

1200V, 600 mOHM, SiC CURRENT LIMITING DEVICE WITH STANDARD 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 250 μ s @ 600V, 80 μ s @ 1200V.
- ▲ Negative temperature coefficient of I_{DS} .
- ▲ Reverse conduction (internal body diode).

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.

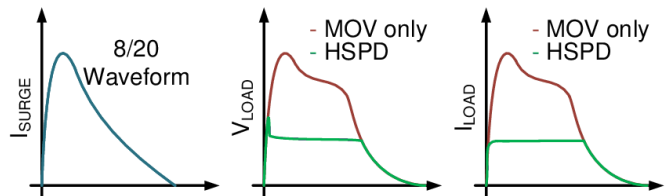
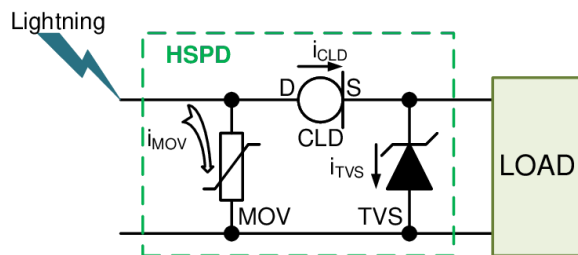
DESCRIPTION

The KE12LS060 is a 600 m Ω Current Limiting Device designed to clamp the forward current at a maximum of 15A and able to sustain surge transients up to 1200V. In reverse mode, the KE12LS060 behaves as a constant resistor. Its elevated ruggedness makes it an ideal device to limit the current through a load in continuous as well as in fault conditions.

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

TYPICAL APPLICATION



KEY PERFORMANCE

Parameter	Value
ON-state Resistance R_{ON}	0.6 Ohm
Nominal Saturation Current $I_{SAT\ NOM}$	10 A
Knee Voltage V_{KNEE}	10 V

PACKAGING



QUICK ORDERING INFORMATION

Part Number	Package	Marking
KE12LS060B	Bare die	
KE12LS060SB	SMB (DO214AA)	KE12LS060
KE12LS060T47	TO-247-2	KE12LS060

Other packages and packaging configurations possible upon request.

ABSOLUTE MAXIMUM RATINGS

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

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	$V_{DS\ MAX\ DC}$	1.3	V	SMB (DO214AA) package
Short-circuit time	$t_{SC\ 600V}$	300	μ s	$V_{DS} = 600V$

