

## FEATURES

Wide Bandgap SiC MOSFET Technology  
Low On-Resistance with High Blocking Voltage  
Low Capacitances with High-Speed Switching  
Low Reverse Recovery (Qrr)  
Robust against Parasitic Turn on Even 0V Turn off Gate Voltage

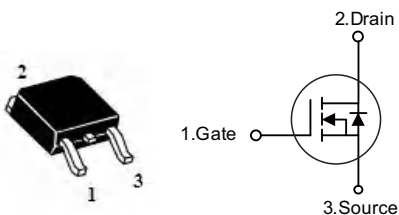
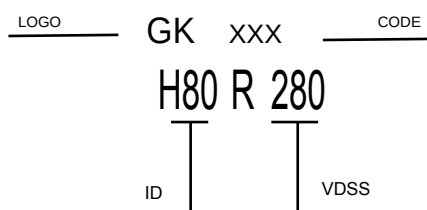
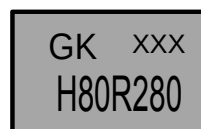
## BENEFITS

Reduced Switching Losses  
Increased System Switching Frequency  
Increased Power Density  
Reduction of Heat Sink Requirements  
Reduced EMI

## APPLICATION

Switch Mode Power Supplies  
High Voltage DC/DC Converters  
Battery Chargers  
Motor Drives  
Pulsed Power Applications

$V_{DS}$  800 V  
 $I_D$  12 A  
 $R_{DS(ON)}$  280 mΩ



## ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

| Parameter                                       | Symbol         | Test Condition                                | Value       | Unit             |
|-------------------------------------------------|----------------|-----------------------------------------------|-------------|------------------|
| Drain to Source Voltage                         | $V_{DS}$       | $V_{GS} = 0V$                                 | 800         | V                |
| Gate to Source Voltage                          | $V_{GS}$       | Absolute maximum values                       | -10/+22     | V                |
| Recommended Operation Voltage of Gate to Source | $V_{GSop}$     | Recommended operational values                | 0/+18       | V                |
| Continuous Drain Current                        | $I_D$          | $V_{GS}=18V, T_C=25^\circ\text{C}$            | 12.0        | A                |
|                                                 |                | $V_{GS}=18V, T_C=100^\circ\text{C}$           | 8.5         |                  |
| Pulsed Drain Current                            | $I_{DM}$       | $V_{GS}=18V, T_C=25^\circ\text{C}$            | 24.0        | A                |
| Power Dissipation                               | $P_{tot}$      | $T_C=25^\circ\text{C}, T_J=175^\circ\text{C}$ | 53.5        | W                |
| Operating and Storage Temperature               | $T_J, T_{stg}$ |                                               | -55 to +175 | $^\circ\text{C}$ |

## Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ unless otherwise noted)

### Static Characteristics

| Parameter                         | Symbol        | Test Condition                                   | Value |      |      | Unit       |
|-----------------------------------|---------------|--------------------------------------------------|-------|------|------|------------|
|                                   |               |                                                  | Min.  | Typ. | Max. |            |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=500\mu A$                        | 800   |      |      | V          |
| Gate Threshold Voltage            | $V_{GS(th)}$  | $V_{GS}=V_{DS}, I_D=1.8mA$                       | 2.6   |      | 4.6  | V          |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{GS}=0V, V_{DS}=800V, T_J=25^{\circ}\text{C}$ |       |      | 100  | $\mu A$    |
| Gate to Source Leakage Current    | $I_{GSS}$     | $V_{GS}=18V, V_{DS}=0V$                          |       |      | 250  | nA         |
| Drain to Source on Resistance     | $R_{DS(on)}$  | $V_{GS}=15V, I_D=5A$                             |       | 415  |      | m $\Omega$ |
|                                   |               | $V_{GS}=15V, I_D=5A, T_J=175^{\circ}\text{C}$    |       | 340  |      |            |
|                                   |               | $V_{GS}=18V, I_D=5A$                             |       | 280  | 364  |            |
|                                   |               | $V_{GS}=18V, I_D=5A, T_J=175^{\circ}\text{C}$    |       | 276  |      |            |

