Zener Diode Silicon Epitaxial Planar

MKZ series

1. Applications

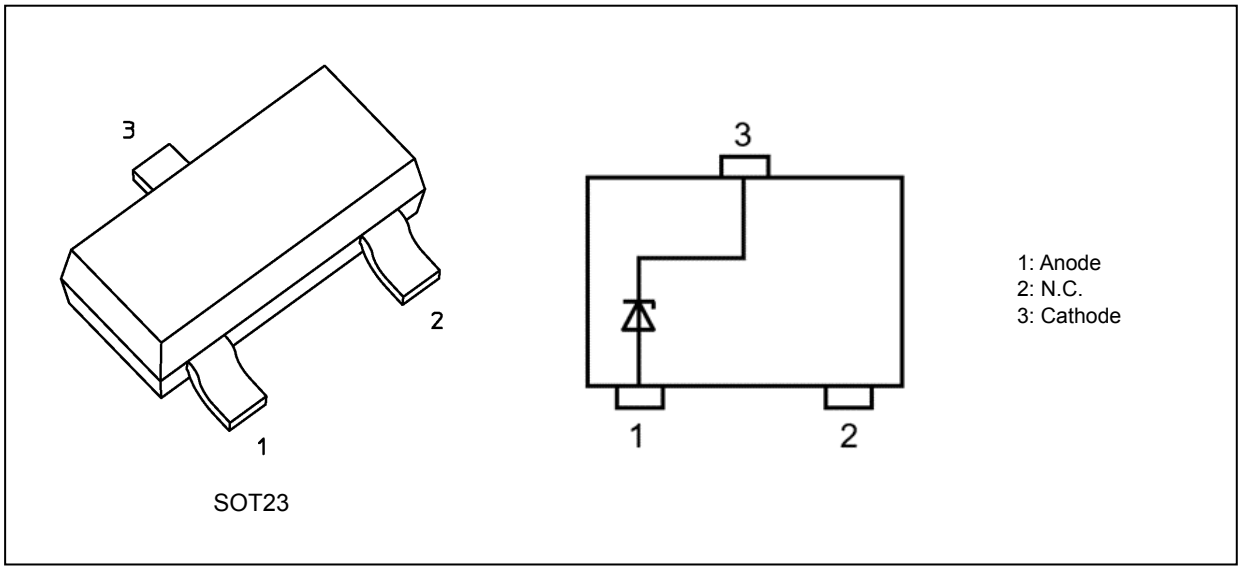
(1) Voltage surge protection

2. Features

(1) Small package

(2) The typical voltage of VZ is accorded to E24 series.

3. Packaging and Internal Circuit



4. Absolute Maximum Ratings 1 (Note) (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Rating	Unit
Power dissipation	P_D	(Note 1)	320	mW
		(Note 2)	1000	
Junction temperature	T_j		150	°C
Storage temperature	T_{stg}		-55 to 150	

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Mounted on a glass epoxy circuit board of 25.4 mm × 25.4 mm × 1.6 mm, Cu pad: 0.42 mm^2 × 3

Note 2: Mounted on a glass epoxy circuit board of 25.4 mm × 25.4 mm × 1.6 mm, Cu pad: 645 mm^2

Start of commercial production
2022-02

5. Absolute Maximum Ratings 2 (Note) (Unless otherwise specified, T_a = 25 °C)

Type No.	Electrostatic discharge voltage (Contact, Air) V_{ESD}(kV) (Note 1)	Peak pulse power P_{PK}(W) (Note 2)	Peak pulse current I_{PP}(A) (Note 2)
MKZ5V6	±30	155	12.0
MKZ6V2	±30	175	11.0
MKZ6V8	±30	180	10.0
MKZ7V5	±30	190	9.5
MKZ8V2	±30	200	8.5
MKZ9V1	±30	200	8.0
MKZ10V	±30	200	7.5
MKZ11V	±30	200	7.25
MKZ12V	±30	200	7.0
MKZ13V	±30	200	6.5
MKZ15V	±30	200	5.6
MKZ16V	±30	200	5.5
MKZ18V	±30	200	5.1
MKZ20V	±30	200	5.0
MKZ22V	±30	200	4.75
MKZ24V	±30	200	4.5
MKZ27V	±20	200	4.1
MKZ30V	±20	200	4.0
MKZ33V	±17	200	3.5
MKZ36V	±12	200	3.0

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note1: According to IEC61000-4-2.

Note2: according to IEC61000-4-5 (tp = 8 / 20 μs)

6. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C)

	Zener Voltage V_Z (V)				Dinamic Impedance Z_Z (Ω)		Dynamic Resistance R_{DYN} (Ω) (Note 1)	Clamp Voltage V_C (V) (Note 1) (Note 2)	Total Capacit-ance C_t (pF) (Note 3)	Reverse Current I_R (μA)	
Type No.	Min	Typ.	Max	Test Current I_Z (mA)	Max	Test Current I_Z (mA)	Typ.	Typ.	Typ.	Max	Test Voltage V_R (V)
MKZ5V6	5.3	5.6	6.0	5	30	5	0.16	9.0	125	1	3.5
MKZ6V2	5.8	6.2	6.6	5	30	5	0.21	10.0	105	2.5	5.0
MKZ6V8	6.4	6.8	7.2	5	30	5	0.27	13.0	88	1.5	5.5
MKZ7V5	7.0	7.5	7.9	5	30	5	0.32	14.0	78	0.1	6.0
MKZ8V2	7.7	8.2	8.7	5	30	5	0.37	16.5	67	0.1	7.0
MKZ9V1	8.5	9.1	9.6	5	30	5	0.44	17.0	62	0.1	7.5
MKZ10V	9.4	10.0	10.6	5	30	5	0.52	19.0	60	0.1	8.0
MKZ11V	10.4	11.0	11.6	5	30	5	0.60	24.0	48	0.1	9.0
MKZ12V	11.4	12.0	12.6	5	30	5	0.70	26.0	44	0.1	10.0
MKZ13V	12.4	13.0	14.1	5	30	5	0.80	27.0	42	0.1	11.0
MKZ15V	13.8	15.0	15.6	5	30	5	0.60	24.0	36	0.1	12.0
MKZ16V	15.3	16.0	17.1	5	35	5	0.50	27.0	35	0.1	14.0
MKZ18V	16.8	18.0	19.1	5	45	5	0.40	28.5	31	0.1	16.0
MKZ20V	18.8	20.0	21.2	5	70	5	0.35	30.5	29	0.1	17.6
MKZ22V	20.8	22.0	23.3	5	70	5	0.40	32.0	27	0.1	18.0
MKZ24V	22.8	24.0	25.6	5	70	5	0.60	36.5	26	0.1	19.0
MKZ27V	25.1	27.0	28.9	2	70	2	0.90	45.0	23	0.1	23.0
MKZ30V	28.0	30.0	32.0	2	100	2	1.25	47.5	21	0.1	27.0
MKZ33V	31.0	33.0	35.0	2	100	2	1.80	57.0	19	0.1	30.0
MKZ36V	34.0	36.0	38.0	2	100	2	2.60	63.0	18	0.1	32.5

Note1: TLP parameters: Z0 = 50 Ω, t_p = 100 ns, t_r = 300 ps, averaging window: t1 = 30 ns to t2 = 60 ns, extraction of dynamic resistance using least squares fit of TLP characteristics between I_{TLP1} = 16 A and I_{TLP2} = 30 A.

