

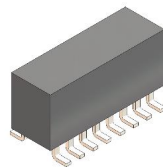
Surface Mount 3000W Vertical Transient Voltage Suppressor Array

MDA3KP6.0A to MXLDA3KP40CAe3



Product Overview

The MDA series of 3000W Transient Voltage Suppressors (TVSs) protects a variety of voltage-sensitive components from destruction or degradation. These high-reliability devices are available in either unidirectional or bidirectional versions and are available with a variety of upscreening options for enhanced reliability. They can protect from secondary lightning effects per IEC61000-4-5 and class levels defined herein, or for inductive switching environments and induced RF protection. Since their response time is virtually instantaneous, they can also be used in protection from ESD and EFT per IEC61000-4-2 and IEC61000-4-4.



Features

- Available in both unidirectional and bidirectional construction
- Available in working stand-off voltage (V_{WM}) range of 6.0 to 40 volts
- Enhanced reliability screening in reference to MIL-PRF-19500 are available. Refer to High Reliability Non-Hermetic Product Portfolio for more details on the screening options.
(See [Part Nomenclature](#) for all options.)
- High reliability with wafer fabrication and assembly lot traceability for all M prefix devices
- 100% surge tested devices
- Suppresses transients up to 3,000W at 10/1000 μ s (see [Figure 1-1](#))
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020F for all M prefix devices.
- 3σ lot norm screening performed on standby current (I_D) for all M prefix devices
- RoHS compliant versions available

Applications and Benefits

- Protection from switching transients and induced RFI
- Protection from ESD, and EFT per IEC 61000-4-2 and IEC 61000-4-4
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:
 - Class 1–4: MDA3KP6.0A to MXLDA3KP40CAe3
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
 - Class 1–3: MDA3KP6.0A to MXLDA3KP40CAe3
 - Class 4: MDA3KP6.0CA to MXLDA3KP18ACAe3
- Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance:
 - Class 2: MDA3KP6.0A to MXLDA3KP40CAe3
 - Class 3: MDA3KP6.0A to MXLDA3KP18ACAe3
 - Class 4: MDA3KP6.0A to MXLDA3KP9.0ACAe3

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1. Electrical Specifications

This section shows the specifications of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

Table 1-1. Absolute Maximum Ratings

Parameters/Test Conditions		Symbol	Value	Unit
Junction and storage temperature		T_J and T_{STG}	-55 to 150	°C
Peak pulse power at 10/1000 μs^1		P_{PP}	3,000	W
$t_{clamping}$ (0 V to $V_{(BR)min}$)	Unidirectional		<100	ps
	Bidirectional		<5	ns
Forward surge current ²		I_{FSM}	200	A
Solder temperature at 10 s		T_{SP}	260	°C

Notes:

1. See [Figure 1-1](#) and [Figure 1-2](#). With impulse repetition rate (duty factor) of 0.05% or less.
2. At 8.3 ms half-sine wave (unidirectional devices only)

1.2 Electrical Characteristics

The following table shows the symbols and definitions of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

Table 1-2. Symbols and Definitions

Symbol	Definition
$I_{(BR)}$	Breakdown current: The current used for measuring breakdown voltage $V_{(BR)}$.
I_D	Standby current: The current at the rated standoff voltage V_{WM} .
I_{PP}	Peak impulse current: The peak current during the impulse.
P_{PP}	Peak pulse power: The peak power that can be applied for a specific pulse width and waveform. The product of I_{PP} and V_C .
$V_{(BR)}$	Breakdown voltage: The voltage across the device at a specified current $I_{(BR)}$ in the breakdown region.
V_C	Clamping voltage: The voltage across the device in a region of low differential resistance during the application of an impulse current (I_{PP}) for a specified waveform.
V_{WM}	Working stand-off voltage: The maximum-rated value of DC or repetitive peak positive cathode-to-anode voltage that may be continuously applied over the standard operating temperature.

The following table shows the electrical characteristics of the MDA3KP6.0A to MXLDA3KP40CAe3 device. All ratings taken at 25 °C unless otherwise specified.