### Dynamic Characteristics

| Parameter                    | Symbol    | Test Condition                                              | Value |      |      | Unit     |
|------------------------------|-----------|-------------------------------------------------------------|-------|------|------|----------|
|                              |           |                                                             | Min.  | Typ. | Max. |          |
| Input Capacitance            | $C_{iss}$ | $V_{GS}=0V, V_{DS}=400V, f=100KHz, T_J=25^{\circ}\text{C}$  |       | 267  |      | pF       |
| Output Capacitance           | $C_{oss}$ |                                                             |       | 21.1 |      |          |
| Reverse Transfer Capacitance | $C_{rss}$ |                                                             |       | 2.21 |      |          |
| Total Gate Charge            | $Q_g$     | $V_{GS}=0/18V, V_{DS}=400V, I_D=5A, T_J=25^{\circ}\text{C}$ |       | 22.3 |      | nC       |
| Gate-Source Charge           | $Q_{gs}$  |                                                             |       | 10.3 |      |          |
| Gate-Drain Charge            | $Q_{gd}$  |                                                             |       | 5.9  |      |          |
| Gate Resistance              | $R_g$     | $f=1MHz$                                                    |       | 6.4  |      | $\Omega$ |

### Thermal Characteristics

| Parameter                                | Symbol        | Value |      |      | Unit                 |
|------------------------------------------|---------------|-------|------|------|----------------------|
|                                          |               | Min.  | Typ. | Max. |                      |
| Thermal Resistance from Junction to Case | $R_{th(j-c)}$ | -     | 2.7  | -    | $^{\circ}\text{C/W}$ |

## Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ unless otherwise noted)

### Switching Characteristics

| Parameter           | Symbol       | Test Condition                                                                               | Value |      |      | Unit |
|---------------------|--------------|----------------------------------------------------------------------------------------------|-------|------|------|------|
|                     |              |                                                                                              | Min.  | Typ. | Max. |      |
| Turn-On Delay Time  | $t_{d(on)}$  | $V_{GS}=0/18\text{V}, V_{DD}=400\text{V}, I_D=5\text{A},$<br>$R_g=5\Omega, L=200\mu\text{H}$ |       | 12.0 |      | ns   |
| Rise Time           | $t_r$        |                                                                                              |       | 40.4 |      |      |
| Turn-Off Delay Time | $t_{d(off)}$ |                                                                                              |       | 16.0 |      |      |
| Fall Time           | $t_f$        |                                                                                              |       | 39.2 |      |      |

### Reverse Diode Characteristics

| Parameter                        | Symbol    | Test Condition                                                                                                         | Value |      |      | Unit |
|----------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------|-------|------|------|------|
|                                  |           |                                                                                                                        | Min.  | Typ. | Max. |      |
| Diode Forward Voltage            | $V_{SD}$  | $V_{GS}=0\text{V}, I_{SD}=3\text{A}, T_J=25^{\circ}\text{C}$                                                           | -     | 3.5  |      | V    |
| Continuous Diode Forward Current | $I_S$     | $V_{GS}=0\text{V}, T_J=25^{\circ}\text{C}$                                                                             |       | 12.0 |      | A    |
| Reverse Recovery Time            | $t_{rr}$  | $V_{GS}=0\text{V}, I_{SD}=5\text{A},$<br>$V_R=400\text{V}, di/dt=830\text{A}/\mu\text{s},$<br>$T_J=25^{\circ}\text{C}$ |       | 11.2 |      | ns   |
| Reverse Recovery Charge          | $Q_{rr}$  |                                                                                                                        |       | 31.8 |      | nC   |
| Peak Reverse Recovery Current    | $I_{rrm}$ |                                                                                                                        |       | 4.8  |      | A    |

