



## Description

### JMT P-channel Enhancement Mode Power MOSFET

#### Features

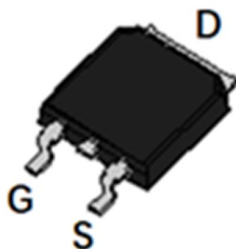
- $V_{DS} = -30V$ ,  $I_D = -90A$   
 $R_{DS(ON)} < 6.4m\Omega$  @  $V_{GS} = -10V$   
 $R_{DS(ON)} < 10.5m\Omega$  @  $V_{GS} = -4.5V$
- Advanced Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

#### Application

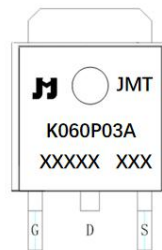
- PWM Applications
- Load Switch
- Power Management



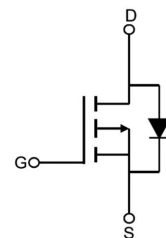
*100% UIS TESTED!*  
*100%  $\Delta V_{ds}$  TESTED!*



TO-252-4R(DPAK) top view



Marking and pin Assignment



Schematic Diagram

## Package Marking and Ordering Information

| Device Marking | Device      | OUTLINE | Device Package | Reel Size | Reel (PCS) | Per Carton (PCS) |
|----------------|-------------|---------|----------------|-----------|------------|------------------|
| JMTK060P03A    | JMTK060P03A | TAPING  | TO-252-4R      | 13inch    | 2500       | 25000            |

## Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise specified)

| Symbol          | Parameter                                       | Max.                | Units        |   |
|-----------------|---|---------------------|--------------|---|
| $V_{DSS}$       | Drain-Source Voltage                            | -30                 | V            |   |
| $V_{GSS}$       | Gate-Source Voltage                             | $\pm 20$            | V            |   |
| $I_D$           | Continuous Drain Current                        | $T_C = 25^\circ C$  | -90          | A |
|                 |   | $T_C = 100^\circ C$ | -59          | A |
| $I_{DM}$        | Pulsed Drain Current <sup>note1</sup>           | -360                | A            |   |
| $E_{AS}$        | Single Pulsed Avalanche Energy <sup>note2</sup> | 210                 | mJ           |   |
| $P_D$           | Power Dissipation                               | $T_C = 25^\circ C$  | 109          | W |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case            | 1.4                 | $^\circ C/W$ |   |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range         | -55 to +175         | $^\circ C$   |   |



## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

| Symbol  | Parameter   | Test Condition   | Min. | Typ. | Max. | Units |
|---|---|--|------|------|------|-------|
| <b>Off Characteristic</b>                                     |   |  |      |      |      |       |
| V <sub>(BR)DSS</sub>  | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA   | -30  | -    | -    | V     |
| I <sub>DSS</sub>  | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V,   | -    | -    | -1   | μA    |
| I <sub>GSS</sub>  | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V  | -    | -    | ±100 | nA    |
| <b>On Characteristics</b>                                     |   |  |      |      |      |       |
| V <sub>GS(th)</sub>   | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA                                       | -1.0 | -1.6 | -2.5 | V     |
| R <sub>DS(on)</sub>   | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> = -10V, I <sub>D</sub> = -30A  | -    | 4.9  | 6.4  | mΩ    |
|   |   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -20A   | -    | 7.5  | 10.5 |       |
| <b>Dynamic Characteristics</b>                                |   |  |      |      |      |       |
| C <sub>iss</sub>  | Input Capacitance   | V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V,<br>f=1.0MHz   | -    | 6800 | -    | pF    |
| C <sub>oss</sub>  | Output Capacitance  |  | -    | 769  | -    | pF    |
| C <sub>rss</sub>  | Reverse Transfer Capacitance                              |  | -    | 726  | -    | pF    |
| Q <sub>g</sub>  | Total Gate Charge   | V <sub>DS</sub> = -15V, I <sub>D</sub> = -30A,<br>V <sub>GS</sub> = -10V                         | -    | 30   | -    | nC    |
| Q <sub>gs</sub>   | Gate-Source Charge  |  | -    | 6    | -    | nC    |
| Q <sub>gd</sub>   | Gate-Drain("Miller") Charge                               |  | -    | 8    | -    | nC    |
| <b>Switching Characteristics</b>                              |   |  |      |      |      |       |
| t <sub>d(on)</sub>  | Turn-on Delay Time  | V <sub>DD</sub> = -15V, I <sub>D</sub> = -30A,<br>V <sub>GS</sub> = -10V, R <sub>GEN</sub> =2.5Ω | -    | 11   | -    | ns    |
| t <sub>r</sub>  | Turn-on Rise Time   |  | -    | 13   | -    | ns    |
| t <sub>d(off)</sub>   | Turn-off Delay Time                                       |  | -    | 52   | -    | ns    |
| t <sub>f</sub>  | Turn-off Fall Time  |  | -    | 21   | -    | ns    |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |   |  |      |      |      |       |
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current  |  | -    | -    | -90  | A     |
| I <sub>SM</sub>   | Maximum Pulsed Drain to Source Diode Forward Current      |  | -    | -    | -360 | A     |
| V <sub>SD</sub>   | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> = -30A   | -    | -0.8 | -1.2 | V     |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