Note2: I_{TLP} = 16 A

Note3: V_R = 0 V, f = 1 MHz

7. Marking List

Type No.	Marking	Type No.	Marking	Type No.	Marking
MKZ5V6	ZLL	MKZ11V	ZM3	MKZ22V	ZMA
MKZ6V2	ZLM	MKZ12V	ZM4	MKZ24V	ZMB
MKZ6V8	ZLN	MKZ13V	ZM5	MKZ27V	ZMC
MKZ7V5	ZLP	MKZ15V	ZM6	MKZ30V	ZMD
MKZ8V2	ZLQ	MKZ16V	ZM7	MKZ33V	ZME
MKZ9V1	ZLR	MKZ18V	ZM8	MKZ36V	ZMF
MKZ10V	ZM2	MKZ20V	ZM9	—	—

8. Marking

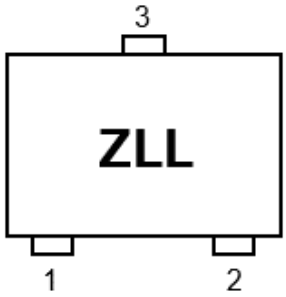


Fig. 8.1 MKZ5V6

9. Land Pattern Dimensions (for reference only)

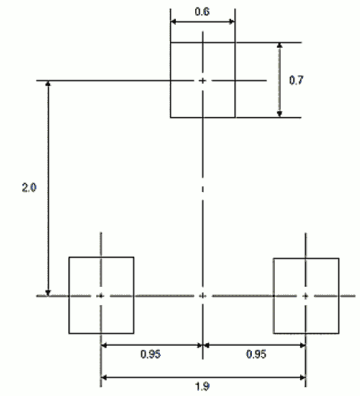


Fig. 9.1 Land Pattern Dimensions (for reference only) (Unit: mm)

10. Characteristics Curves

10.1. MKZ series Characteristics Curves(Note)

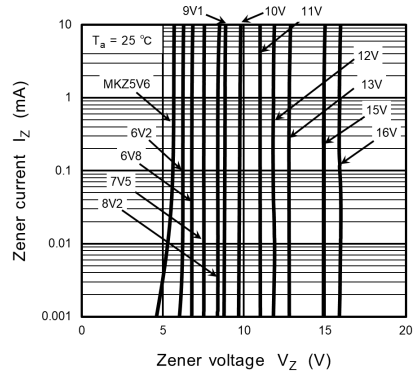


Fig. 10.1.1 I_Z - V_Z(1)

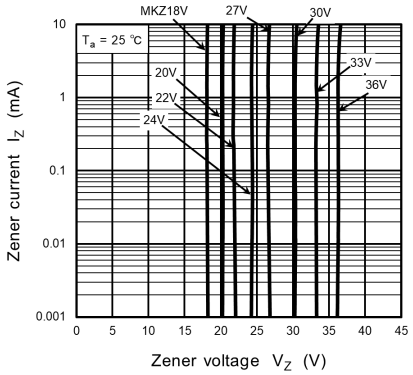


Fig. 10.1.2 I_Z - V_Z(2)

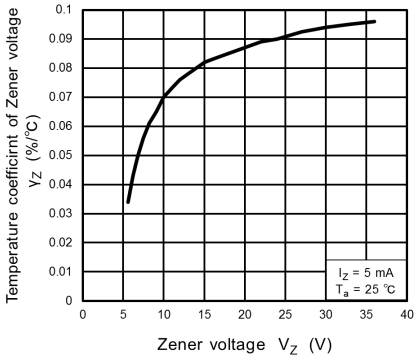


Fig. 10.1.3 γ_Z - V_Z

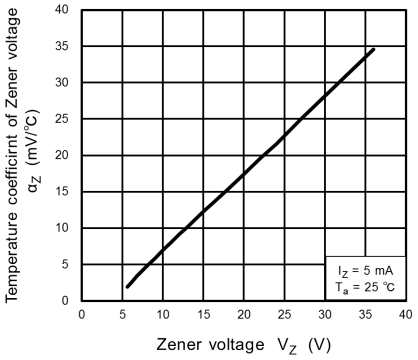


Fig. 10.1.4 α_Z - V_Z

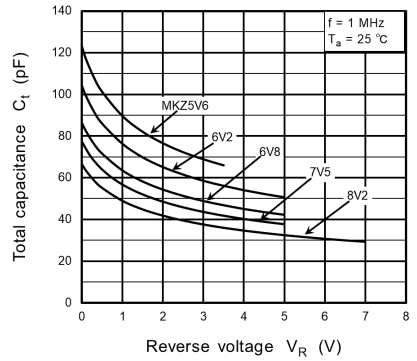


Fig. 10.1.5 C_t - V_R (1)

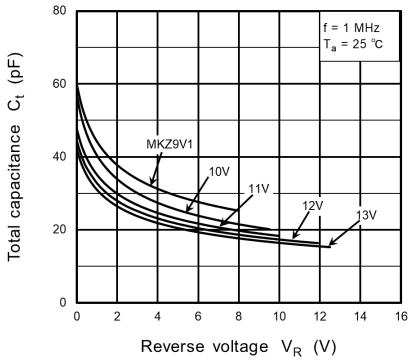


Fig. 10.1.6 C_t - V_R (2)

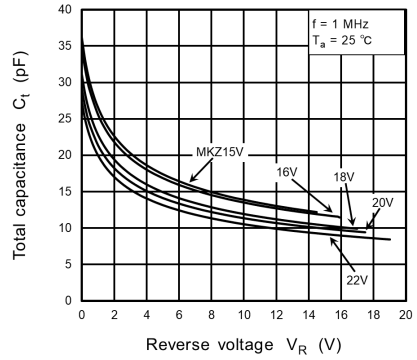


Fig. 10.1.7 C_t - V_R (3)

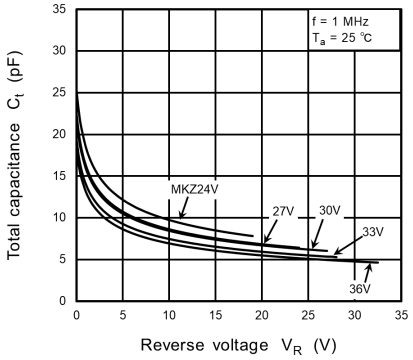


Fig. 10.1.8 C_t - V_R (4)

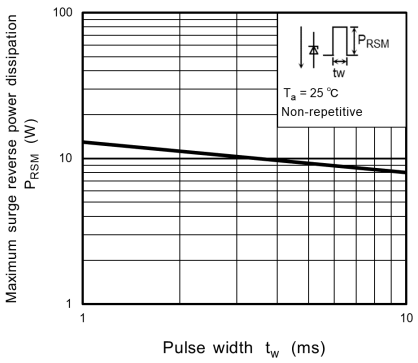


Fig. 10.1.9 P_{RSM} - t_w

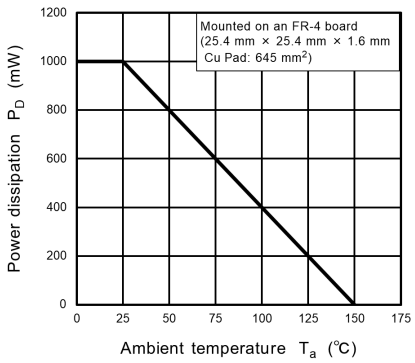


Fig. 10.1.10 P_D - T_a

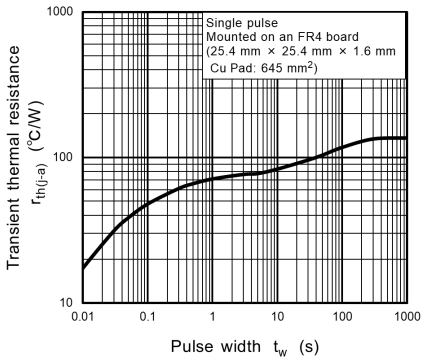


Fig. 10.1.11 $r_{th(j-a)}$ - t_w

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

10.2. MKZ5V6 Characteristics Curves(Note)

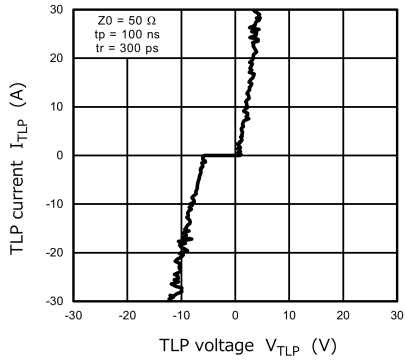


Fig. 10.2.1 I_{TLP} - V_{TLP}

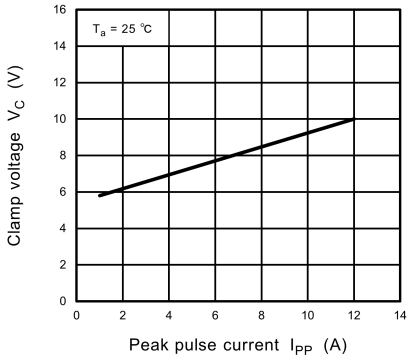


Fig. 10.2.2 V_C - I_{PP}

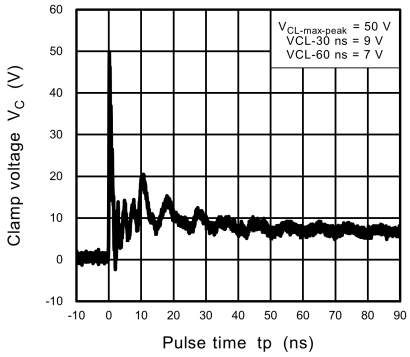


Fig. 10.2.3 IEC61000-4-2 Clamp Waveform +8 kV

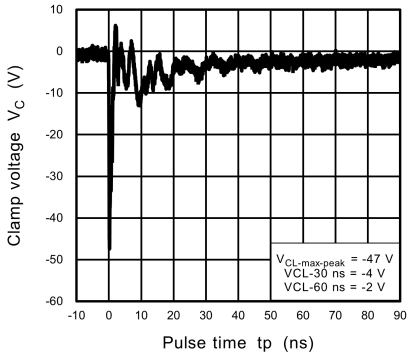


Fig. 10.2.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.3. MKZ6V2 Characteristics Curves(Note)

