



**PKC-136**

Application Specific Discretes  
ASD™

**PEAK CLAMP**

#### MAIN PRODUCT CHARACTERISTICS

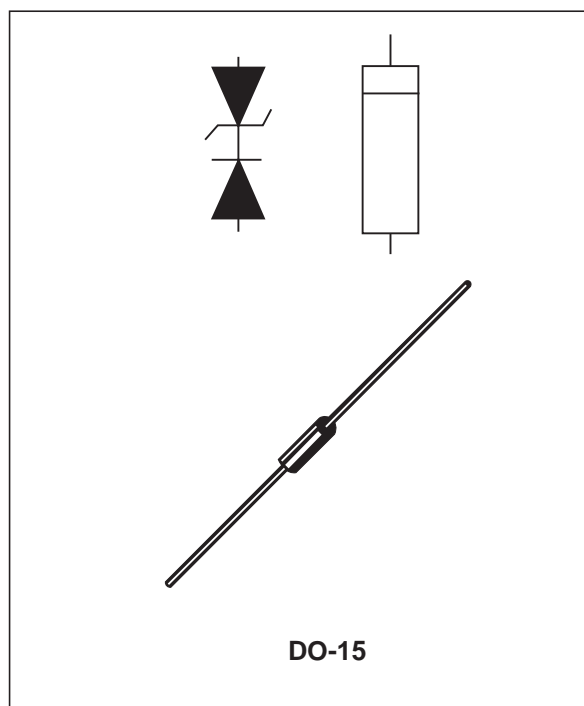
|           |        |
|-----------|--------|
| $V_{BR}$  | 160Vdc |
| $V_{DRM}$ | 700Vdc |
| P         | 1.5W   |

#### FEATURES

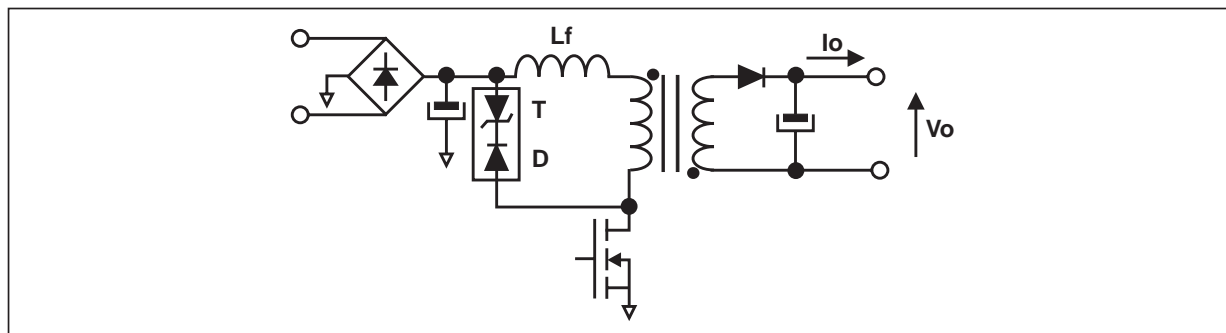
- Protection of the Mosfet in flyback power supply
- TRANSIL™ and blocking diode in a single package

#### BENEFITS

- Accurate voltage clamping regardless load
- Reduced current loop
- Reduced EMI emission
- High integration
- Fast assembly
- Reduced losses in stand by mode



#### BASIC CONNECTION



#### ABSOLUTE MAXIMUM RATINGS (limiting values)

| Symbol    | Parameter   | Value         | Unit |
|-----------|---|---------------|------|
| $T_{stg}$ | Storage temperature                                     | - 40 to + 150 | °C   |
| $T_j$     | Junction temperature                                    | 150           | °C   |
| P         | Maximum power dissipation $T^{\circ}lead = 90^{\circ}C$ | 1.5           | W    |

# ELECTRICAL CHARACTERISTICS TRANSIL

| Symbol     | Parameter               | Test conditions  |                      | Value |      |      | Unit                |
|------------|-------------------------|--|----------------------|-------|------|------|---------------------|
|            |                         |  |                      | Min.  | Typ. | Max. |                     |
| $I_{RM}$   | Leakage current         | $V_R = 136V$   | $T_j = 25^{\circ}C$  |       |      | 1    | $\mu A$             |
|            |                         |  | $T_j = 125^{\circ}C$ |       |      | 10   |                     |
| $V_{BR}$   | Breakdown voltage       | $I_R = 1mA$<br>pulse test < 50ms                         | $T_j = 25^{\circ}C$  | 150   | 160  | 170  | V                   |
| $R_d$      | Dynamical Resistance    | tp < 500ns<br>between $I = 0.5Amps$<br>and $I = 1.5Amps$ | $T_j = 125^{\circ}C$ |       |      | 4    | $\Omega$            |
| $\alpha T$ | Temperature Coefficient |  |                      |       |      | 10.8 | $10^{-4}/^{\circ}C$ |
| $V_{sCL}$  | Surge Clamping voltage  | $I_{pp} = 2.7Amps$<br>10/1000 $\mu s$                    |                      |       |      | 219  | V                   |