Table 1-3. Electrical Characteristics¹⁻³

Microchip Part Number	Working Stand-off Voltage V_{WM}	Breakdown Voltage $V_{(BR)}$ at $I_{(BR)}$		Maximum Clamping Voltage V_C at I_{PP}	Maximum Standby Current I_D at V_{WM}	Maximum Peak Pulse Current at 10/1000 μs I_{PP} (Figure 1-1)
		V	mA		μA	A
MDA3KP6.0(C)A	6	6.67–7.37	10	10.3	1000	291.3
MDA3KP6.5(C)A	6.5	7.22–7.98	10	11.2	500	267.9
MDA3KP7.0(C)A	7	7.78–8.6	10	12.0	200	250
MDA3KP7.5(C)A	7.5	8.33–9.21	1	12.9	100	232.6
MDA3KP8.0(C)A	8	8.89–9.83	1	13.6	50	220.6
MDA3KP8.5(C)A	8.5	9.44–10.4	1	14.4	25	208.4
MDA3KP9.0(C)A	9	10.0–11.1	1	15.4	10	194.8
MDA3KP10(C)A	10	11.1–12.3	1	17.0	5	176.4
MDA3KP11(C)A	11	12.2–13.5	1	18.2	5	164.8
MDA3KP12(C)A	12	13.3–14.7	1	19.9	5	150.6
MDA3KP13(C)A	13	14.4–15.9	1	21.5	5	139.4
MDA3KP14(C)A	14	15.6–17.2	1	23.2	2	129.4
MDA3KP15(C)A	15	16.7–18.5	1	24.4	2	123
MDA3KP16(C)A	16	17.8–19.7	1	26.0	2	115.4
MDA3KP17(C)A	17	18.9–20.9	1	27.6	2	106.6
MDA3KP18(C)A	18	20.0–22.1	1	29.2	2	102.8
MDA3KP20(C)A	20	22.2–24.5	1	32.4	2	92.6
MDA3KP22(C)A	22	24.4–26.9	1	35.5	2	84.4
MDA3KP24(C)A	24	26.7–29.5	1	38.9	2	77.2
MDA3KP26(C)A	26	28.9–31.9	1	42.1	2	71.2
MDA3KP28(C)A	28	31.1–34.4	1	45.4	2	66
MDA3KP30(C)A	30	33.3–36.8	1	48.4	2	62
MDA3KP33(C)A	33	36.7–40.6	1	53.3	2	56.2
MDA3KP36(C)A	36	40.0–44.2	1	58.1	2	51.6
MDA3KP40(C)A	40	44.4–49.1	1	64.5	2	46.4

Notes:

1. Normal selection criteria for TVS devices is by working stand-off voltage (V_{WM}), which should be equal to or greater than DC or continuous peak operating voltage.
2. TVS devices are tested to maximum peak pulse current (I_{PP}) with clamping voltage monitored. This surge capability is one of the most significant electrical characteristics of the device and should be considered as part of customer quality inspections.
3. For unidirectional, the forward voltage (V_F) is 4.0 volts maximum at 500 amps peak for 8.3 ms half-sine wave.

1.3 Typical Performance Curves

This section shows the typical performance curves of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