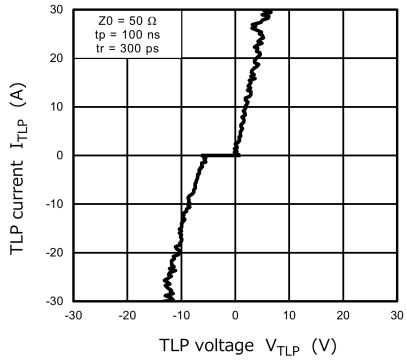


Fig. 10.3.1 I_{TLP} - V_{TLP}

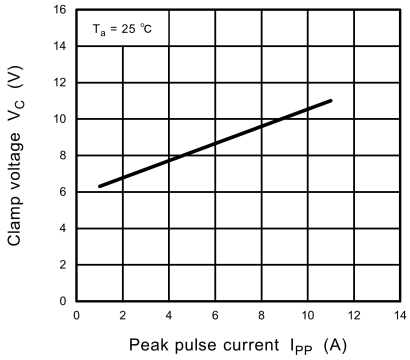


Fig. 10.3.2 V_C - I_{PP}

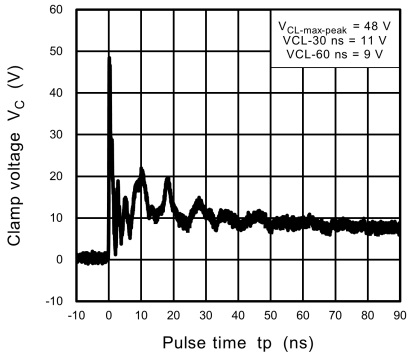


Fig. 10.3.3 IEC61000-4-2 Clamp Waveform +8 kV

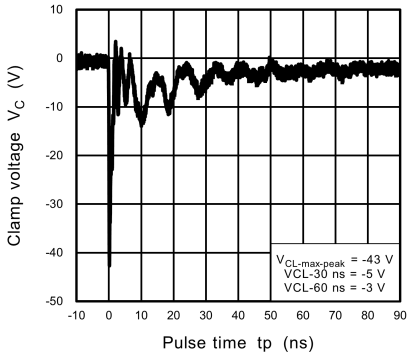


Fig. 10.3.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.4. MKZ6V8 Characteristics Curves(Note)

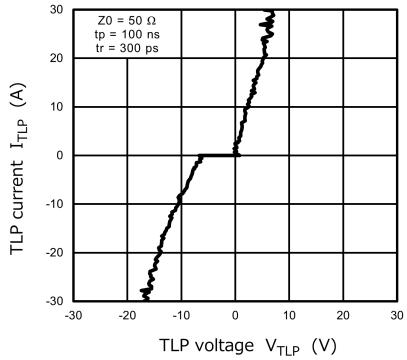


Fig. 10.4.1 I_{TLP} - V_{TLP}

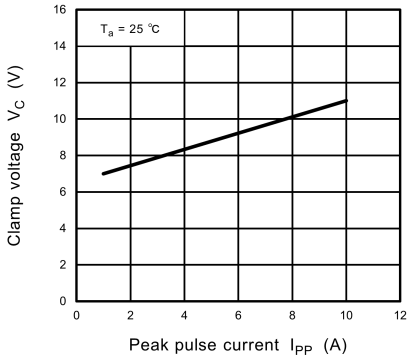


Fig. 10.4.2 V_C - I_{PP}

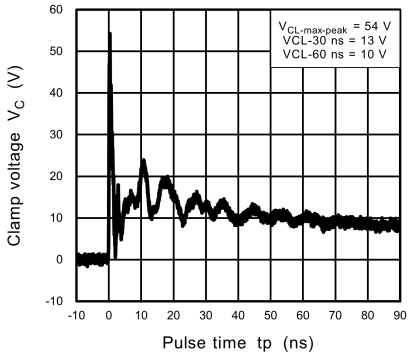


Fig. 10.4.3 IEC61000-4-2 Clamp Waveform +8 kV

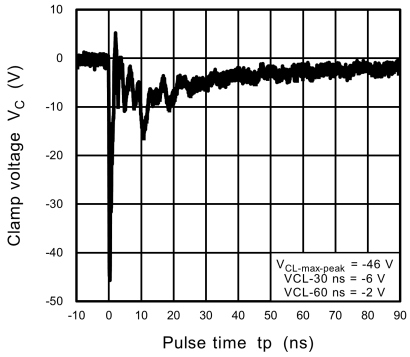


Fig. 10.4.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.5. MKZ7V5 Characteristics Curves(Note)

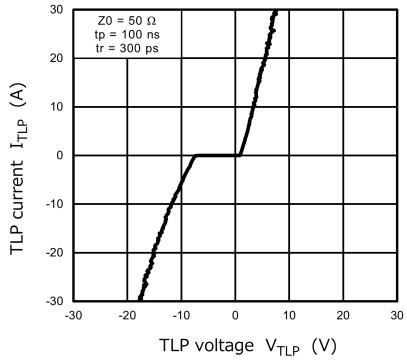


Fig. 10.5.1 I_{TLP} - V_{TLP}

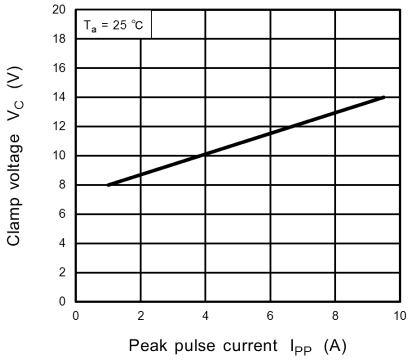


Fig. 10.5.2 V_C - I_{PP}

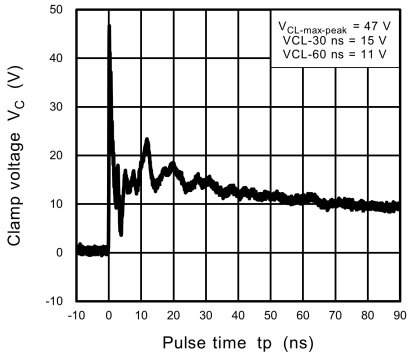


Fig. 10.5.3 IEC61000-4-2 Clamp Waveform +8 kV

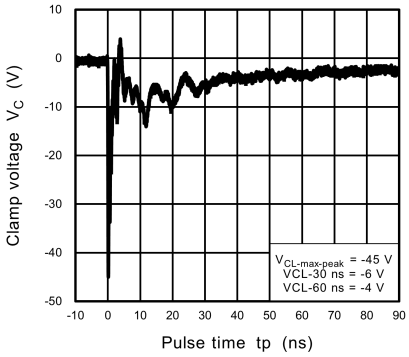


Fig. 10.5.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.6. MKZ8V2 Characteristics Curves(Note)

