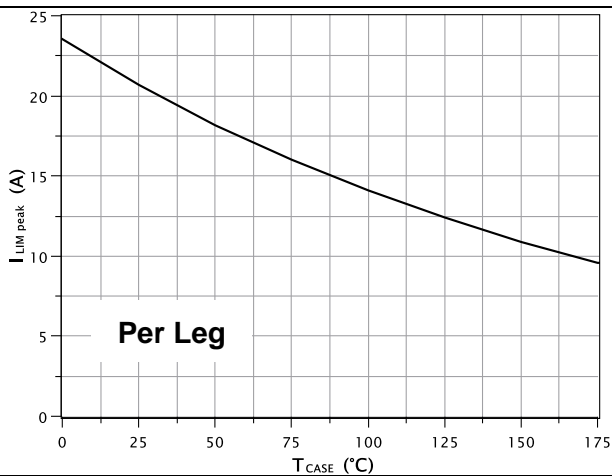
 Unless otherwise stated, specification applies for $T_{CASE}=25^{\circ}C$ and for one leg.

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
ON-state-Resistance	R_{ON}		0.35 0.75		Ohms	$T_J=25^{\circ}C$ $T_J=150^{\circ}C$
Maximum recommended Operating DC current	I_{DC}	-7		+7	A	TO-220 package
Limiting Current	$I_{LIM\ 1\mu s}$	15	20	25	A	$t_{pulse} = 1\mu s, V_{DS} = 600V, T_{CASE}=25^{\circ}C$
	$I_{LIM\ 10\mu s}$	5	7	9	A	$t_{pulse} = 10\mu s, V_{DS} = 600V, T_{CASE}=25^{\circ}C$
	$I_{LIM\ 100\mu s}$	2	4	6	A	$t_{pulse} = 100\mu s, V_{DS} = 600V, T_{CASE}=25^{\circ}C$
Operating Junction Temperature	T_J	-55		+175	$^{\circ}C$	TO-220 package
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}		1.6	1.8	$^{\circ}C/W$	For one leg or two in series
			0.8	1.1	$^{\circ}C/W$	For both legs in parallel

TYPICAL PERFORMANCE

 Unless otherwise stated, measurements performed at $T_{CASE}=25^{\circ}C$.

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 (TO-220 package).

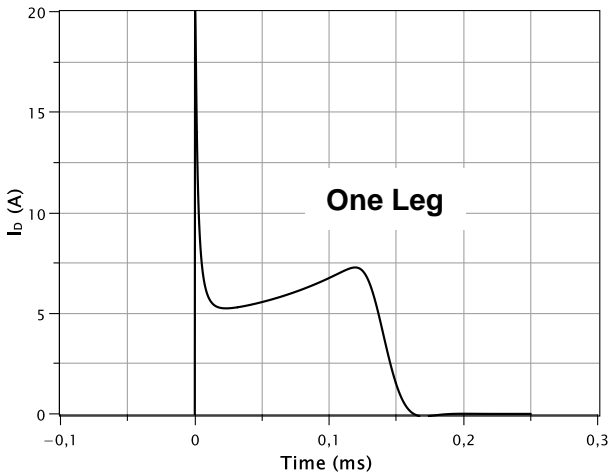


Fig 5. Typical 1.2/50µs, 1000V/500A CLD current response.

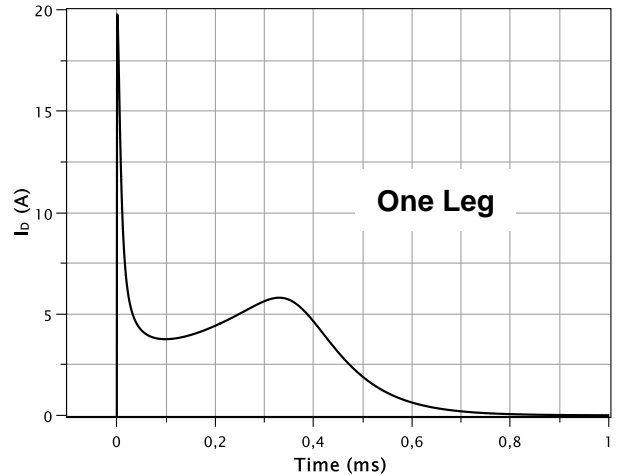


Fig 6. Typical 40/120µs, 750V/750A CLD current response.

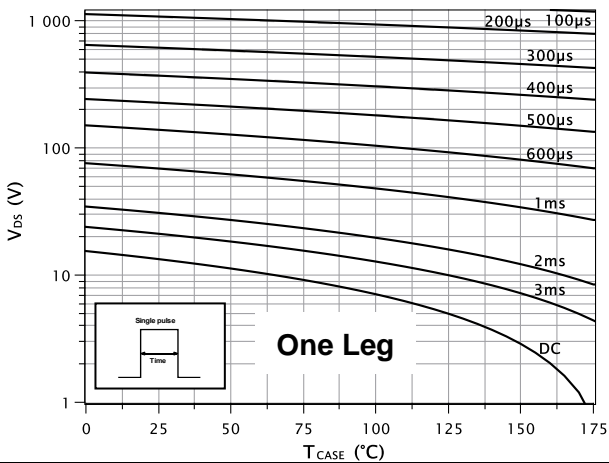


Fig 7. Safe Operating Area for square pulse (TO-220 package).