ELECTRICAL CHARACTERISTICS

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

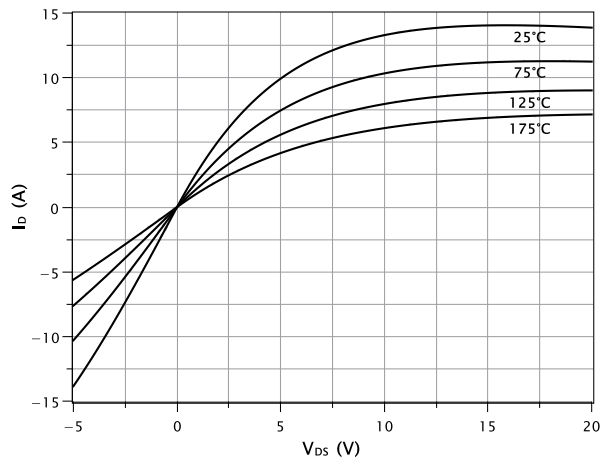
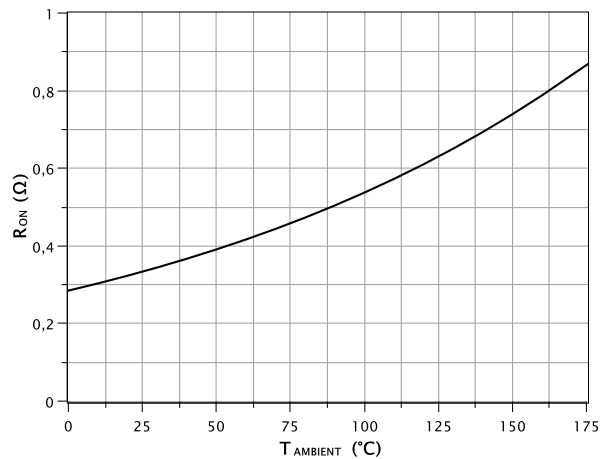
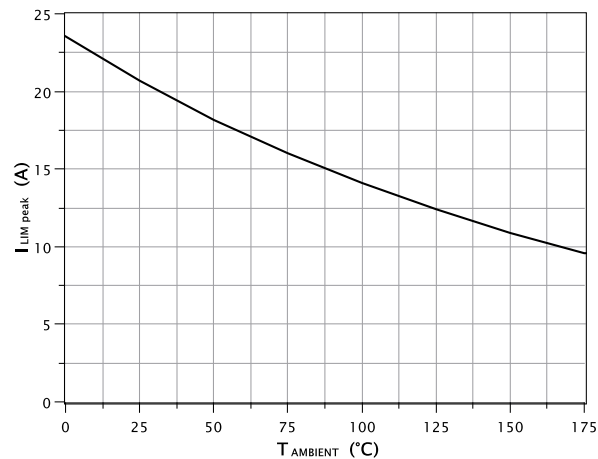
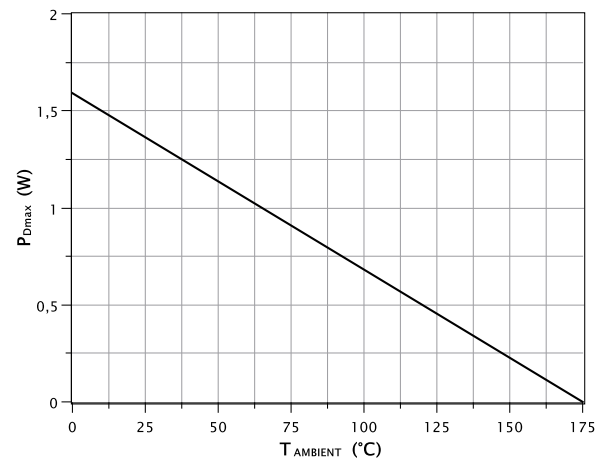
Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
ON-state-Resistance	R_{ON}		0.35		Ohm	$T_J=25^{\circ}\text{C}$
			0.75			$T_J=150^{\circ}\text{C}$
Maximum recommended Operating DC current	I_{DC}	-1		+1	A	SMB (DO214AA) package
Limiting Current	$I_{\text{LIM } 1\mu\text{s}}$	15	20	25	A	$t_{\text{pulse}} = 1\mu\text{s}, V_{\text{DS}} = 600\text{V}, T_{\text{AMBIENT}}=25^{\circ}\text{C}$
	$I_{\text{LIM } 10\mu\text{s}}$	5	7	9	A	$t_{\text{pulse}} = 10\mu\text{s}, V_{\text{DS}} = 600\text{V}, T_{\text{AMBIENT}}=25^{\circ}\text{C}$
	$I_{\text{LIM } 100\mu\text{s}}$	2	4	6	A	$t_{\text{pulse}} = 100\mu\text{s}, V_{\text{DS}} = 600\text{V}, T_{\text{AMBIENT}}=25^{\circ}\text{C}$
Operating Junction Temperature	T_J	-55		+175	$^{\circ}\text{C}$	SMB (DO214AA) package
Storage Temperature	T_{STG}	-55		+175	$^{\circ}\text{C}$	

THERMAL CHARACTERISTICS

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min	Typ	Max		
Junction-Ambient Thermal Resistance	$R_{\text{TH-JA}}^1$	90	110	130	$^{\circ}\text{C/W}$	SMB (DO214AA) package
Junction-Lead Thermal Resistance	$R_{\text{TH-JL}}^1$	10	15	20	$^{\circ}\text{C/W}$	On drain lead (#2)

¹ Device mounted on 1.6mm thick infinite FR4 PCB with 5.0 mm x 3.0 mm copper pad areas.

TYPICAL PERFORMANCE

 Unless otherwise stated, measurements performed at $T_{\text{AMBIENT}}=25^{\circ}\text{C}$. Device is mounted on 1.6mm thick infinite FR4 PCB with 5.0 mm x 3.0 mm copper pad areas.

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

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

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

Fig 4. DC Power dissipation derating curve (SMB package).

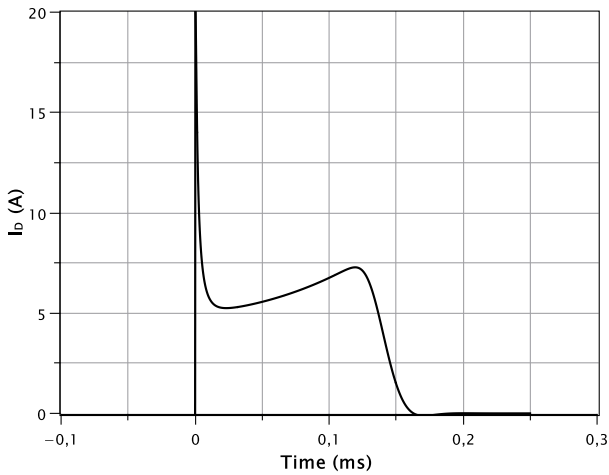


Fig 5. Typical 1.2/50µs, 1000V/500A CLD current response.