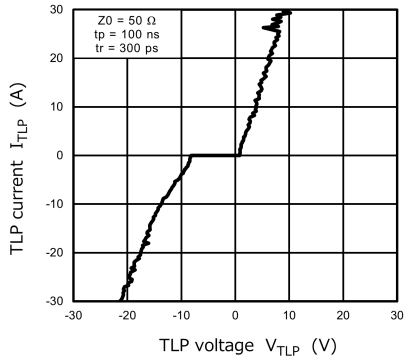


Fig. 10.6.1 I_{TLP} - V_{TLP}

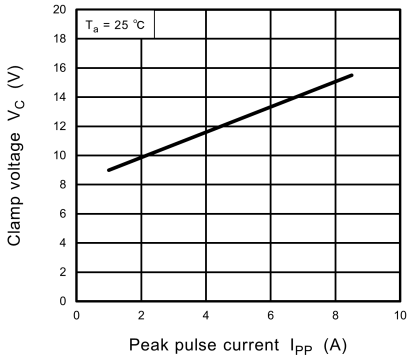


Fig. 10.6.2 V_C - I_{PP}

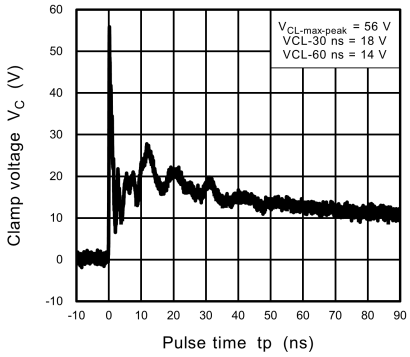


Fig. 10.6.3 IEC61000-4-2 Clamp Waveform +8 kV

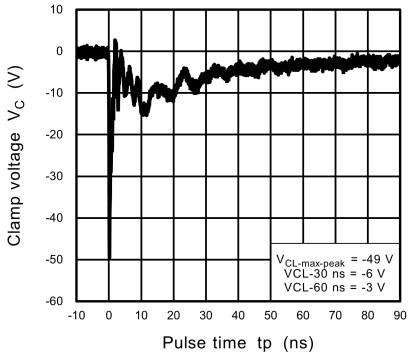


Fig. 10.6.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.7. MKZ9V1 Characteristics Curves(Note)

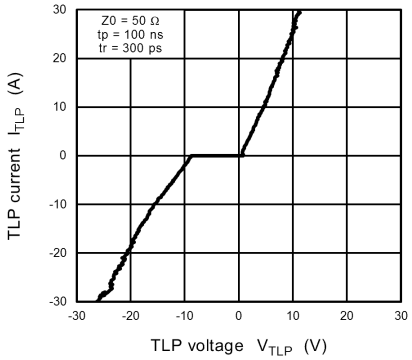


Fig. 10.7.1 I_{TLP} - V_{TLP}

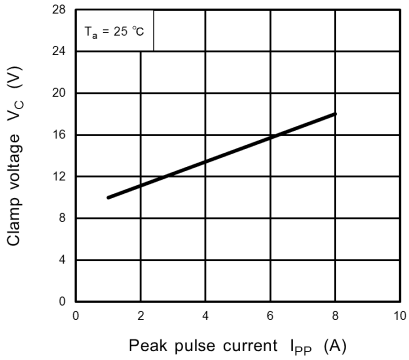


Fig. 10.7.2 V_C - I_{PP}

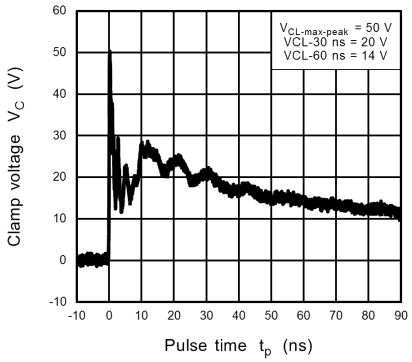


Fig. 10.7.3 IEC61000-4-2 Clamp Waveform +8 kV

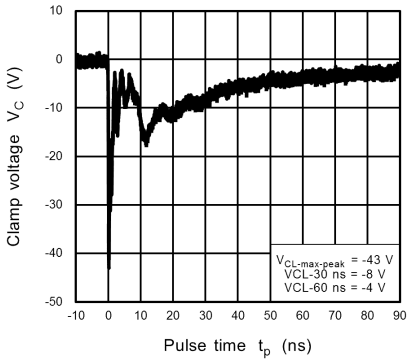


Fig. 10.7.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.8. MKZ10V Characteristics Curves(Note)

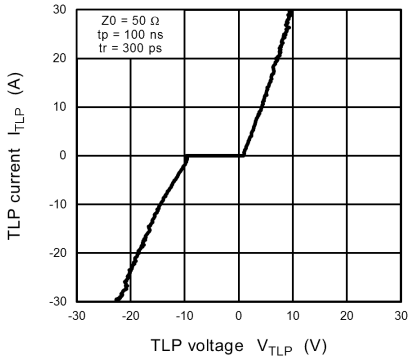


Fig. 10.8.1 I_{TLP} - V_{TLP}

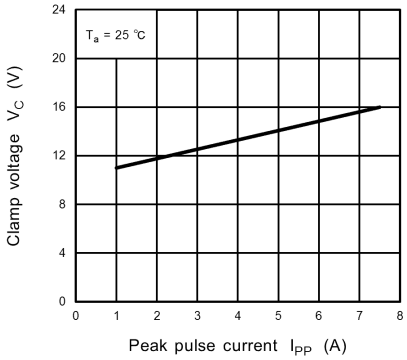


Fig. 10.8.2 V_C - I_{PP}

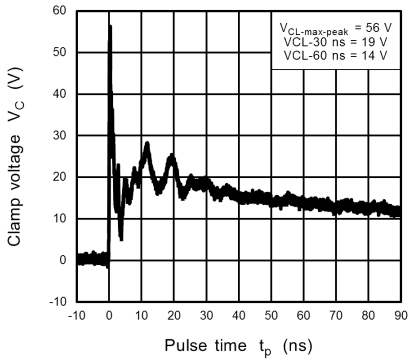


Fig. 10.8.3 IEC61000-4-2 Clamp Waveform +8 kV

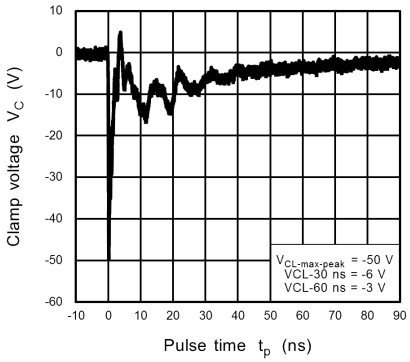


Fig. 10.8.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.9. MKZ11V Characteristics Curves(Note)

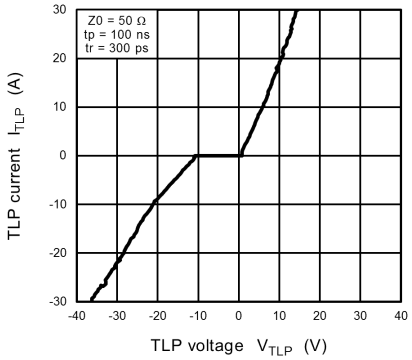


Fig. 10.9.1 I_{TLP} - V_{TLP}

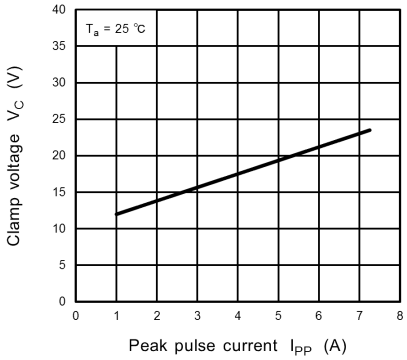


Fig. 10.9.2 V_C - I_{PP}

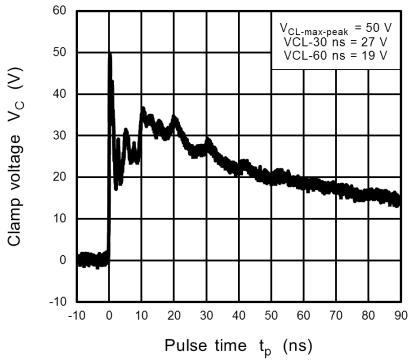


Fig. 10.9.3 IEC61000-4-2 Clamp Waveform +8 kV

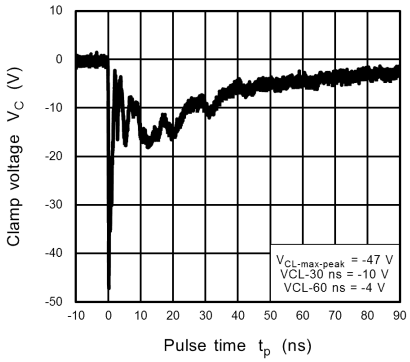


Fig. 10.9.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.10. MKZ12V Characteristics Curves(Note)

