

## Features

- Split Gate Trench MOSFET Technology
- High Density Cell Design for Low  $R_{DS(ON)}$
- High Speed Switching
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

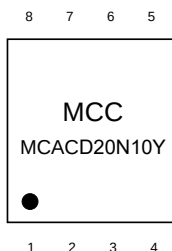
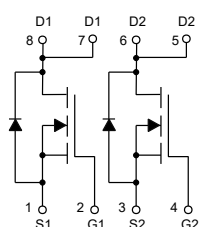
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 45°C/W Junction to Ambient (Note 2)
- Thermal Resistance: 4°C/W Junction to Case

| Parameter                        | Symbol                  | Rating | Unit |
|----------------------------------|-------------------------|--------|------|
| Drain-Source Voltage             | $V_{DS}$                | 100    | V    |
| Gate-Source Voltage              | $V_{GS}$                | ±20    | V    |
| Continuous Drain Current         | $T_C=25^\circ\text{C}$  | 20     | A    |
|                                  | $T_C=100^\circ\text{C}$ | 12.6   |      |
| Pulsed Drain Current (Note 3)    | $I_{DM}$                | 80     | A    |
| Total Power Dissipation (Note 4) | $P_D$                   | 31     | W    |
| Avalanche Energy (Note 5)        | $E_{AS}$                | 64     | mJ   |

### Note:

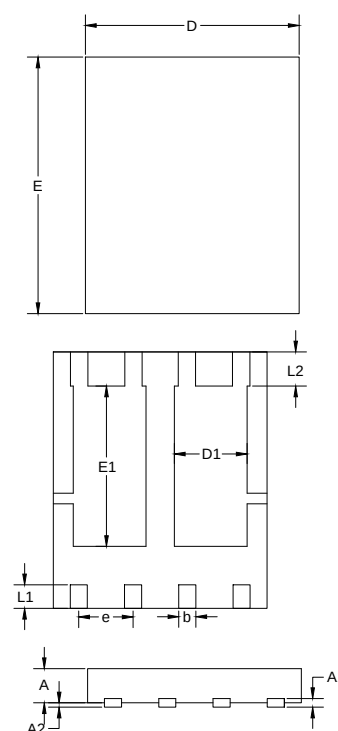
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. copper, in a still air environment with  $T_A=25^\circ\text{C}$ .
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction-case thermal resistance.
5.  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ ,  $V_G=10\text{V}$ ,  $L=0.5\text{mH}$ .

## Internal Structure and Marking Code



# Dual N-CHANNEL MOSFET

## DFN5060-8D



| DIMENSIONS |        |       |      |      |      |
|------------|--------|-------|------|------|------|
| DIM        | INCHES |       | MM   |      | NOTE |
|            | MIN    | MAX   | MIN  | MAX  |      |
| D          | 0.193  | 0.201 | 4.90 | 5.10 |      |
| E          | 0.232  | 0.240 | 5.90 | 6.10 |      |
| A          | 0.028  | 0.035 | 0.70 | 0.90 |      |
| A1         | 0.008  |       | 0.20 |      | BSC  |
| A2         | 0.000  | 0.004 | 0.00 | 0.10 |      |
| D1         | 0.063  | 0.071 | 1.60 | 1.80 |      |
| E1         | 0.144  | 0.152 | 3.65 | 3.85 |      |
| L1         | 0.018  | 0.026 | 0.45 | 0.65 |      |
| L2         | 0.031  |       | 0.80 |      | BSC  |
| b          | 0.012  | 0.020 | 0.30 | 0.50 |      |
| e          | 0.050  |       | 1.27 |      | BSC  |

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

| Parameter                       | Symbol               | Test Conditions                                                                        | Min | Typ  | Max  | Unit |
|---------------------------------|----------------------|----------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics          |                      |                                                                                        |     |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                             | 100 |      |      | V    |
| Gate-Source Leakage Current     | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                             |     |      | ±100 | nA   |
| Zero Gate Voltage Drain Current | I <sub>DSS</sub>     | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                             |     |      | 1    | μA   |
| Gate-Threshold Voltage          | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 1.0 | 1.5  | 2.5  | V    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =15A                                              |     | 17.6 | 22   | mΩ   |
|                                 |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =7A                                              |     | 21   | 27   |      |
| Gate Resistance                 | R <sub>g</sub>       | f=1 MHz, Open drain                                                                    |     | 2.0  |      | Ω    |
| Diode Characteristics           |                      |                                                                                        |     |      |      |      |
| Continuous Body Diode Current   | I <sub>S</sub>       |                                                                                        |     |      | 20   | A    |
| Diode Forward Voltage           | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =10A                                               |     |      | 1.2  | V    |
| Reverse Recovery Time           | t <sub>rr</sub>      | I <sub>F</sub> =10A, dI <sub>F</sub> /dt=100A/μs                                       |     | 27   |      | ns   |
| Reverse Recovery Charge         | Q <sub>rr</sub>      |                                                                                        |     | 32   |      | nC   |
| Dynamic Characteristics         |                      |                                                                                        |     |      |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                                      |     | 1202 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                        |     | 632  |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                        |     | 30   |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A                        |     | 15   |      | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                        |     | 4.2  |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                        |     | 2.5  |      |      |
| Turn-On Delay Time              | t <sub>d(on)</sub>   | V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =10A, R <sub>GEN</sub> =3Ω |     | 27   |      | ns   |
| Turn-On Rise Time               | t <sub>r</sub>       |                                                                                        |     | 14   |      |      |
| Turn-Off Delay Time             | t <sub>d(off)</sub>  |                                                                                        |     | 25   |      |      |
| Turn-Off Fall Time              | t <sub>f</sub>       |                                                                                        |     | 12.8 |      |      |

