

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Product Summary



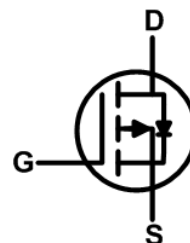
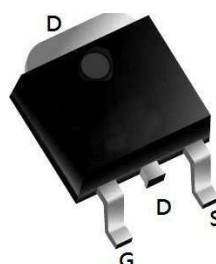
| BVDSS | RDSON | ID   |
|-------|-------|------|
| -100V | 46mΩ  | -30A |

### Description

The XR30P10 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR30P10 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

### TO252 Pin Configuration



**Table 1. Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$  unless otherwise noted)**

| Symbol           | Parameter                                            | Limit      | Unit             |
|------------------|------------------------------------------------------|------------|------------------|
| $V_{DS}$         | Drain-Source Voltage ( $V_{GS}=0V$ )                 | -100       | V                |
| $V_{GS}$         | Gate-Source Voltage ( $V_{DS}=0V$ )                  | $\pm 20$   | V                |
| $I_D$            | Drain Current-Continuous( $T_C=25^\circ\text{C}$ )   | -30        | A                |
|                  | Drain Current-Continuous( $T_C=100^\circ\text{C}$ )  | -21        | A                |
| $I_{DM}$ (pluse) | Drain Current-Continuous@ Current-Pulsed (Note 1)    | -120       | A                |
| $P_D$            | Maximum Power Dissipation( $T_C=25^\circ\text{C}$ )  | 107        | W                |
|                  | Maximum Power Dissipation( $T_C=100^\circ\text{C}$ ) | 53         | W                |
| $E_{AS}$         | Avalanche energy (Note 2)                            | 361        | mJ               |
| $T_J, T_{STG}$   | Operating Junction and Storage Temperature Range     | -55 To 175 | $^\circ\text{C}$ |

**Table 2. Thermal Characteristic**

| Symbol          | Parameter                            | Typ | Max | Unit               |
|-----------------|--------------------------------------|-----|-----|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case |     | 1.4 | $^\circ\text{C/W}$ |

**Table 3. Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)**

| Symbol                             | Parameter                         | Conditions                                                                                 | Min  | Typ  | Max  | Unit |
|------------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------|------|------|------|------|
| On/Off States                      |                                   |                                                                                            |      |      |      |      |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage    | V <sub>GS</sub> =0V I <sub>D</sub> =-250μA                                                 | -100 | -127 |      | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current   | V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V                                                |      |      | -1   | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current         | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                 |      |      | ±100 | nA   |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage            | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                  | -1   | -1.8 | -2.5 | V    |
| g <sub>FS</sub>                    | Forward Transconductance          | V <sub>DS</sub> =-5V, I <sub>D</sub> =-15A                                                 |      | 50   |      | S    |
| R <sub>DS(ON)</sub>                | Drain-Source On-State Resistance  | V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A                                                |      | 46   | 57.5 | mΩ   |
|                                    |                                   | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A                                               |      | 48   | 63   | mΩ   |
| Dynamic Characteristics            |                                   |                                                                                            |      |      |      |      |
| C <sub>iss</sub>                   | Input Capacitance                 | V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1.0MHz                                       |      | 8056 |      | pF   |
| C <sub>oss</sub>                   | Output Capacitance                |                                                                                            |      | 195  |      | pF   |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance      |                                                                                            |      | 70   |      | pF   |
| Switching Parameters               |                                   |                                                                                            |      |      |      |      |
| t <sub>d(on)</sub>                 | Turn-on Delay Time                | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-50V, R <sub>L</sub> =3.3Ω, R <sub>GEN</sub> =9.1Ω |      | 13   |      | nS   |
| t <sub>r</sub>                     | Turn-on Rise Time                 |                                                                                            |      | 64   |      | nS   |
| t <sub>d(off)</sub>                | Turn-Off Delay Time               |                                                                                            |      | 36   |      | nS   |
| t <sub>f</sub>                     | Turn-Off Fall Time                |                                                                                            |      | 52   |      | nS   |
| Q <sub>g</sub>                     | Total Gate Charge                 | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-50V, I <sub>D</sub> =-10A                         |      | 147  |      | nC   |
| Q <sub>gs</sub>                    | Gate-Source Charge                |                                                                                            |      | 17   |      | nC   |
| Q <sub>gd</sub>                    | Gate-Drain Charge                 |                                                                                            |      | 31   |      | nC   |
| Source-Drain Diode Characteristics |                                   |                                                                                            |      |      |      |      |
| I <sub>SD</sub>                    | Source-Drain Current (Body Diode) |                                                                                            |      |      | -30  | A    |
| V <sub>SD</sub>                    | Forward on Voltage (Note 3)       | V <sub>GS</sub> =0V, I <sub>S</sub> =-15A                                                  |      |      | -1.2 | V    |
| t <sub>rr</sub>                    | Reverse Recovery Time             | I <sub>F</sub> =-15A, di/dt=100A/μs                                                        |      | 72   |      | ns   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge           | I <sub>F</sub> =-15A, di/dt=100A/μs                                                        |      | 120  |      | nC   |