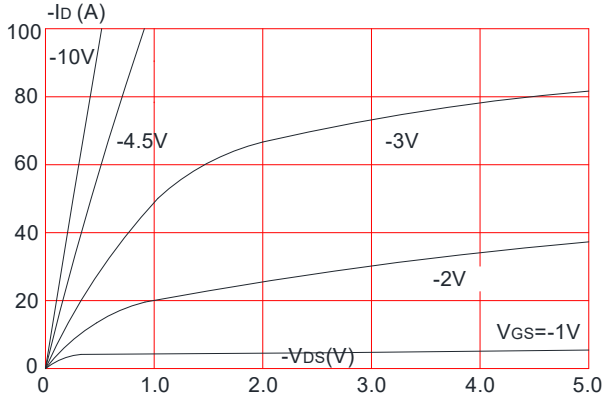
2. E<sub>AS</sub> condition: T<sub>J</sub>=25°C, V<sub>DD</sub>= -15V, V<sub>G</sub>= -10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>= -29A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

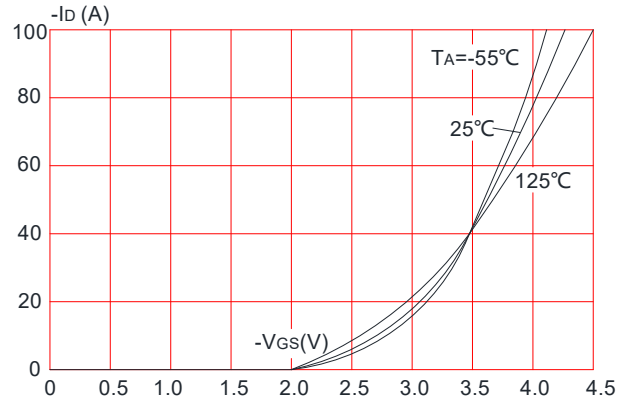


## Typical Performance Characteristics

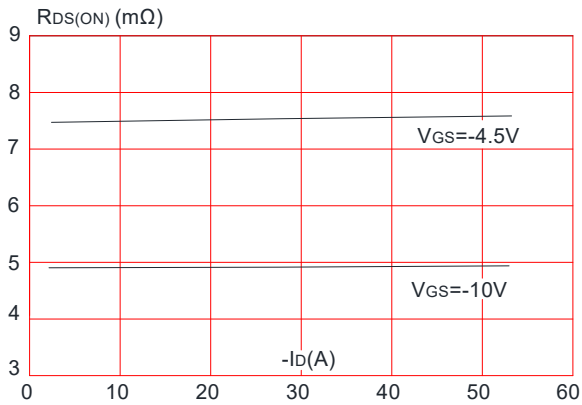
**Figure 1: Output Characteristics**



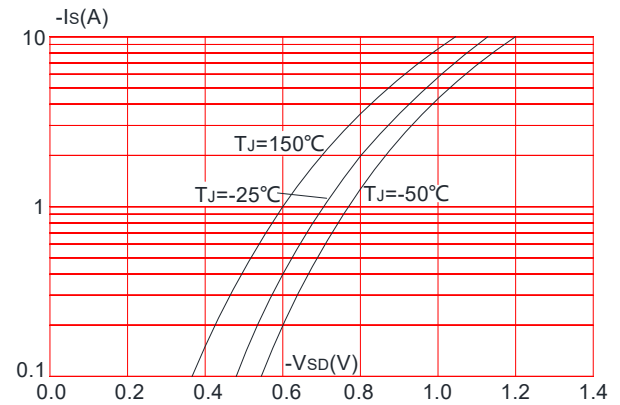
**Figure 2: Typical Transfer Characteristics**