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

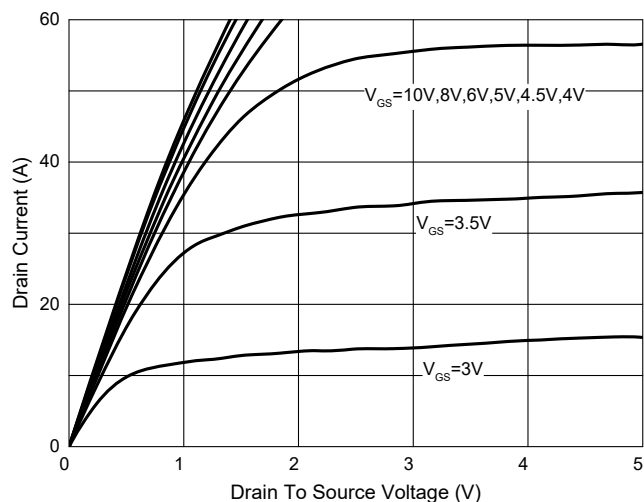


Fig. 2 - Transfer Characteristics

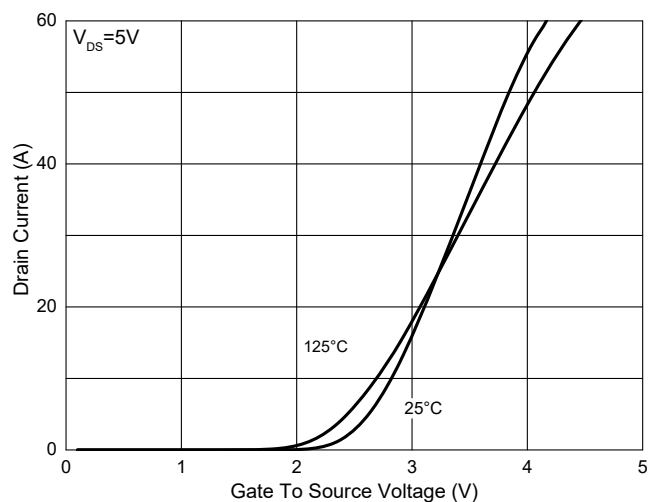


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

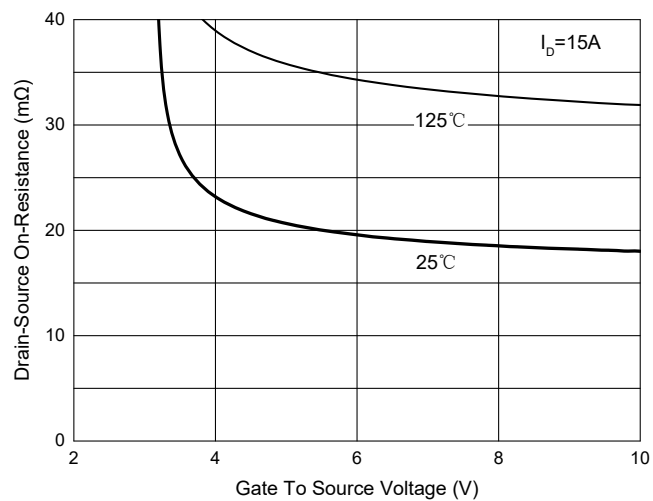


Fig. 4 -  $R_{DS(ON)} - I_D$

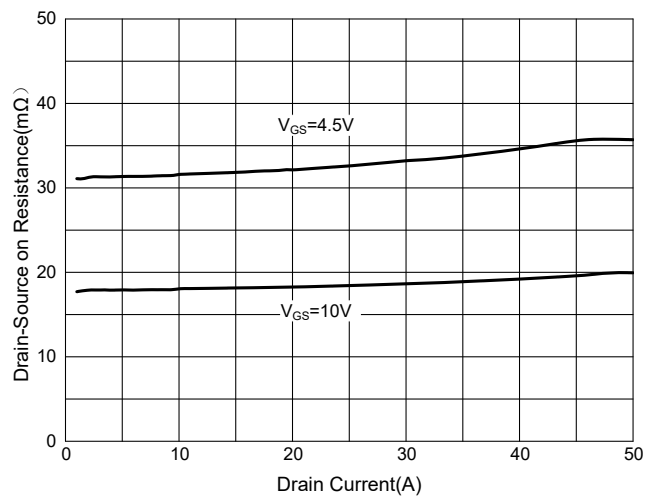