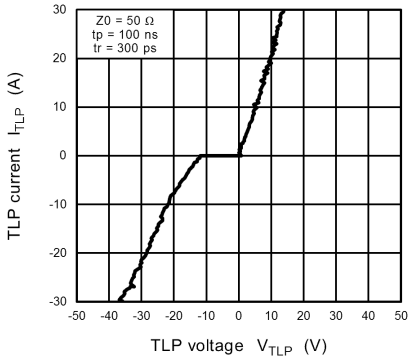


Fig. 10.10.1 I_{TLP} - V_{TLP}

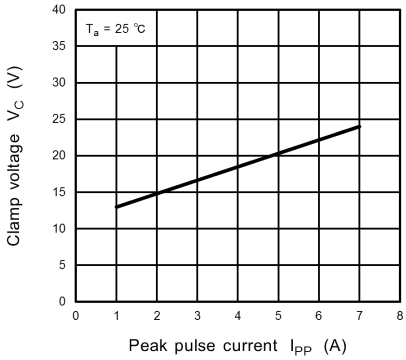


Fig. 10.10.2 V_C - I_{PP}

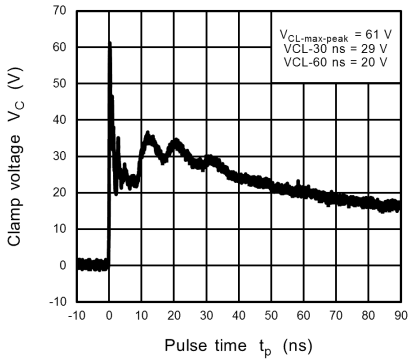


Fig. 10.10.3 IEC61000-4-2 Clamp Waveform +8 kV

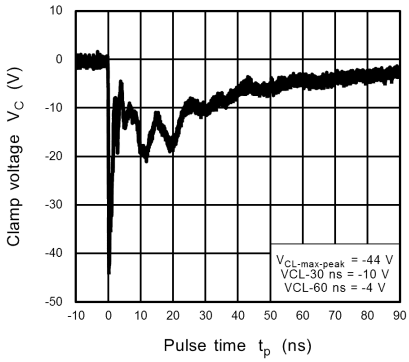


Fig. 10.10.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.11. MKZ13V Characteristics Curves(Note)

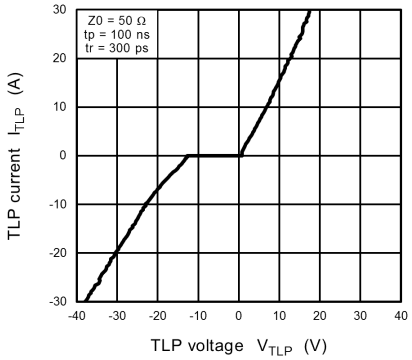


Fig. 10.11.1 I_{TLP} - V_{TLP}

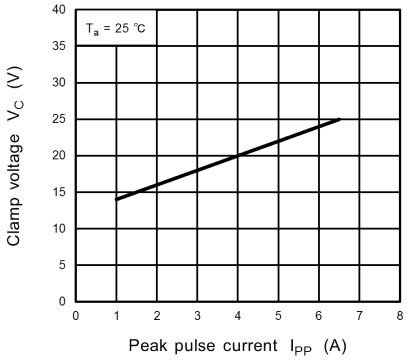


Fig. 10.11.2 V_C - I_{PP}

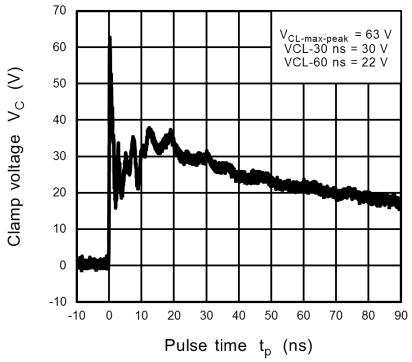


Fig. 10.11.3 IEC61000-4-2 Clamp Waveform +8 kV

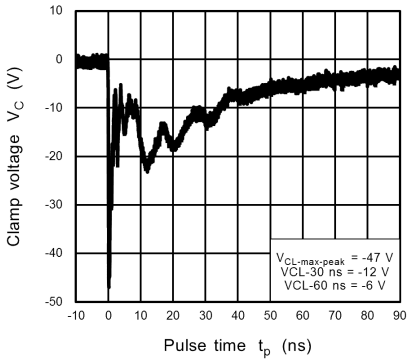


Fig. 10.11.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.12. MKZ15V Characteristics Curves(Note)

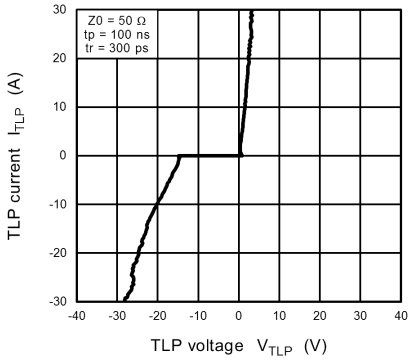


Fig. 10.12.1 I_{TLP} - V_{TLP}

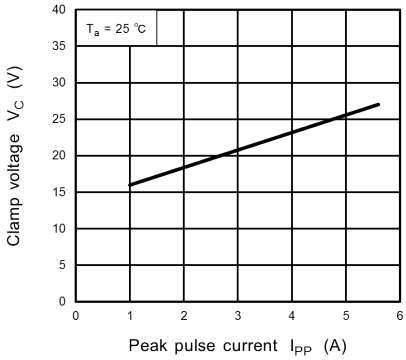


Fig. 10.12.2 V_C - I_{PP}

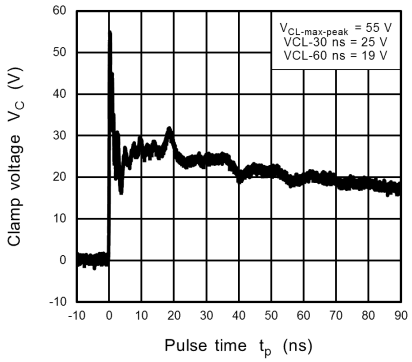


Fig. 10.12.3 IEC61000-4-2 Clamp Waveform +8 kV

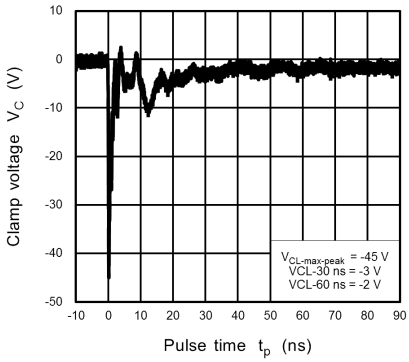


Fig. 10.12.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.13. MKZ16V Characteristics Curves(Note)

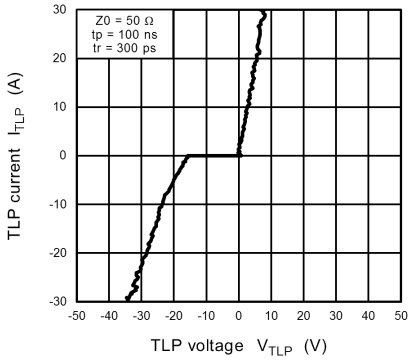


Fig. 10.13.1 I_{TLP} - V_{TLP}

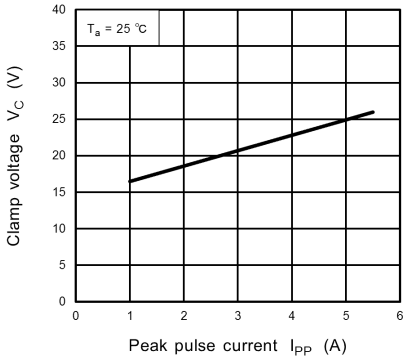


Fig. 10.13.2 V_C - I_{PP}

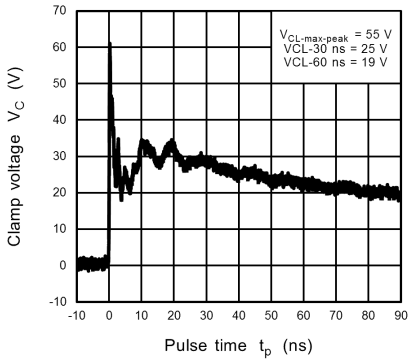


Fig. 10.13.3 IEC61000-4-2 Clamp Waveform +8 kV

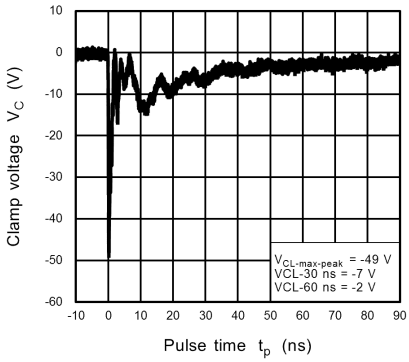


Fig. 10.13.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.14. MKZ18V Characteristics Curves(Note)