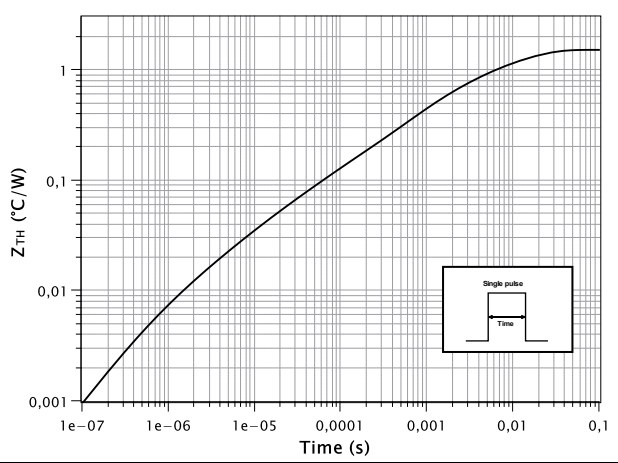


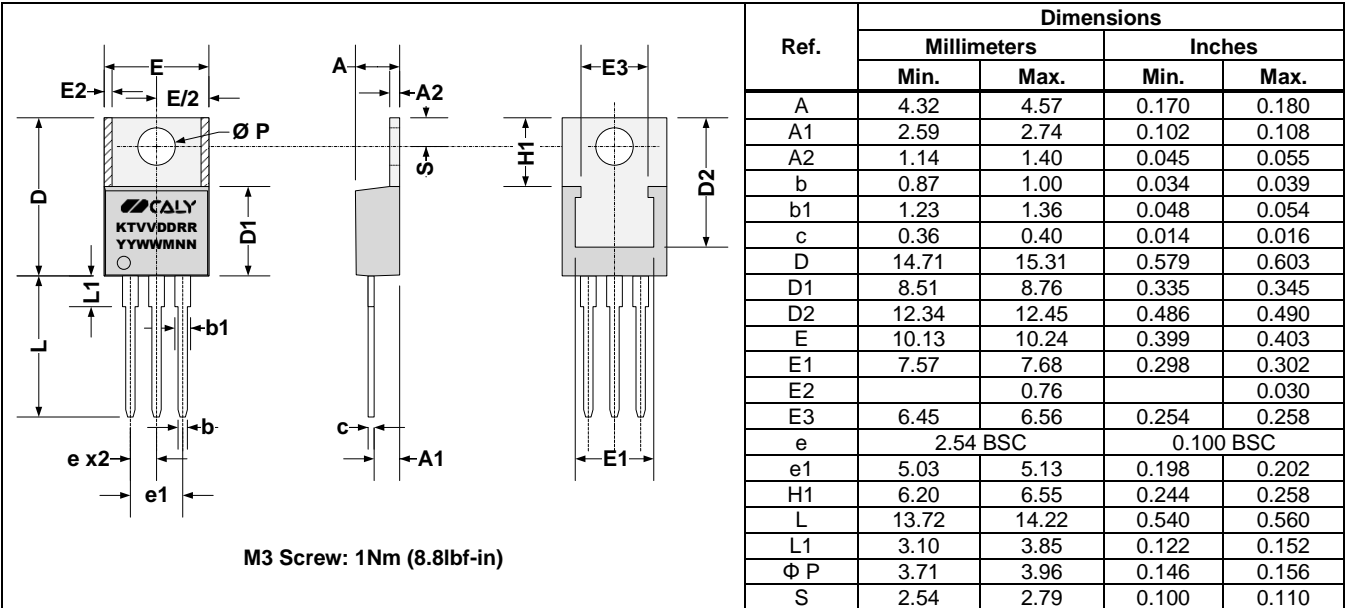
Fig 8. Typical transient thermal impedance (TO-220 package).

DETAILED ORDERING INFORMATION

<u>K</u> ↓ Source K = CALY Technologies	<u>E</u> ↓ Temperature range: E = -55°C to +175°C	<u>12</u> ↓ Rated Voltage: 12 = 1200V	<u>LEB</u> ↓ Device / Type LEB = Current Limiting Device	<u>060</u> ↓ Rated Resistance: 060 = 600 mOhm	<u>T20</u> ↓ Package: T20 = TO-220-3L
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Part Number	Temperature Range	Package	Pin Count	Marking
KE12LEB060T20	-55°C to +175°C	TO-220-3L	2	KE12LEB060

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

PACKAGE OUTLINES
TO-220-3L

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-Aug-23	First issue

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