Figure 1-1. Peak Pulse Power vs. Pulse Time

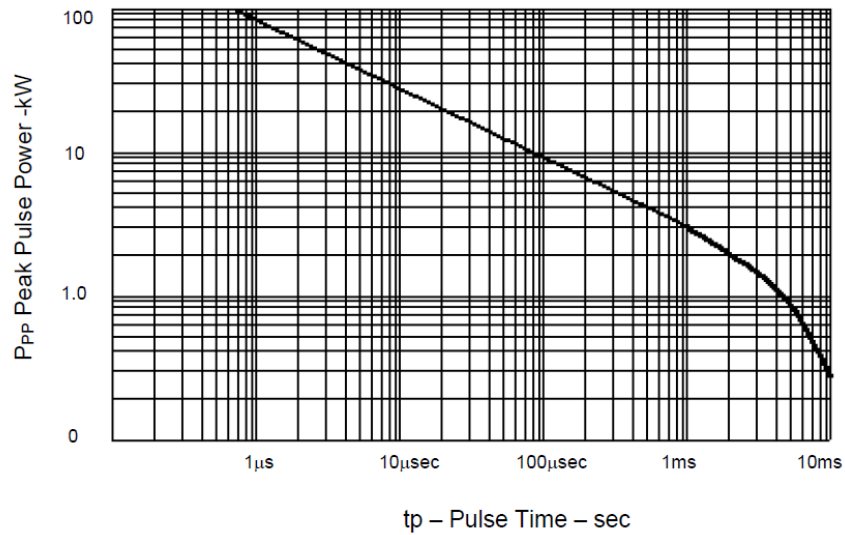


Figure 1-2. Pulse Waveform

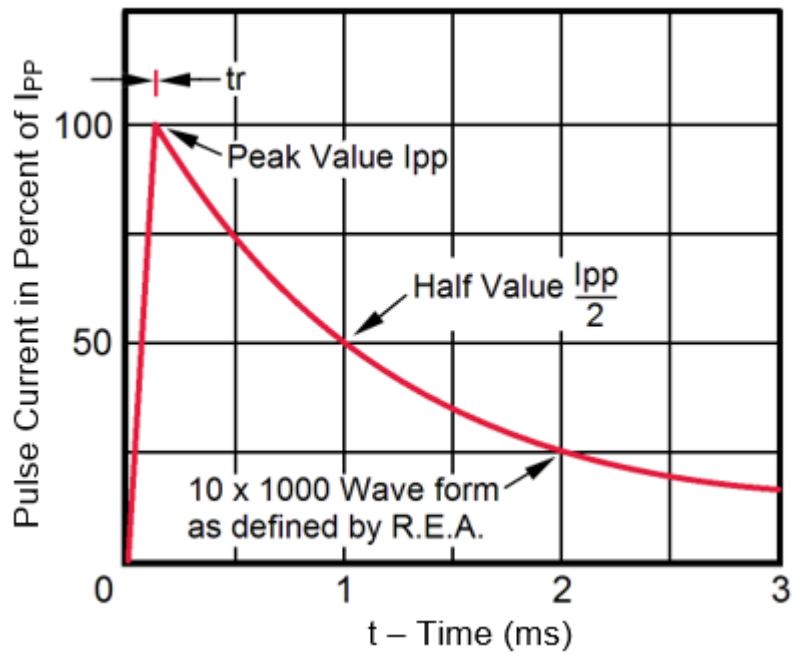
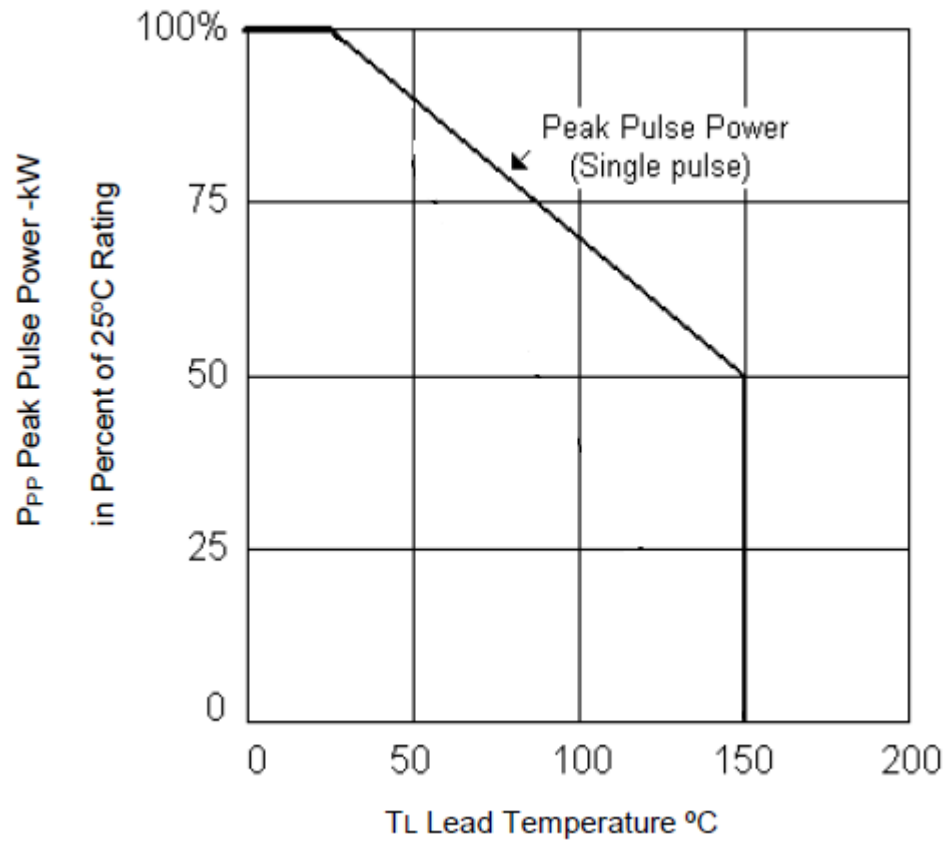