## RATING AND CHARACTERISTIC CURVES

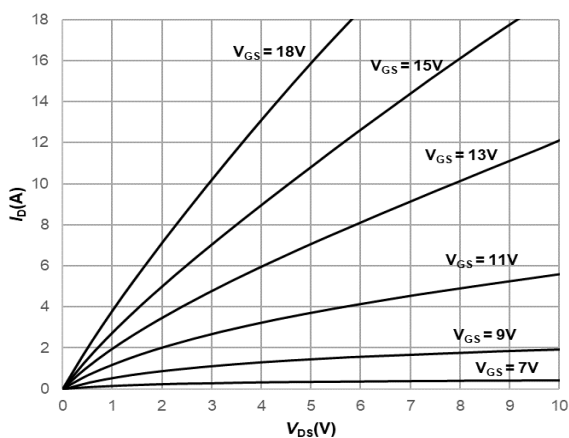


Fig1. Output Characteristics  $T_j = 25^\circ\text{C}$

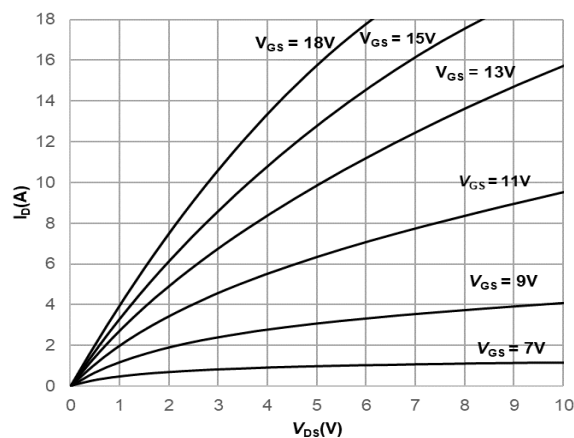


Fig2. Output Characteristics  $T_j = 175^\circ\text{C}$

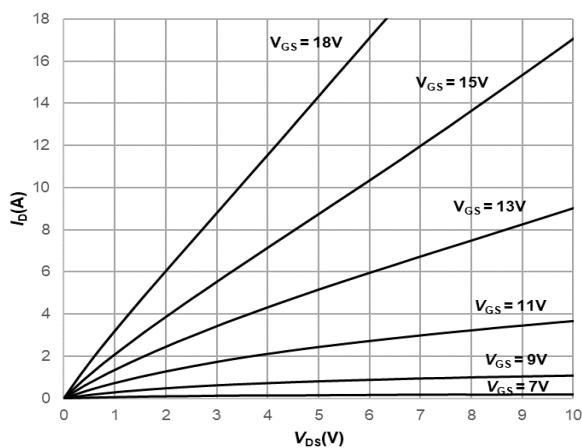


Fig3. Output Characteristics  $T_j = -40^\circ\text{C}$

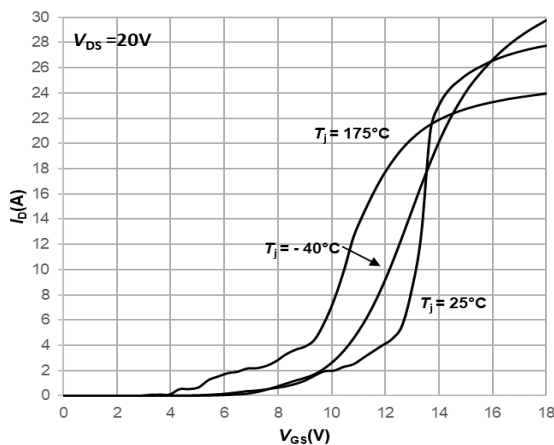


Fig4. Typical Transfer Characteristics

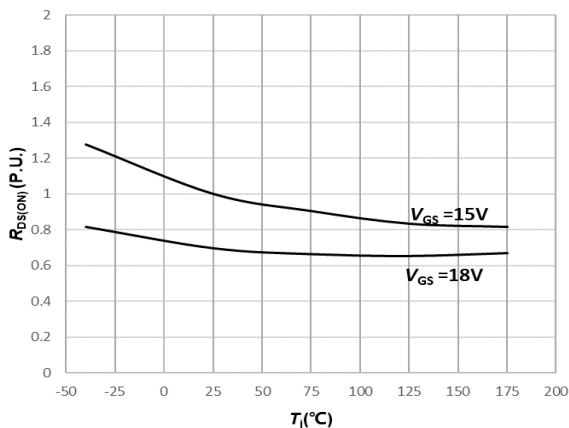