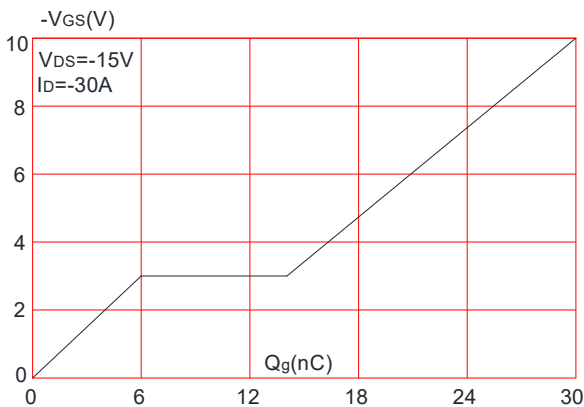
**Figure 3: On-resistance vs. Drain Current**



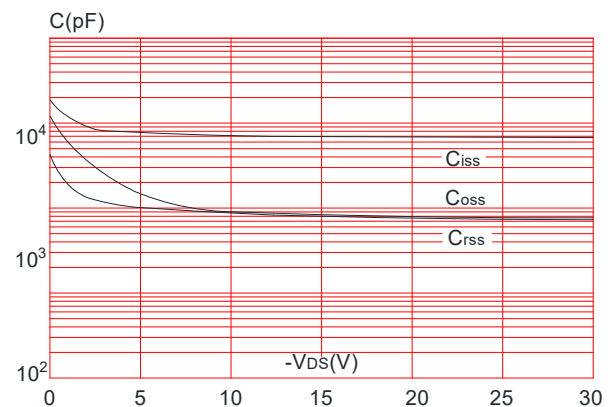
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

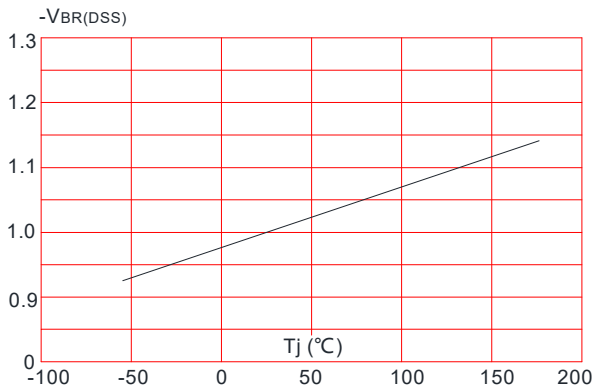


**Figure 6: Capacitance Characteristics**

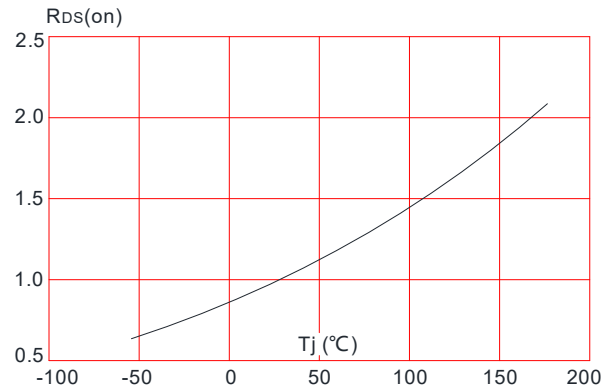




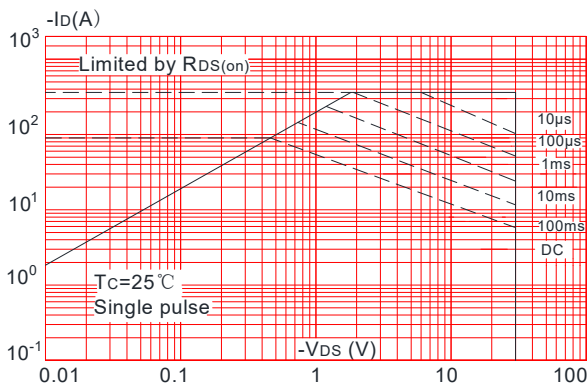
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