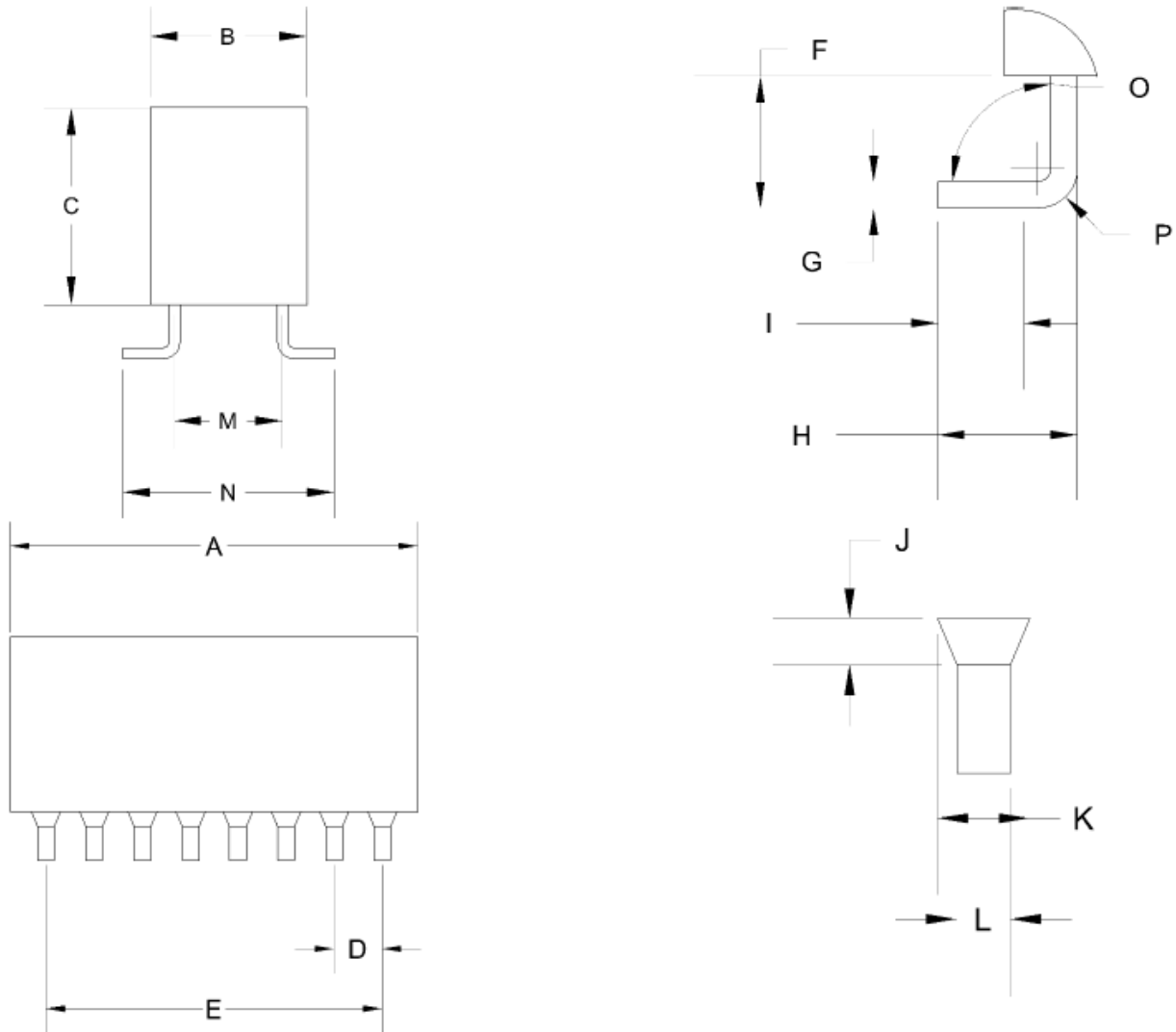
Figure 1-3. Derating Curve



2. Package Dimensions

This section shows the package dimensions of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

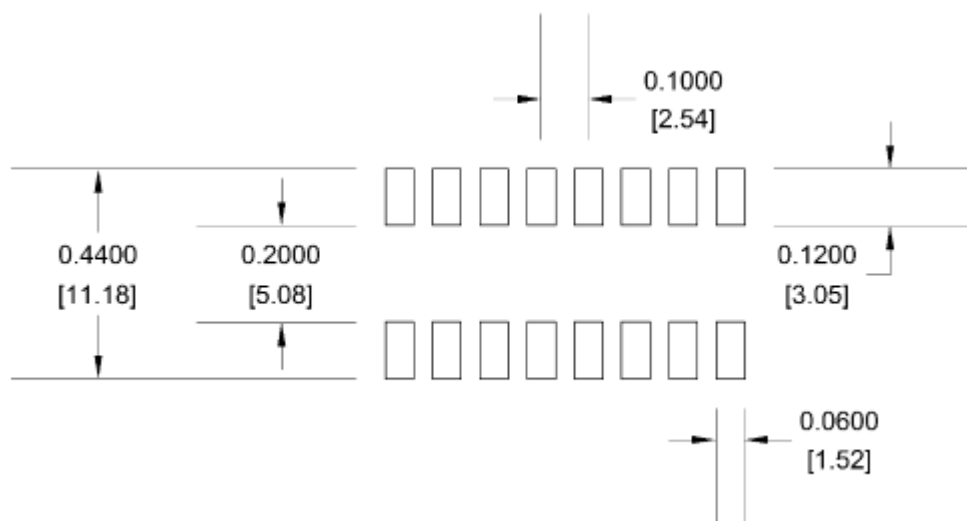
Figure 2-1. Package Dimensions



Ref.	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
A	0.828	0.868	21.03	22.05
B	0.270	0.310	6.86	7.87
C	0.340	0.380	8.64	9.65
D	0.100 (typ)		2.54 (typ)	
E	0.700 (typ)		17.78 (typ)	
F	0.095	0.105	2.41	2.67
G	0.015	0.025	0.38	0.64
H	0.105 (typ)		2.67 (typ)	
I	0.065 (typ)		1.65 (typ)	
J	0.025	0.035	0.64	0.89
K	0.055	0.065	1.40	1.65
L	0.030	0.040	0.76	1.02
M	0.195	0.205	4.95	5.21
N	0.370	0.410	9.40	10.41
O	89°	94°	89°	94°
P	0.025	0.035	0.64	0.89