## CALCULATION OF THE CLAMPING VOLTAGE:

In repetitive mode and for low current rating, use the equation (1) and (2) to calculate the breakdown voltage  $V_{BR}$  of the transil versus the operating junction temperature and use the equation (3) to calculate the clamping voltage versus the transil current  $I_{pp}$  and the temperature.

$$\Delta V_{BR} = \alpha T (T_j - 25) V_{BR}(25^{\circ}C) \quad (1)$$

$$V_{BR}(T_j) = V_{BR}(25^{\circ}C) + \Delta V_{BR} \quad (2)$$

$$V_{CL}(T_j) = V_{BR}(T_j) + R_d \cdot I_{pp} \quad (3)$$

## ELECTRICAL CHARACTERISTICS DIODE ( $T_j = 25^{\circ}C$ unless otherwise specified)

| Symbol    | Parameter                       | Tests conditions                                   |                      | Value |      |      | Unit    |
|-----------|---------------------------------|--|----------------------|-------|------|------|---------|
|           |                                 |  |                      | Min.  | Typ. | Max. |         |
| $I_R$     | Reverse leakage current         | $V_R = V_{RRM}$                                    | $T_j = 25^{\circ}C$  |       |      | 3    | $\mu A$ |
|           |                                 |  | $T_j = 125^{\circ}C$ |       | 3    | 20   |         |
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | $T_j = 25^{\circ}C$                                |                      | 700   |      |      | V       |
| $t_{rr}$  | Reverse Recovery Time           | $I_F = 1A$ $dl_F / dt = -50A/\mu s$<br>$V_R = 30V$ |                      |       |      | 45   | ns      |
| $V_{FP}$  | Peak Forward Voltage            | $I_F = 3A$<br>$dl_F / dt = 100A/\mu s$             | $T_j = 25^{\circ}C$  |       |      | 12   | V       |
|           |                                 |  | $T_j = 125^{\circ}C$ |       |      | 18   |         |

## CAPACITANCE

| Symbol | Parameter                             | Typical Value | Unit |
|--------|---------------------------------------|---------------|------|
| C      | Total Parasitic capacitance 1MHz 30mV | 35            | pF   |

# THERMAL RESISTANCES

| Symbol        | Parameter                                | Value | Unit                 |
|---------------|--|-------|----------------------|
| $R_{th(j-l)}$ | Junction to leads $L = 10\text{mm}$      | 40    | $^{\circ}\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient condition see note 1 | 105   | $^{\circ}\text{C/W}$ |

**Note 1:** Device mounted on a epoxy FR4 board of 35 $\mu\text{m}$  thickness

Lead Length: 10mm

Pad diameter: 4mm

Track width: 1mm

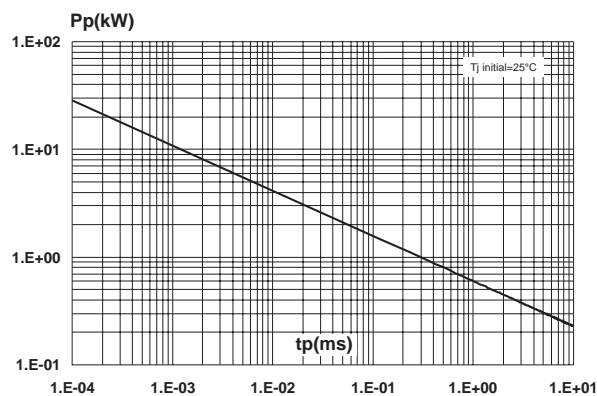
Track length: 25mm

The  $R_{th(j-a)}$  can be reduced by replacing the Cu track by plan:

