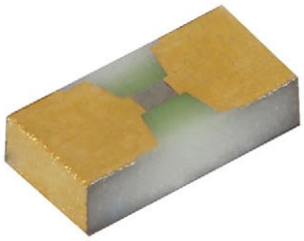
Electro-Pyrotechnic Initiator Thin Film Chip Resistor



LINKS TO ADDITIONAL RESOURCES

3D Models

The electro-pyrotechnic initiator thin film chips (EPIC) are resistors dedicated to pyrotechnic applications. The EPIC resistors are based on Ta_2N thin film technology deposited on specifically prepared ceramic substrate for optimized dissipation purpose. The standard case geometry (SMD) enables the implementation of assembly process commonly used in the electronic component industry (pick and place, reflow soldering on flat PCB used as header) providing high productivity. The principle of EPIC is to convert electrical energy into heat energy in a precise electro-thermal profile for the purpose of initiating a series of pyrotechnic events in a controlled energetic reaction. In the mining industry, as the bridge wire (BW) technology, the EPIC is commonly used in electronic detonators (digital blasting) for very precise rock fragmentation. The EPIC resistors are designed for any pyrotechnic application requiring very fast and reproducible ignition.

FEATURES

Pb-free Available

RoHS* Available

- Surface Mount Design for standard assembly process
- SMD version only
- Active area designed upon performances
- Case size 0603
- Firing energy down to 50 µJ
- Firing time down to 50 µs
- Ohmic value: 2 Ω to 10 Ω ± 15 % (typical) (1)
- Joule effect, or flash ignition for very fast firing
- Easy set up by design of firing levels
- “No Fire” / “All Fire” ratio up to 70 %
- Very predictable, reproducible and reliable behavior
- Compatibility with pyrotechnic element has to be tested in real environment
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Notes

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

(1) For ohmic value < 3 Ω the tolerance will be discussed with Vishay Sfernice

TECHNOLOGY

The EPIC active area (heating zone) will be impregnated by the user with a primary pyrotechnic material (usually wet primer followed by drying) in such way to ensure an intimate contact for an optimum heat transfer of thermal energy. The geometry of the active area of the EPIC, and both the primer chemistry and its impregnation method, will determine the global performances. Note that the active area of EPIC shall not be put in direct contact with explosive powder as grain size will not ensure intimate contact and will induce non reproducible and non reliable performances.

The two main characteristics of a EPIC resistor are their “All Fire” (AF) and “No Fire” (NF) performances:

- “All Fire” (AF) represents the command pulse where the major amount of the dissipated energy will be transferred to the primer to generate the ignition. Customer will have to provide Vishay Sfernice with “All Fire” conditions, usually with capacitance discharge parameters or with minimum current or voltage and corresponding short pulse duration.
- “No Fire” (NF) represents the immunity of the resistor with primer to the environmental electro-magnetic pollution and electric continuity test, where the major amount of the dissipated energy will be transferred to the substrate to ensure no ignition. Customer will have to provide Vishay Sfernice with “No Fire” conditions, usually maximum current or voltage and corresponding longest duration. In case of applicable capacitance discharge test the parameters shall also be provided.

ASSEMBLY PRECAUTIONS

In order to obtain reproducible ignition performances it is important that the assembly process fulfills the following criteria:

- Do not use iron soldering method to mount the EPIC on its header because uncontrolled amount of solder could impact the heat transfer (potential misfire or ignition delay).
- Take specific precautions, such as no air bubble during preparation and application of primer, in order to ensure the intimate contact of pyrotechnic primer and EPIC active area (potential misfire).
- Take specific handling precaution in order not to damage EPIC active area (ex: pickup head design for pick and place or specific fixing tools in the entire assembly process).
- The EPIC reliability is only guaranteed for one single reflow profile.
- In case of necessity to dismantle an EPIC, another EPIC must be used (no rework is allowed)
- Pay specific attention to the cleaning process after reflow soldering in order not to damage the active area and to keep it clean from various pollutions

For technical questions, contact: sferthinfilm@vishay.com

STANDARD ELECTRICAL SPECIFICATIONS			
MODEL	SIZE / CASE DESIGNATION (1)	RESISTANCE RANGE Ω	RESISTANCE TOLERANCE %
EPIC (SMD)	0603	2 to 10	15 to 30