Fig5. Normalized On-Resistance vs. Temperature

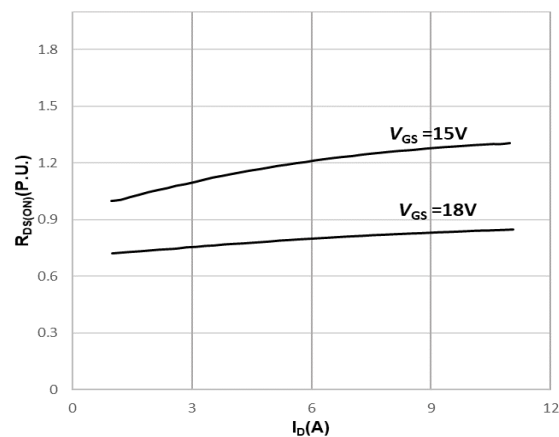


Fig6. Normalized On-Resistance vs. Drain Current For  $T_j = 25^\circ\text{C}$



## RATING AND CHARACTERISTIC CURVES

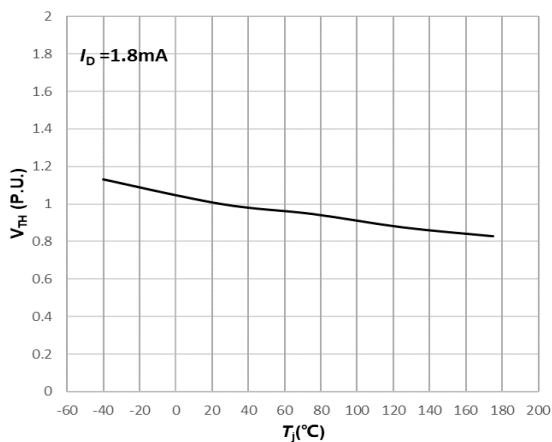


Fig7. Normalized Threshold Voltage vs. Temperature

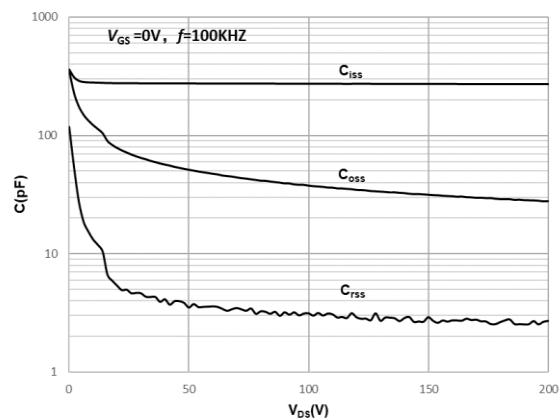


Fig8. Capacitances vs. Drain-Source Voltage (0-200V)

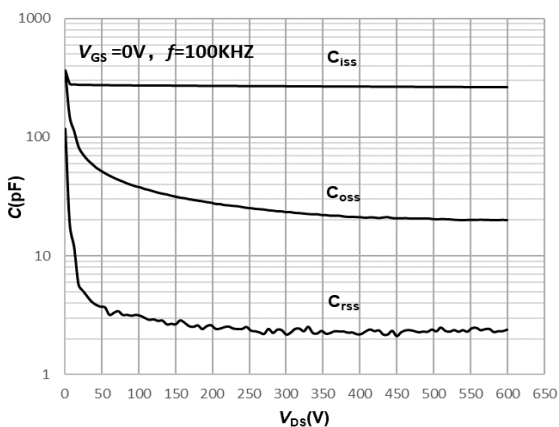


Fig9. Capacitances vs. Drain-Source Voltage (0-600V)