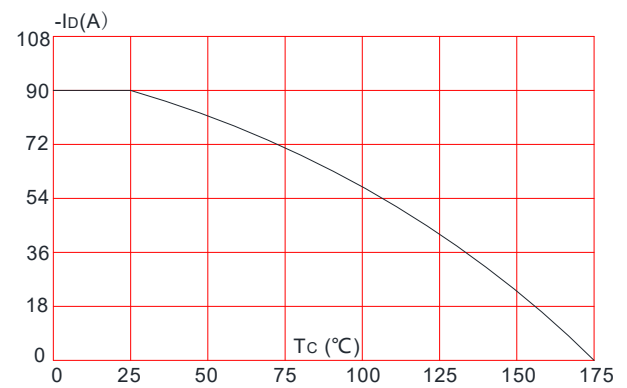
**Figure 8: Normalized on Resistance vs. Junction Temperature**



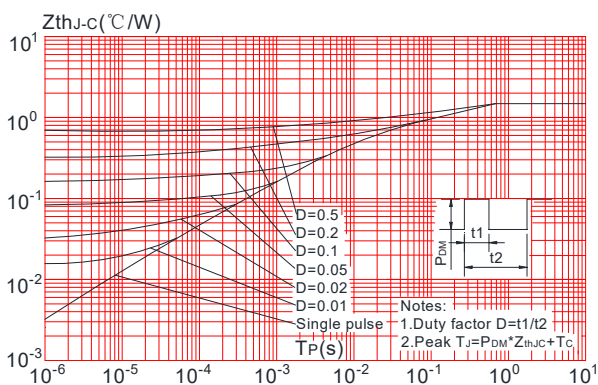
**Figure 9: Maximum Safe Operating Area**