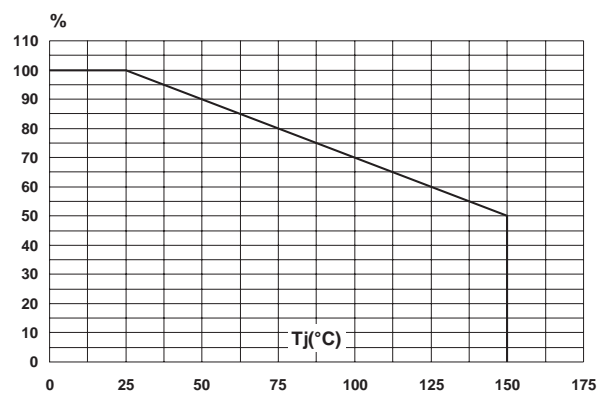
$S(\text{Cu}) = 1.5\text{cm}^2/\text{lead}$   $R_{th(j-a)} = 65^{\circ}\text{C/W}$

$S(\text{Cu}) = 3.5\text{cm}^2/\text{lead}$   $R_{th(j-a)} = 60^{\circ}\text{C/W}$

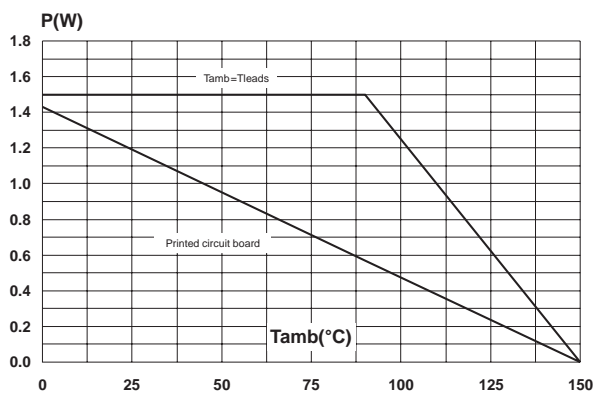
**Fig. 1:** Peak pulse power versus exponential pulse duration.



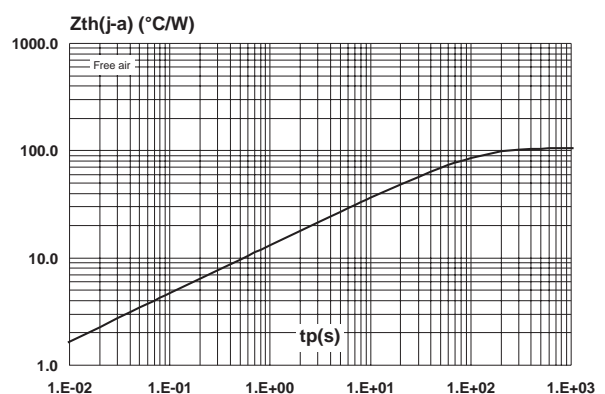
**Fig. 2:** Relative variation of peak pulse power versus initial junction temperature.



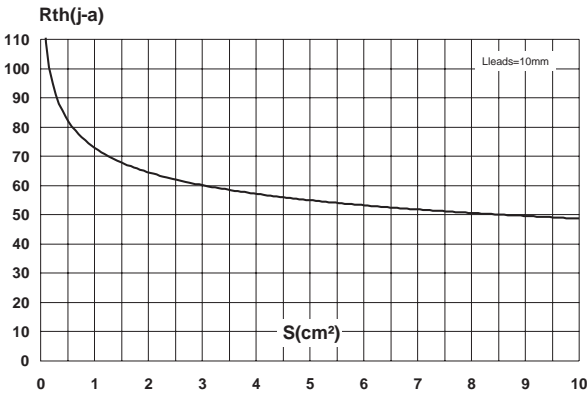
**Fig. 3:** Average power dissipation versus ambient temperature.



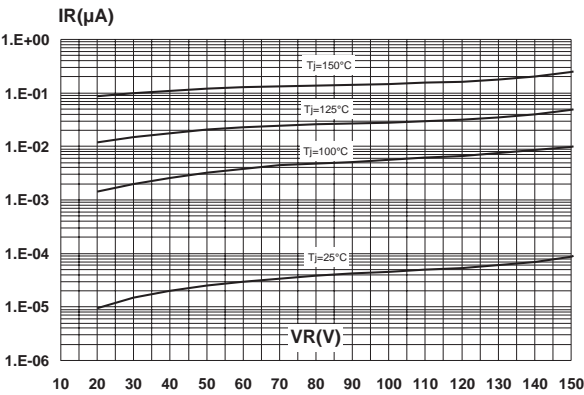
**Fig. 4:** Variation of thermal impedance junction to ambient versus pulse duration (printed circuit board epoxy FR4)