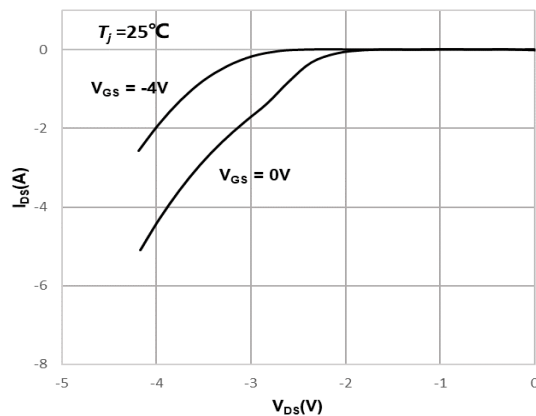


Fig10. Body Diode Characteristics

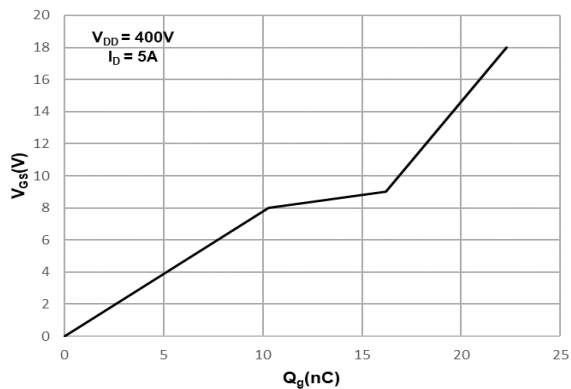


Fig11. Gate Charge Characteristic

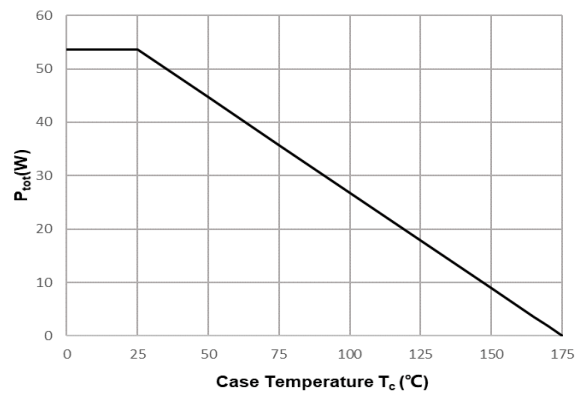


Fig12. Power Dissipation vs. Case temperature

## RATING AND CHARACTERISTIC CURVES

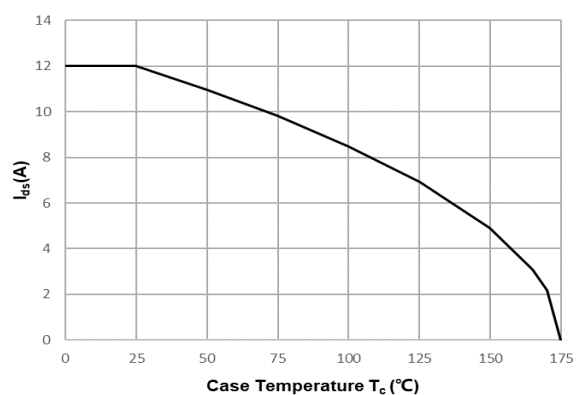
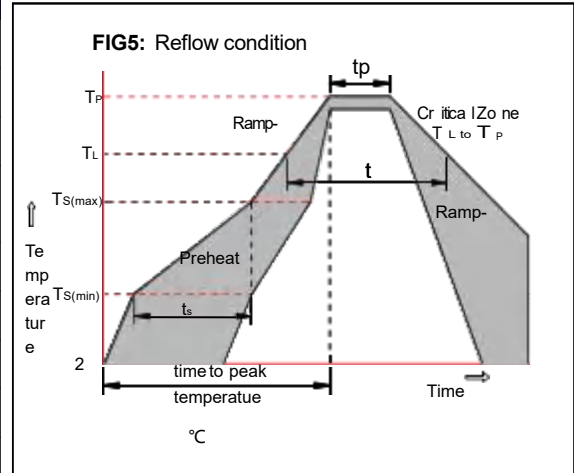