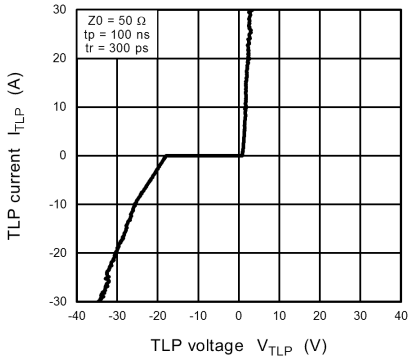


Fig. 10.14.1 I_{TLP} - V_{TLP}

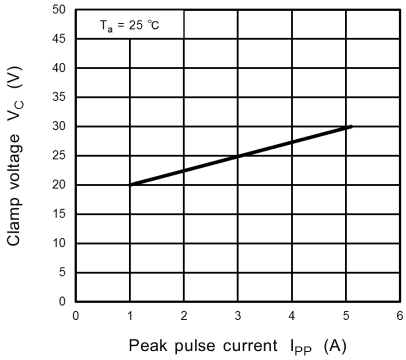


Fig. 10.14.2 V_C - I_{PP}

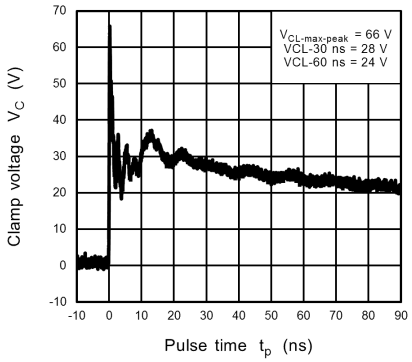


Fig. 10.14.3 IEC61000-4-2 Clamp Waveform +8 kV

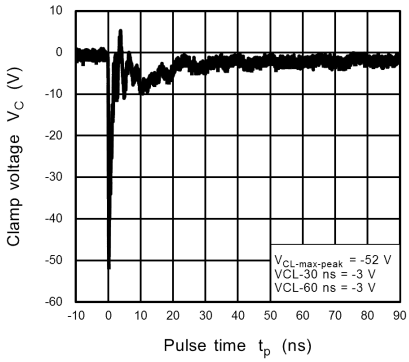


Fig. 10.14.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.15. MKZ20V Characteristics Curves(Note)

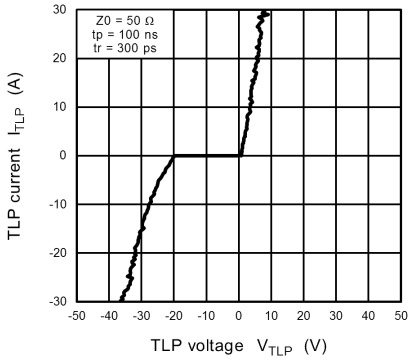


Fig. 10.15.1 I_{TLP} - V_{TLP}

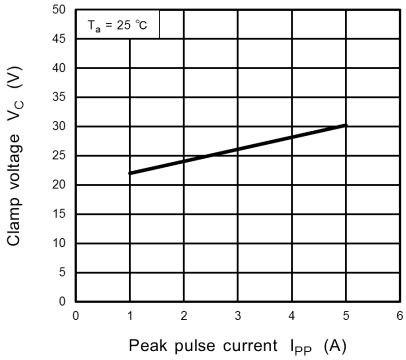


Fig. 10.15.2 V_C - I_{PP}

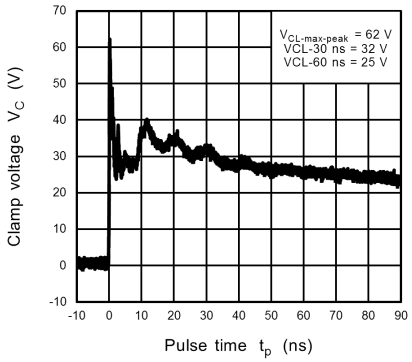


Fig. 10.15.3 IEC61000-4-2 Clamp Waveform +8 kV

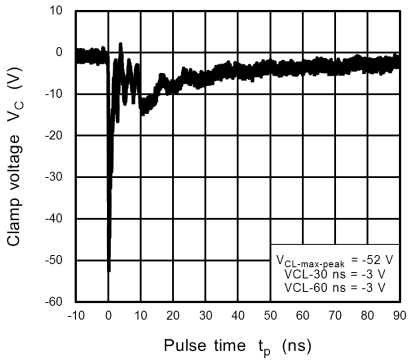


Fig. 10.15.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.16. MKZ22V Characteristics Curves(Note)

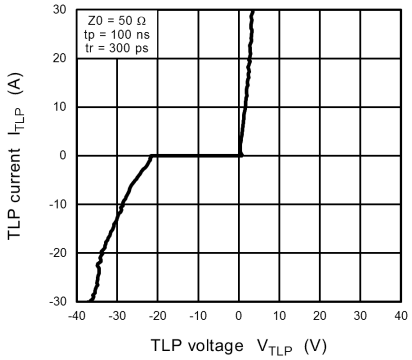


Fig. 10.16.1 I_{TLP} - V_{TLP}

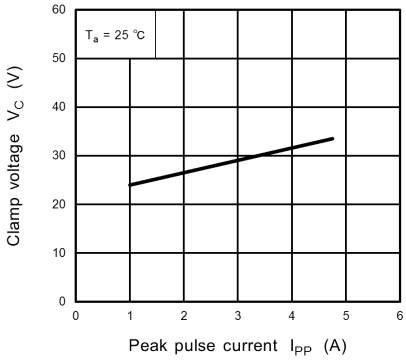


Fig. 10.16.2 V_C - I_{PP}

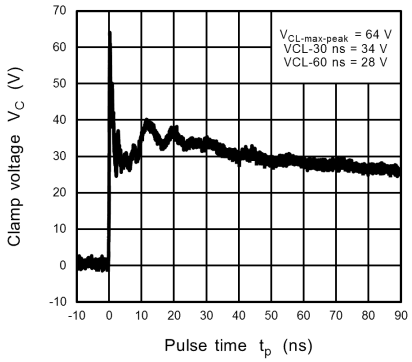


Fig. 10.16.3 IEC61000-4-2 Clamp Waveform +8 kV

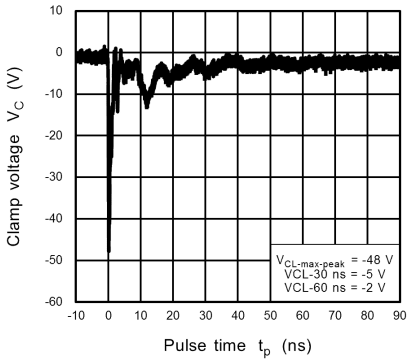


Fig. 10.16.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.17. MKZ24V Characteristics Curves(Note)

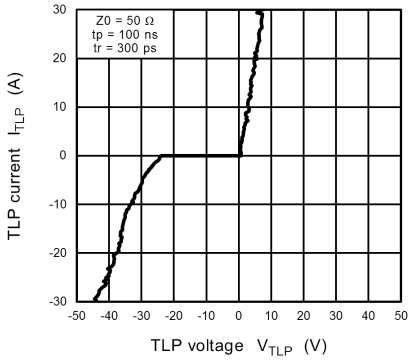


Fig. 10.17.1 I_{TLP} - V_{TLP}

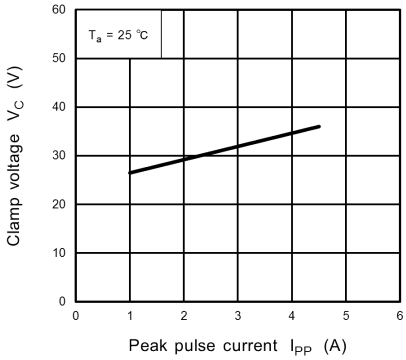


Fig. 10.17.2 V_C - I_{PP}

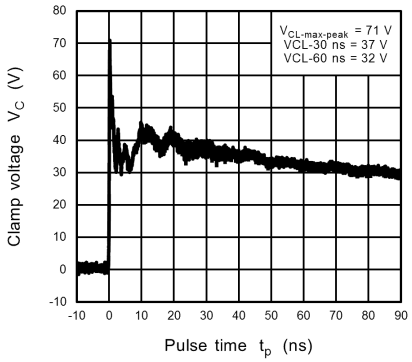


Fig. 10.17.3 IEC61000-4-2 Clamp Waveform +8 kV

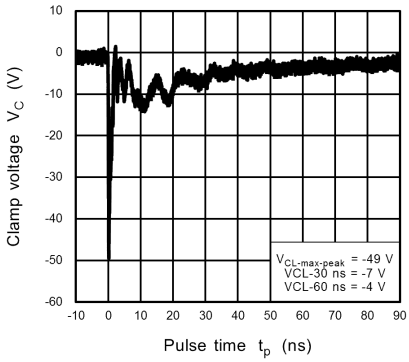


Fig. 10.17.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.18. MKZ27V Characteristics Curves(Note)