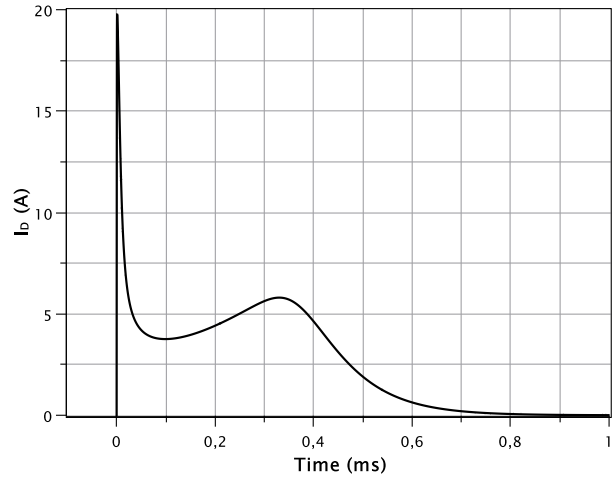


Fig 6. Typical 40/120µs, 750V/750A CLD current response.

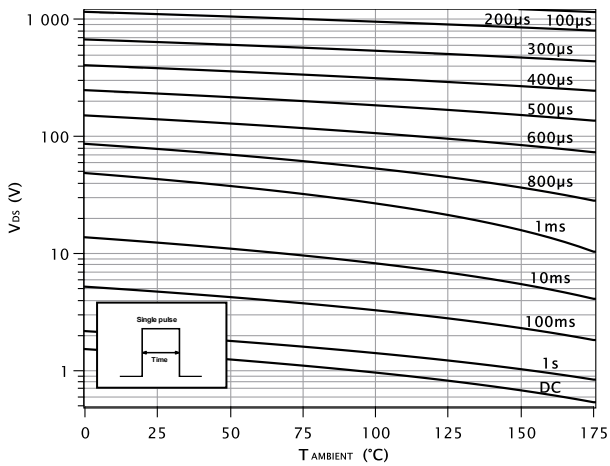


Fig 7. Safe Operating Area for square pulse (SMB package).

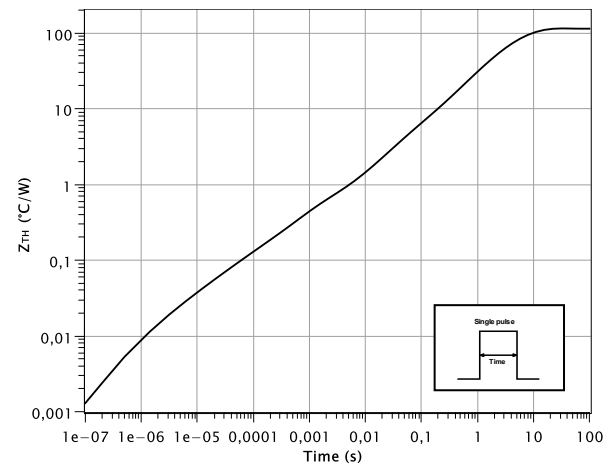


Fig 8. Typical transient thermal impedance (SMB package).

DETAILED ORDERING INFORMATION

K ↓ Source K = CALY Technologies	E ↓ Temperature range: E = -55°C to +175°C	12 ↓ Rated Voltage: 12 = 1200V	LS ↓ Device / Type LS = Current Limiting Device	060 ↓ Rated Resistance: 060 = 600 mOhm	T ↓ Package: T = TO247
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Part Number	Temperature Range	Package	Pin Count	Marking
KE12LS060B	-55°C to +210°C	Bare die		
KE12LS060SB	-55°C to +175°C	SMB (DO214AA)	2	KE12LS060
KE12LS060T47	-55°C to +175°C	TO-247-2	2	KE12LS060

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

PACKAGE OUTLINES

SMB (JEDEC DO-214AA)

	Ref.	Dimensions			
		Millimeters		Inches	
		Min.	Max.	Min.	Max.
	b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016	
D	3.30	3.95	0.130	0.156	
E	5.10	5.60	0.201	0.220	
E1	4.05	4.60	0.159	0.181	
G	0.05	0.20	0.002	0.008	
J	1.95	2.65	0.077	0.104	
L	0.75	1.50	0.030	0.059	

Unique Lot Assembly Code

Y	Year code: A = 2016, B = 2017, C = 2018, D = 2019, E = 2020, F = 2021...
WW	Assembly week (01 to 52).
M	Assembly location code.
NN	Assembly lot code (01 to 99).

REVISION HISTORY

Revision	Date	Description
1A	2017-Nov-29	First issue
1B	2018-Aug-08	Amended links in Contact Us Section

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