Note

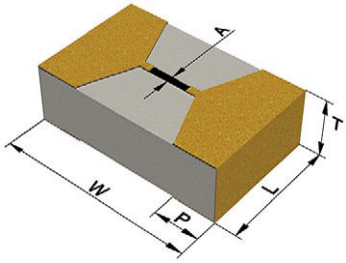
(1) Detailed dimensions are specified in Dimensions and Tolerances table

RANGE OF IGNITION PERFORMANCES					
MODEL	"NO FIRE" CURRENT A	"NO FIRE" DURATION s	"ALL FIRE" CURRENT A	IGNITION TIME ms	"ALL FIRE" ENERGY µJ
EPIC	0.3 to 0.8	2 to 5	Down to 0.8	Down to 0.05	Down to 50

Note

- Ignition performances are dependent on both pyrotechnic primer chemistry and active area geometry

DIMENSIONS AND TOLERANCES in millimeters (inches)



MODEL	SIZE / CASE DESIGNATION	WIDTH W	LENGTH L	THICKNESS T	INSULATION DISTANCE I	BACK SIDE PADS P	ACTIVE AREA WIDTH TOLERANCE A
EPIC (SMD)	0603	1.52 ± 0.15 (0.080 ± 0.006)	0.76 ± 0.13 (0.030 ± 0.005)	0.40 ± 0.13 (0.016 ± 0.005)	-	0.38 ± 0.13 (0.015 ± 0.005)	± 0.007 (± 0.0003)

CONSTRUCTION

- Substrate: ceramic (alumina)
- Resistive element: Ta_2N
- Terminations: SMD wraparound
- Electro-plated gold or hot dipped tin-silver on nickel

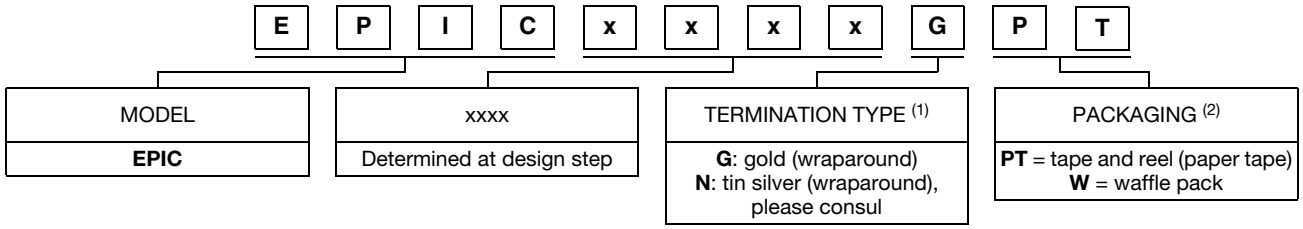
HOW TO GET THE RIGHT EPIC

Each EPIC will have to be adapted to customer pyrotechnic primer chemistry (energetic material). To reach the right EPIC design it is necessary to work by "iterations". Upon receipt of the EPIC Design Guide duly filled, an initial sampling lot is given to customer (along with a EPIC reference) so he can provide "No Firing" / "All Firing" performances obtained after first testing. After the analysis of these first test results a new set of samples will be proposed (eventually tooling charges will be necessary) in order to get closer to the customer requirements. It may be several iterations until the right design is found. It may also happen that all requirements cannot be fulfilled simultaneously and then a compromise will be necessary between EPIC design and customer pyrotechnic primer chemistry or ignition parameters.

When the iterations are finished, which means that the design is validated with total or partial requirements fulfilled, Vishay Sfernice will design a final set of photomasks for serial production.

ORDERING PROCEDURE

Global Part Numbering: EPICxxxxGT



Notes

- EPIC being a semi-custom product, please fill EPIC / MEPIC Design Guide (www.vishay.com/doc?53045) and send to sferthinfilm@vishay.com to get appropriate part number

(1) Gold termination finish valid for both reflow soldering and conductive gluing. Tin Silver termination finish only valid for reflow soldering

(2) Customer assembly process requirement:
- Waffle pack for manual placing on PCB
- Tape and reel for automatic pick and place

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.