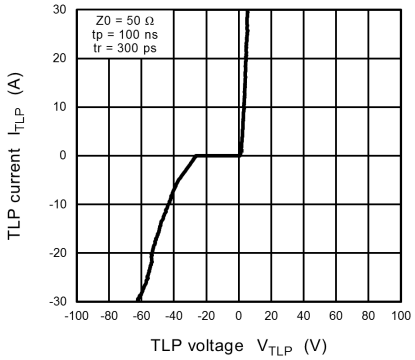


Fig. 10.18.1 I_{TLP} - V_{TLP}

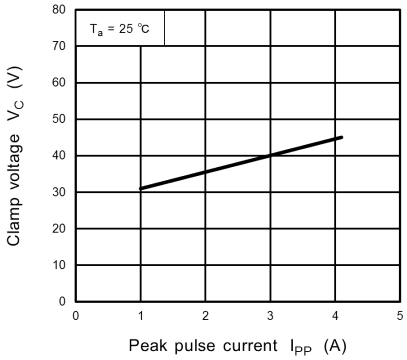


Fig. 10.18.2 V_C - I_{PP}

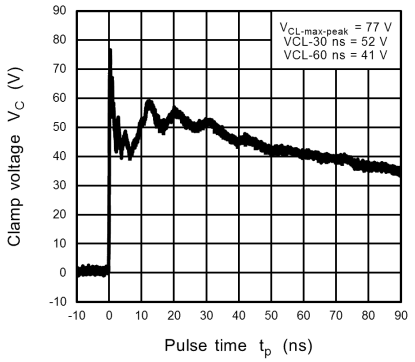


Fig. 10.18.3 IEC61000-4-2 Clamp Waveform +8 kV

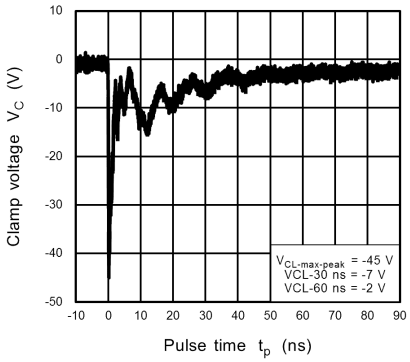


Fig. 10.18.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.19. MKZ30V Characteristics Curves(Note)

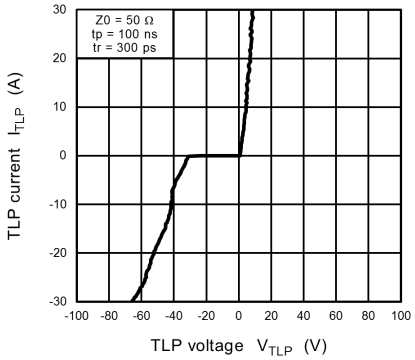


Fig. 10.19.1 I_{TLP} - V_{TLP}

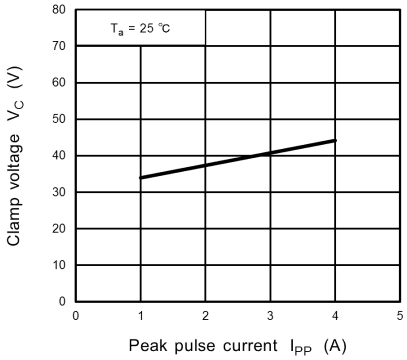


Fig. 10.19.2 V_C - I_{PP}

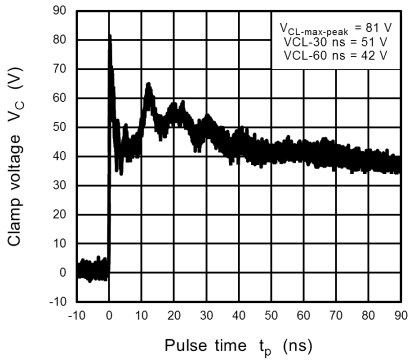


Fig. 10.19.3 IEC61000-4-2 Clamp Waveform +8 kV

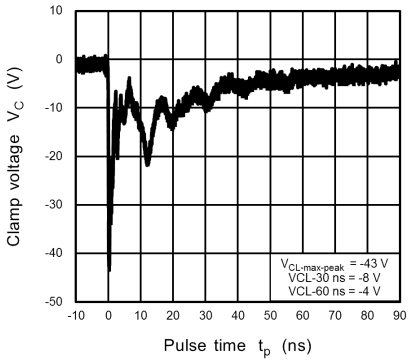


Fig. 10.19.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.20. MKZ33V Characteristics Curves(Note)

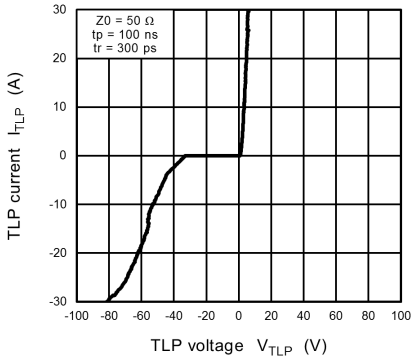


Fig. 10.20.1 I_{TLP} - V_{TLP}

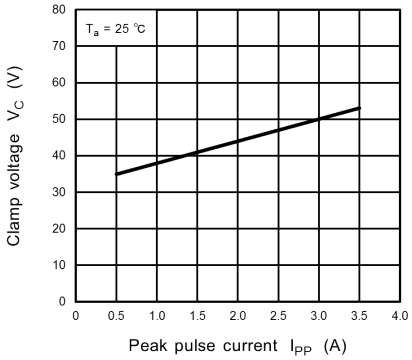


Fig. 10.20.2 V_C - I_{PP}

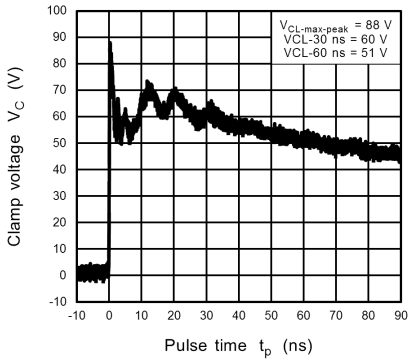


Fig. 10.20.3 IEC61000-4-2 Clamp Waveform +8 kV

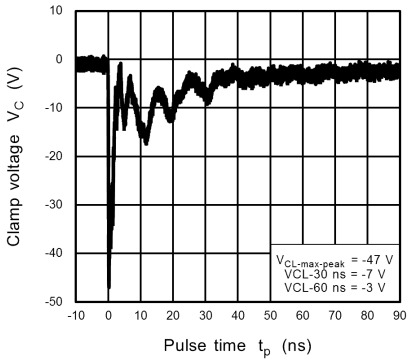


Fig. 10.20.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.21. MKZ36V Characteristics Curves(Note)