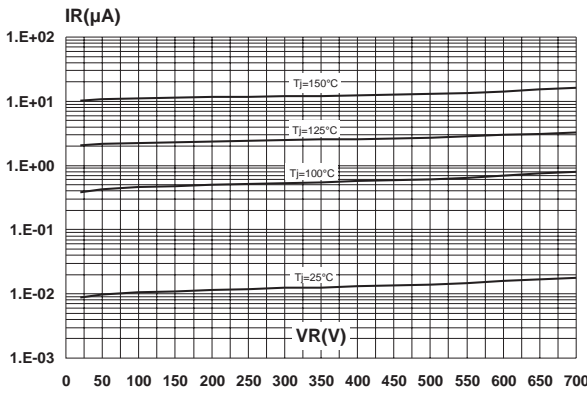
**Fig. 5:** Thermal resistance junction to ambient versus copper surface under each lead.



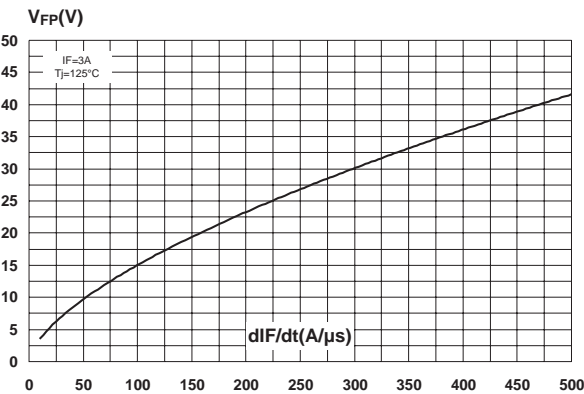
**Fig. 6-1:** Reverse leakage current versus reverse voltage applied (typical values, for Transil).



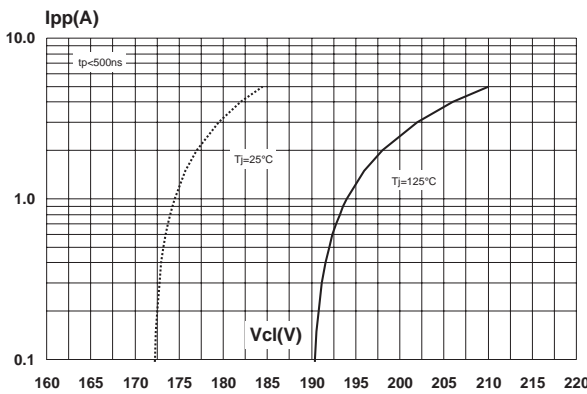
**Fig. 6-2:** Reverse leakage current versus reverse voltage applied (typical values, for diode).



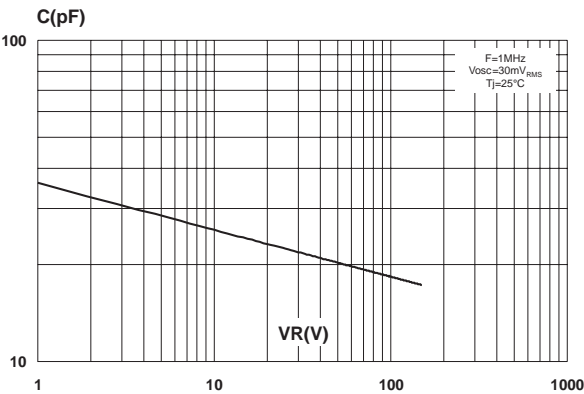
**Fig. 7:** Transient peak forward voltage versus  $dI_F/dt$  (90% confidence).



**Fig. 8:** Clamping voltage versus peak pulse current (maximum values).



**Fig. 9:** Junction capacitance versus reverse voltage applied on clamping characteristic (typical values).



**PACKAGE MECHANICAL DATA**  
DO-15

| REF. | DIMENSIONS  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A    | 6.05        | 6.75 | 0.238  | 0.266 |
| B    | 2.95        | 3.53 | 0.116  | 0.139 |
| C    | 26          | 31   | 1.024  | 1.220 |
| D    | 0.71        | 0.88 | 0.028  | 0.035 |

| Ordering type | Marking                          | Package | Weight | Base qty | Delivery mode |
|---------------|----------------------------------|---------|--------|----------|---------------|
| PKC136        | Partnumber<br>Diode cathode ring | DO-15   | 0.4g   | 1000     | Ammopack      |
| PKC136-RL     | Partnumber<br>Diode cathode ring | DO-15   | 0.4g   | 6000     | Tape and reel |

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