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

Notes 2.EAS condition:  $T_J=25^\circ\text{C}, V_{DD}=50V, V_{GS}=-10V, R_g=25\Omega, L=0.5mH$ .

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

### Typical Electrical And Thermal Characteristics (Curves)

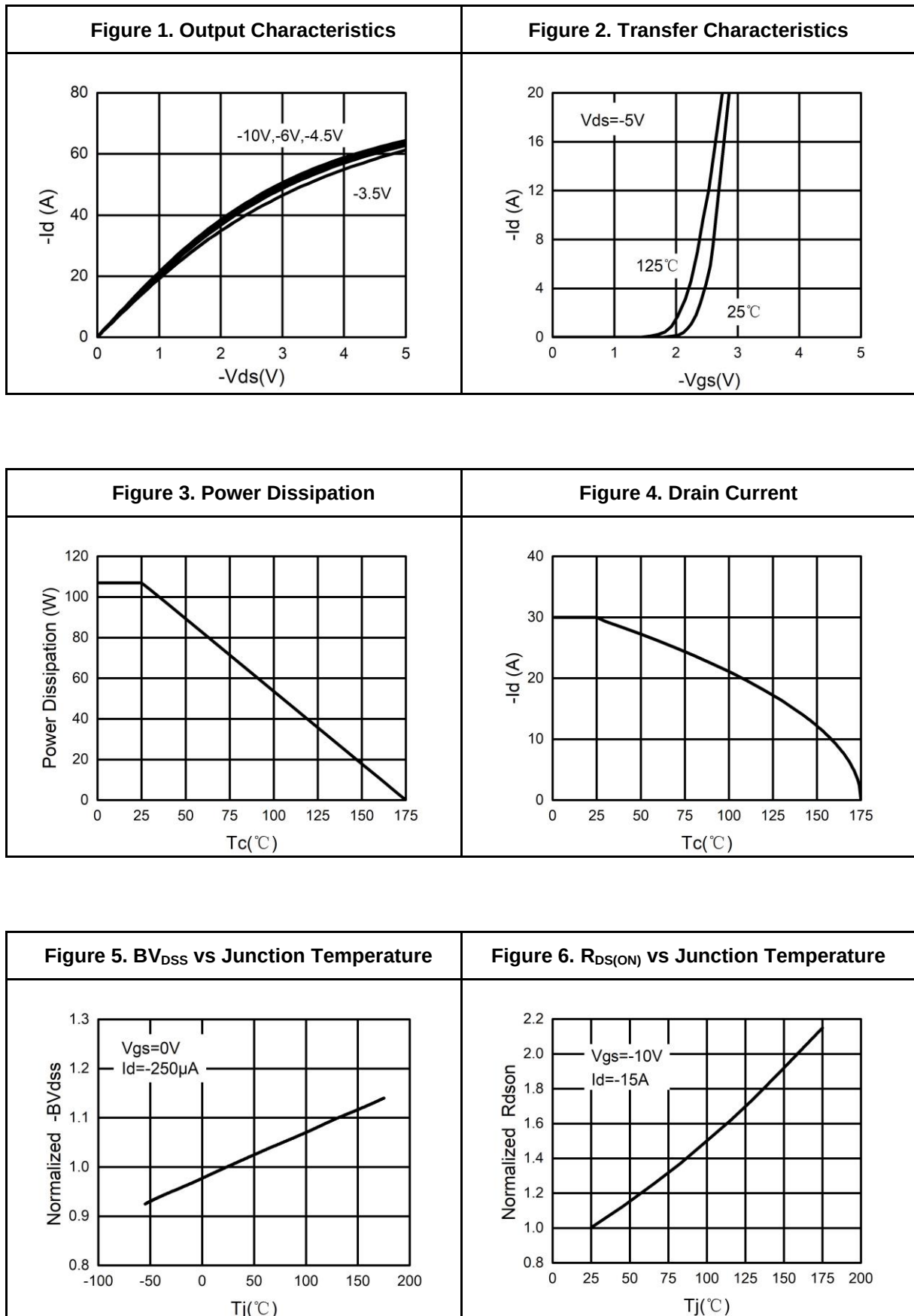