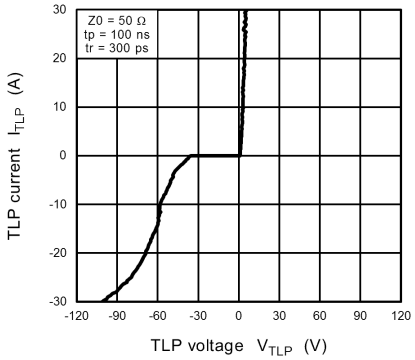


Fig. 10.21.1 I_{TLP} - V_{TLP}

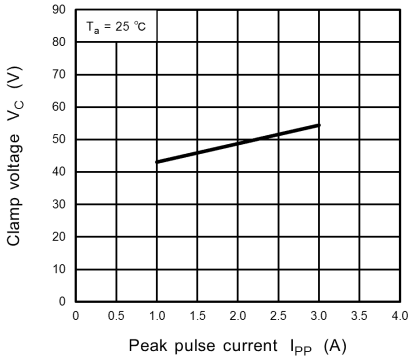


Fig. 10.21.2 V_C - I_{PP}

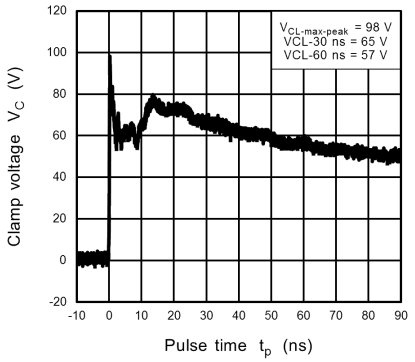


Fig. 10.21.3 IEC61000-4-2 Clamp Waveform +8 kV

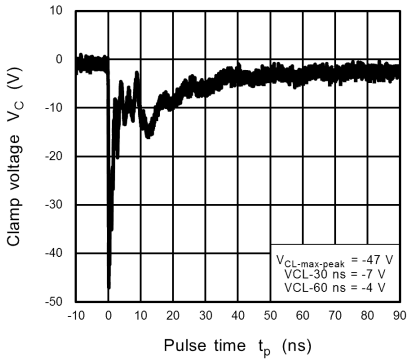


Fig. 10.21.4 IEC61000-4-2 Clamp Waveform -8 kV

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
Refer to Fig.10.22.1, Fig.10.22.2 for peak pulse current(V_C-I_{PP}) and clamp waveform measurement circuit.

10.22. V_C-I_{PP} Peak Pulse and Clamp waveform measurement circuit

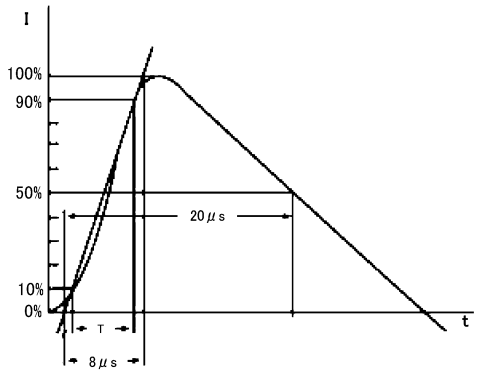


Fig. 10.22.1 V_C-I_{PP} Peak Pulse Current (according to IEC61000-4-5 8/20 μs pulse)

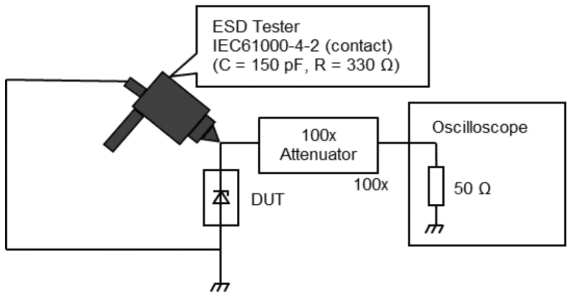
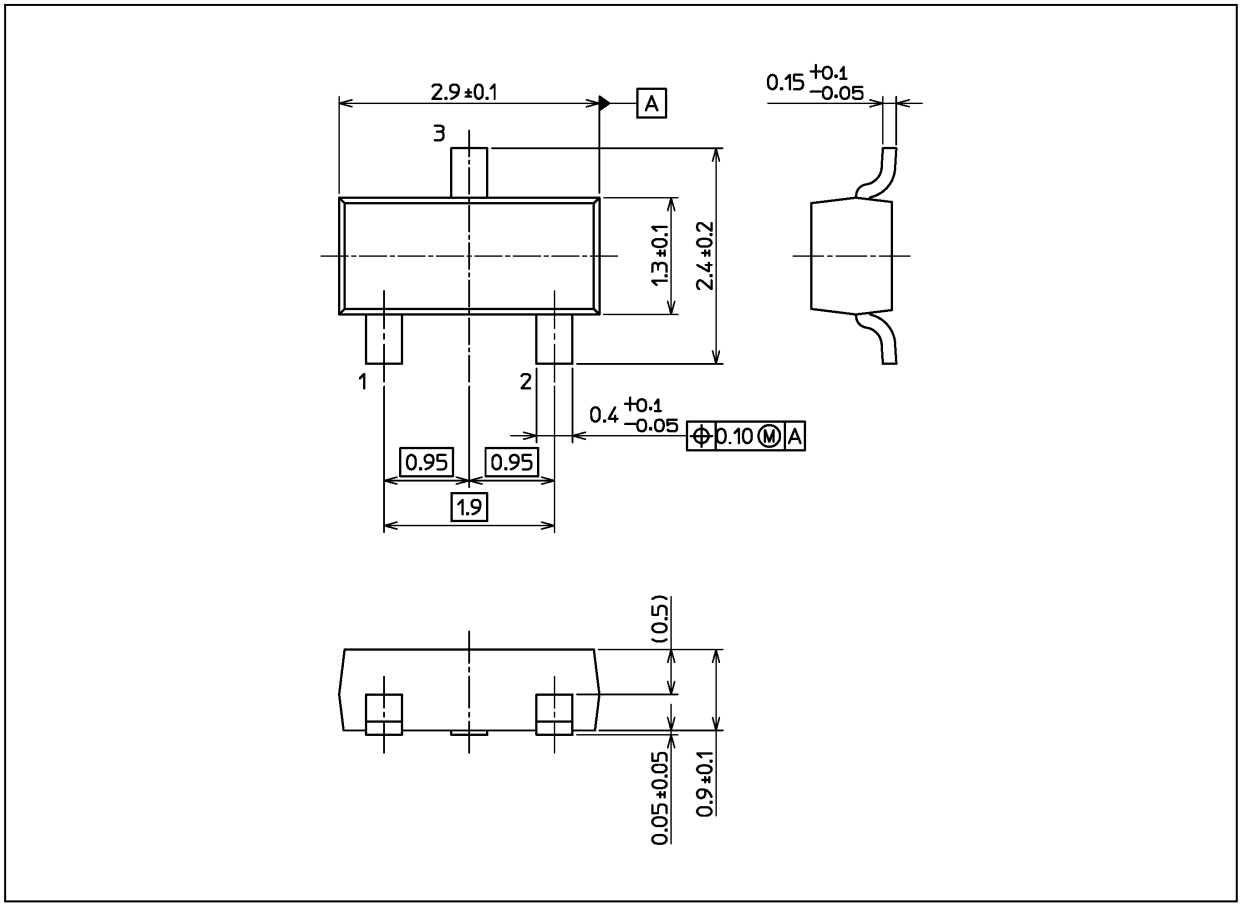


Fig. 10.22.2 Clamp waveform measurement circuit (according to IEC61000-4-2)

Package Dimensions

Unit: mm



Weight: 9 mg (typ.)

Package Name(s)
Nickname: SOT23

RESTRICTIONS ON PRODUCT USE

Toshiba Corporation and its subsidiaries and affiliates are collectively referred to as "TOSHIBA".
Hardware, software and systems described in this document are collectively referred to as "Product".

- TOSHIBA reserves the right to make changes to the information in this document and related Product without notice.
- This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA's written permission, reproduction is permissible only if reproduction is without alteration/omission.
- Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before customers use the Product, create designs including the Product, or incorporate the Product into their own applications, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and (b) the instructions for the application with which the Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS' PRODUCT DESIGN OR APPLICATIONS.**
- **PRODUCT IS NEITHER INTENDED NOR WARRANTED FOR USE IN EQUIPMENTS OR SYSTEMS THAT REQUIRE EXTRAORDINARILY HIGH LEVELS OF QUALITY AND/OR RELIABILITY, AND/OR A MALFUNCTION OR FAILURE OF WHICH MAY CAUSE LOSS OF HUMAN LIFE, BODILY INJURY, SERIOUS PROPERTY DAMAGE AND/OR SERIOUS PUBLIC IMPACT ("UNINTENDED USE").** Except for specific applications as expressly stated in this document, Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, Class 3 medical devices, equipment used for automobiles, and military vehicles and munitions. **IF YOU USE PRODUCT FOR UNINTENDED USE, TOSHIBA ASSUMES NO LIABILITY FOR PRODUCT.** For details, please contact your TOSHIBA sales representative or contact us via our website.
- Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NONINFRINGEMENT.**
- Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the applicable export laws and regulations including, without limitation, the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. **TOSHIBA ASSUMES NO LIABILITY FOR DAMAGES OR LOSSES OCCURRING AS A RESULT OF NONCOMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.**