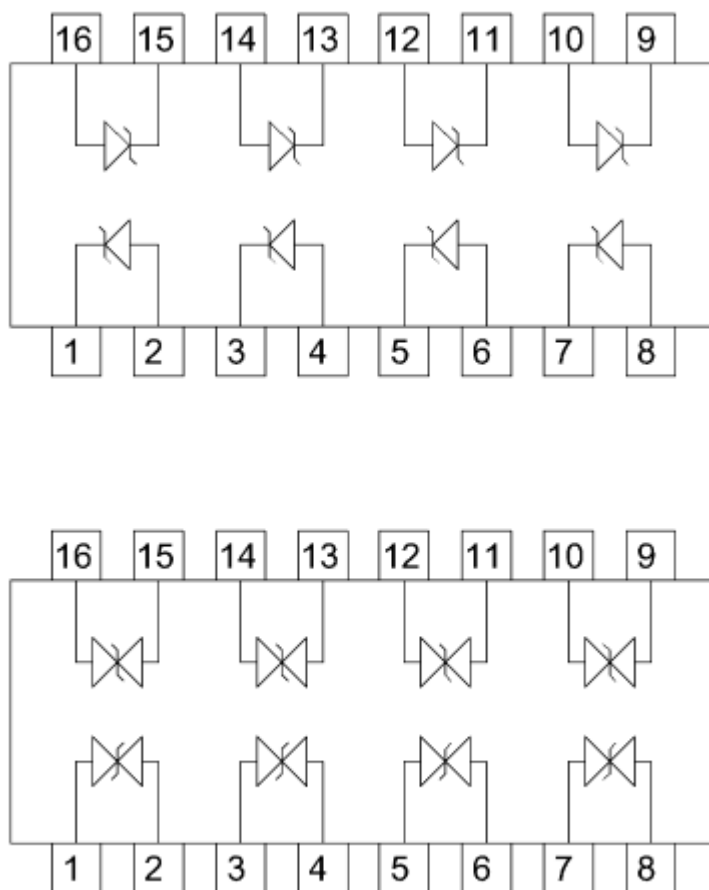
The following image shows the pad layout dimensions of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

Figure 2-2. Pad Layout



The following image shows the diode layout dimensions of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

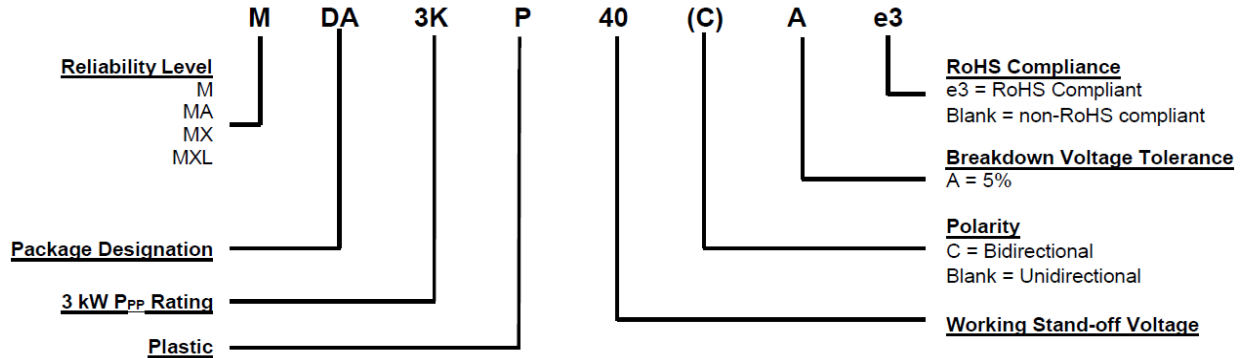
Figure 2-3. Diode Layout



3. Part Nomenclature

This section shows the part nomenclature methodology of the MDA3KP6.0A to MXLDA3KP40CAe3 device.

Figure 3-1. Part Nomenclature



- Case: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- Terminals: Tin-lead or annealed matte-tin plating readily solderable per MIL-STD-750, method 2026
- Marking: Reliability level, part number, and date code. Pin 1 defined by a DOT on top of the package
- Polarity: For unidirectional parts, the odd number pins are cathodes of each TVS (see [Figure 2-3](#))
- Trays: Consult factory for quantities.
- Weight: Approximately 5 grams
- See [Package Dimensions](#).

4. Revision History

Table 4-1. Revision History

Revision	Date	Description
B	03/2024	Changed part number MDA3KP40A to MXLDA3KP40CAe3 and updated data sheet template.
A	06/2022	Document migrated from Microsemi template to Microchip template; Assigned Microchip literature number DS00004582A, which replaces the previous Microsemi literature number RF01243.
Initial release (Microsemi Revision A)	2019	Document created.

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