Figure 7. Gate Charge Waveforms

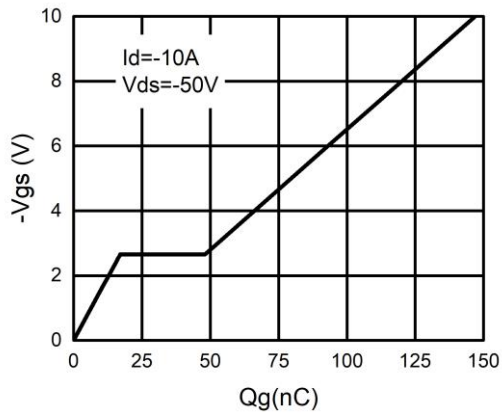


Figure 8. Capacitance

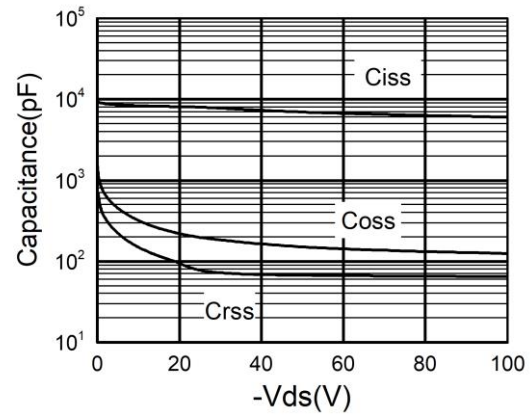


Figure 9. Body-Diode Characteristics

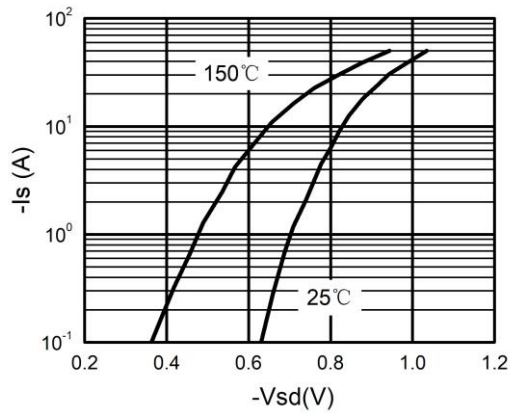
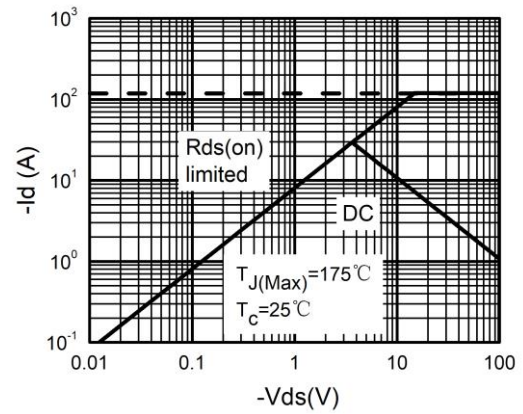