**Figure 10: Maximum Continuous Drain Current vs. Case Temperature**

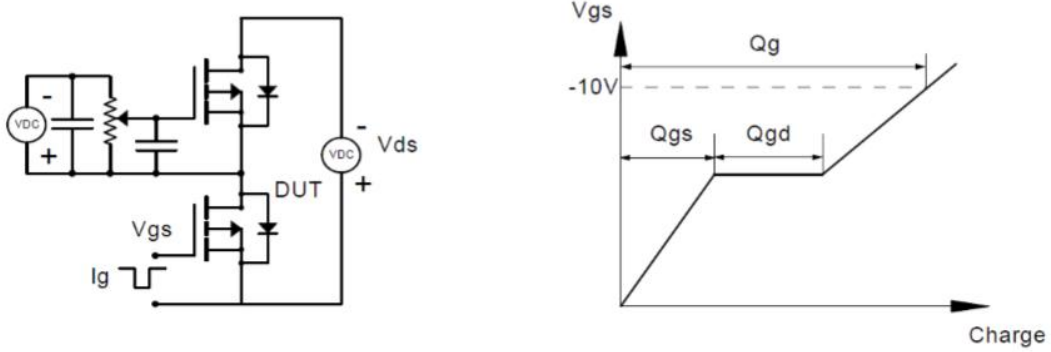


**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case**

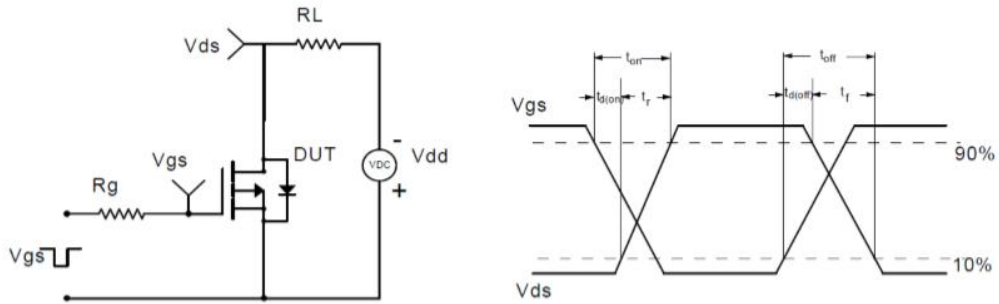


## Test Circuit

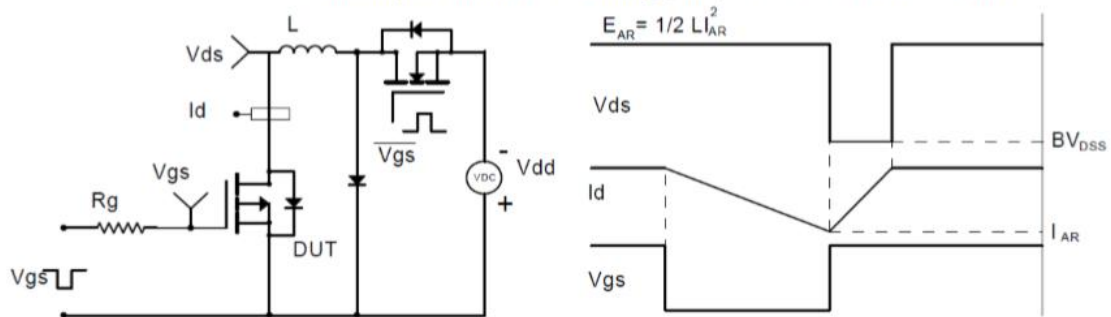
### Gate Charge Test Circuit & Waveform



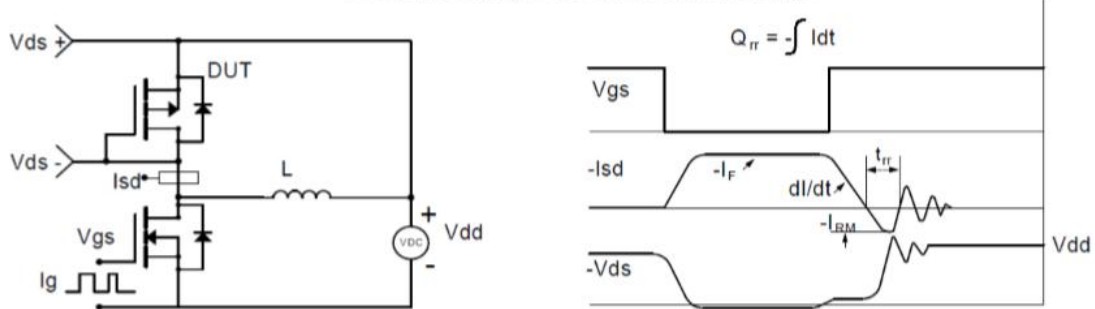
### Resistive Switching Test Circuit & Waveforms



### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

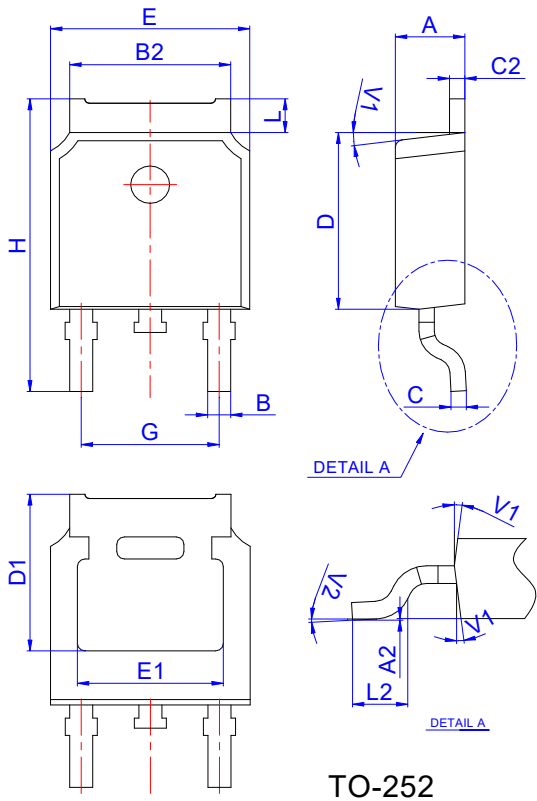


### Diode Recovery Test Circuit & Waveforms



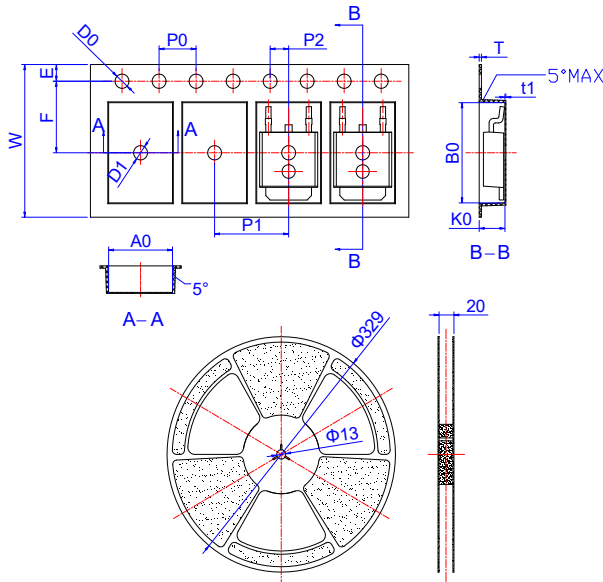


## Package Mechanical Data-TO-252-4R



| Ref. | Dimensions  |      |       |          |      |       |
|------|-------------|------|-------|----------|------|-------|
|      | Millimeters |      |       | Inches   |      |       |
|      | Min.        | Typ. | Max.  | Min.     | Typ. | Max.  |
| A    | 2.10        |      | 2.50  | 0.083    |      | 0.098 |
| A2   | 0           |      | 0.10  | 0        |      | 0.004 |
| B    | 0.66        |      | 0.86  | 0.026    |      | 0.034 |
| B2   | 5.18        |      | 5.48  | 0.202    |      | 0.216 |
| C    | 0.40        |      | 0.60  | 0.016    |      | 0.024 |
| C2   | 0.44        |      | 0.58  | 0.017    |      | 0.023 |
| D    | 5.90        |      | 6.30  | 0.232    |      | 0.248 |
| D1   | 5.30REF     |      |       | 0.209REF |      |       |
| E    | 6.40        |      | 6.80  | 0.252    |      | 0.268 |
| E1   | 4.63        |      |       | 0.182    |      |       |
| G    | 4.47        |      | 4.67  | 0.176    |      | 0.184 |
| H    | 9.50        |      | 10.70 | 0.374    |      | 0.421 |
| L    | 1.09        |      | 1.21  | 0.043    |      | 0.048 |
| L2   | 1.35        |      | 1.65  | 0.053    |      | 0.065 |
| V1   |             | 7°   |       |          | 7°   |       |
| V2   | 0°          |      | 6°    | 0°       |      | 6°    |

## Reel Specification-TO-252-4R



| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| W    | 15.90       | 16.00 | 16.10 | 0.626  | 0.630 | 0.634 |
| E    | 1.65        | 1.75  | 1.85  | 0.065  | 0.069 | 0.073 |
| F    | 7.40        | 7.50  | 7.60  | 0.291  | 0.295 | 0.299 |
| D0   | 1.40        | 1.50  | 1.60  | 0.055  | 0.059 | 0.063 |
| D1   | 1.40        | 1.50  | 1.60  | 0.055  | 0.059 | 0.063 |
| P0   | 3.90        | 4.00  | 4.10  | 0.154  | 0.157 | 0.161 |
| P1   | 7.90        | 8.00  | 8.10  | 0.311  | 0.315 | 0.319 |
| P2   | 1.90        | 2.00  | 2.10  | 0.075  | 0.079 | 0.083 |
| A0   | 6.85        | 6.90  | 7.00  | 0.270  | 0.271 | 0.276 |
| B0   | 10.45       | 10.50 | 10.60 | 0.411  | 0.413 | 0.417 |
| K0   | 2.68        | 2.78  | 2.88  | 0.105  | 0.109 | 0.113 |
| T    | 0.24        |       | 0.27  | 0.009  |       | 0.011 |
| t1   | 0.10        |       |       | 0.004  |       |       |
| 10P0 | 39.80       | 40.00 | 40.20 | 1.567  | 1.575 | 1.583 |




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