Fig13. Continuous Drain Current vs. Case Temperature

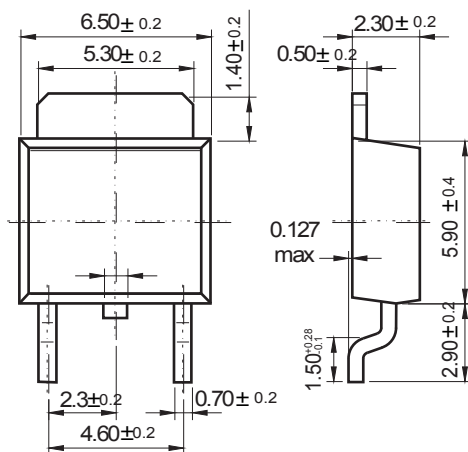
## Soldering parameters

| Reflow Condition                                        |                                   | Pb-Free assembly<br>(see as below) |
|---------------------------------------------------------|-----------------------------------|------------------------------------|
| Pre Heat                                                | -Temperature Min ( $T_{s(min)}$ ) | +150 °C                            |
|                                                         | -Temperature Max( $T_{s(max)}$ )  | +200 °C                            |
|                                                         | -Time (Min to Max) (ts)           | 60-180 secs.                       |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3 °C/sec. Max                      |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3 °C/sec. Max                      |
| Reflow                                                  | -Temperature( $T_L$ )(Liquid us)  | +217 °C                            |
|                                                         | -Temperature( $t_L$ )             | 60-150 secs.                       |
| Peak Temp ( $T_P$ )                                     |                                   | +260(+0/-5) °C                     |
| Time within 5 °C of actual Peak Temp ( $t_P$ )          |                                   | 30 secs. Max                       |
| Ramp-down Rate                                          |                                   | 6 °C/sec. Max                      |
| Time 25 °C to Peak Temp ( $T_P$ )                       |                                   | 8 min. Max                         |
| Do not exceed                                           |                                   | +260 °C                            |

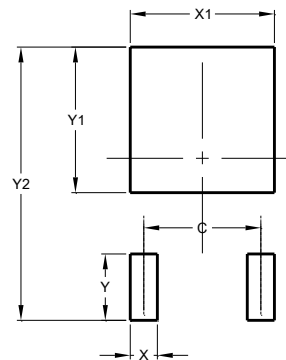


## Package Dimensions & Suggested Pad Layout

### TO-252



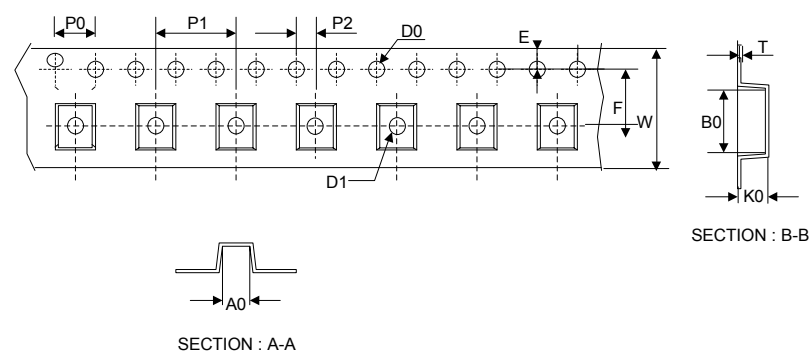
Dimensions in inches and (millimeters)



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 4.55          |
| X          | 1.50          |
| X1         | 5.80          |
| Y          | 2.70          |
| Y1         | 6.00          |
| Y2         | 10.90         |

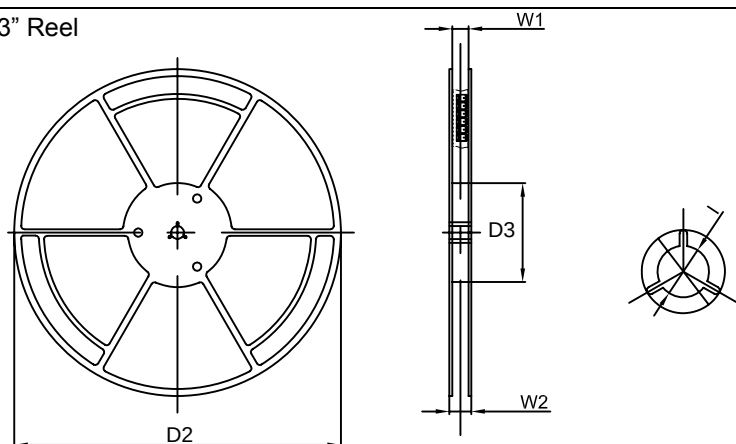
## Tape & reel specification

### Tape



| Symbol | Dimension (mm) |
|--------|----------------|
| P0     | 4.00±0.20      |
| P1     | 8.00±0.20      |
| P2     | 2.00±0.20      |
| D0     | 1.55±0.15      |
| D1     | 1.55±0.20      |
| E      | 1.75±0.20      |
| F      | 7.50±0.20      |
| W      | 16.00±0.20     |
| A0     | 7.10±0.20      |
| B0     | 10.50±0.20     |
| K0     | 2.70±0.20      |
| T      | 0.30±0.10      |
| D2     | 330.0±5.0      |
| D3     | 100.0±4.0      |
| W1     | 20.0±5.0       |
| W2     | 25.0±5.0       |
| I      | 13.0±2.0       |

### 13" Reel



Quantity: 2500PCS