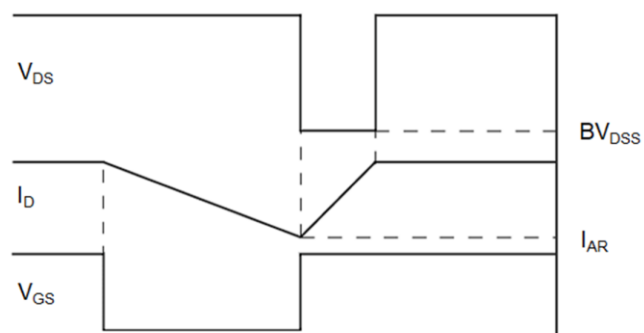
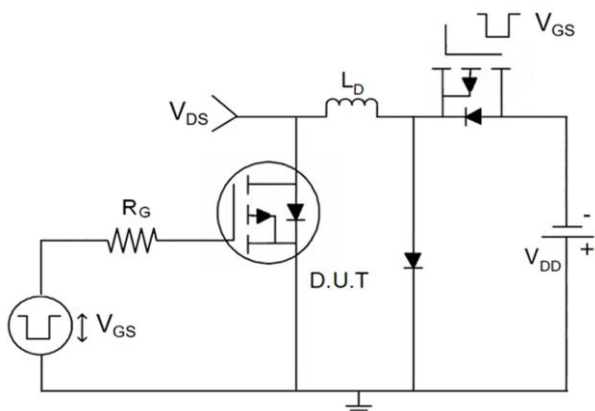
Figure 10. Maximum Safe Operating Area



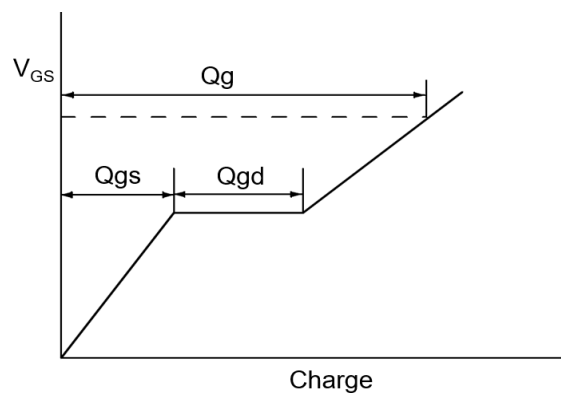
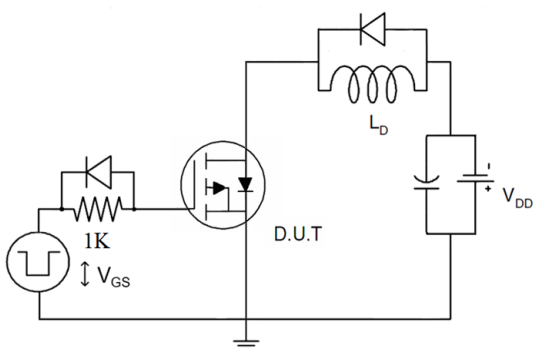
## Test Circuit

## P-Ch 100V Fast Switching MOSFETs

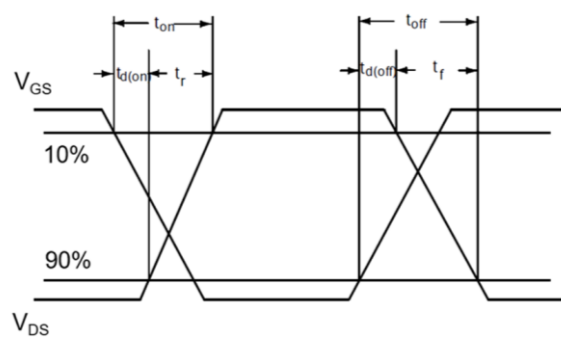
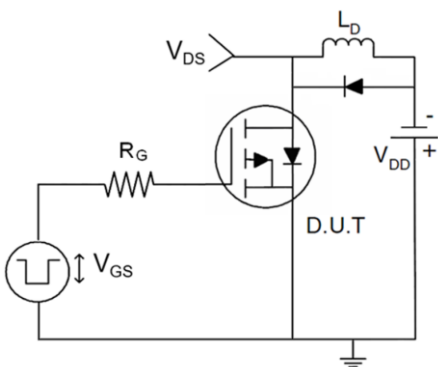
### 1) $E_{AS}$ Test Circuits



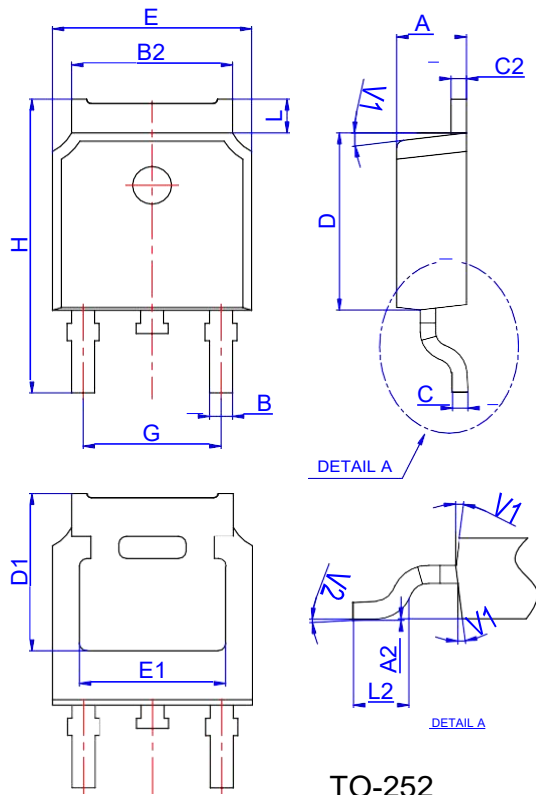
### 2) Gate Charge Test Circuit



### 3) Switch Time Test Circuit

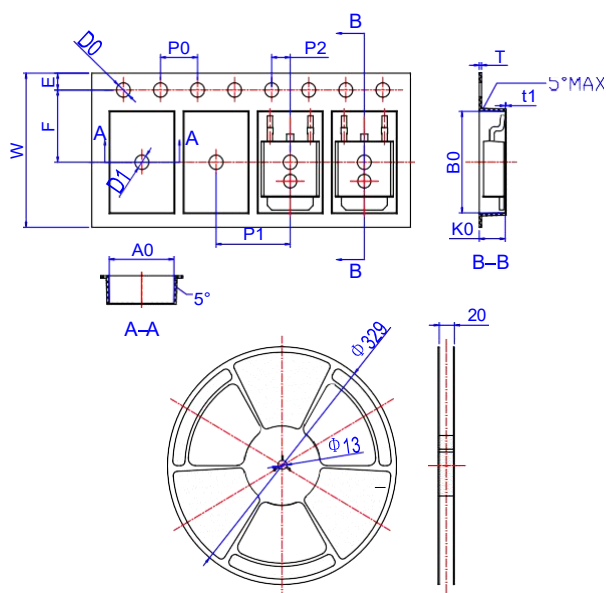


### Package Mechanical Data-TO-252



| 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 |