Fig. 5 - Capacitance Characteristics

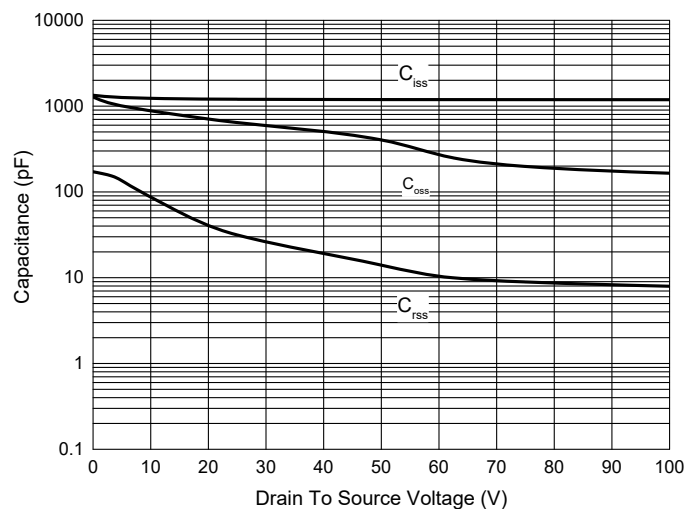
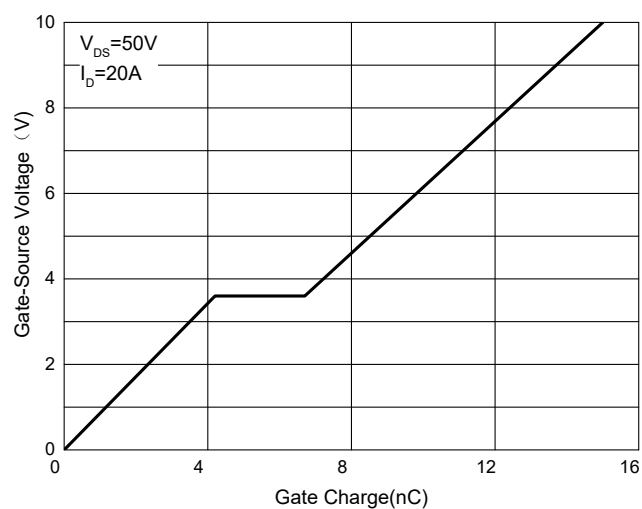


Fig. 6 - Gate Charge



## Curve Characteristics

Fig. 7 - Normalized Threshold voltage

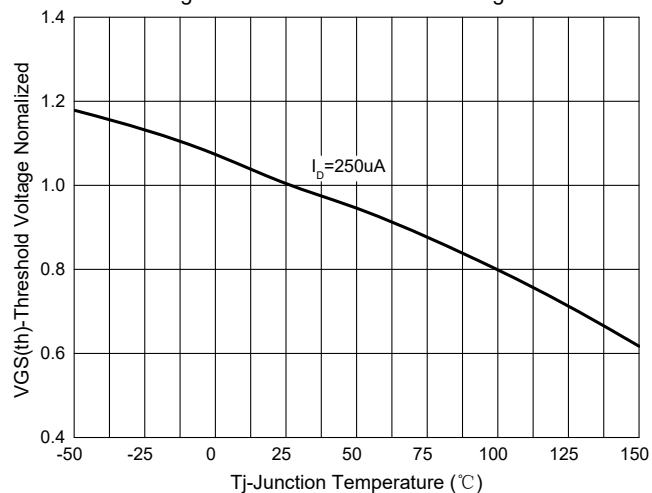


Fig.8-Normalized On Resistance Characteristics

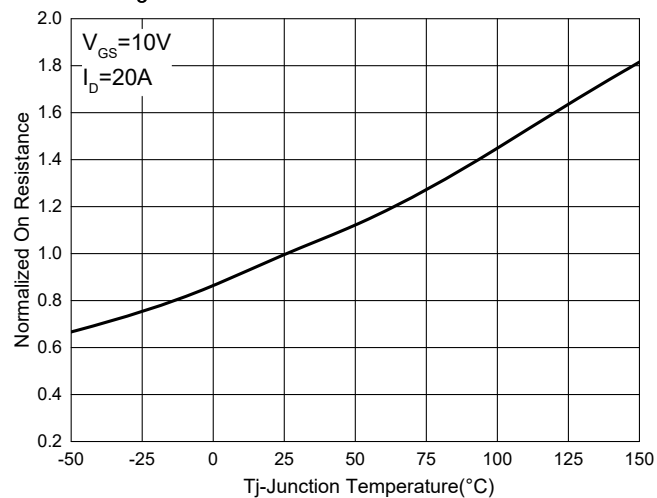


Fig.9 -  $I_S - V_{SD}$

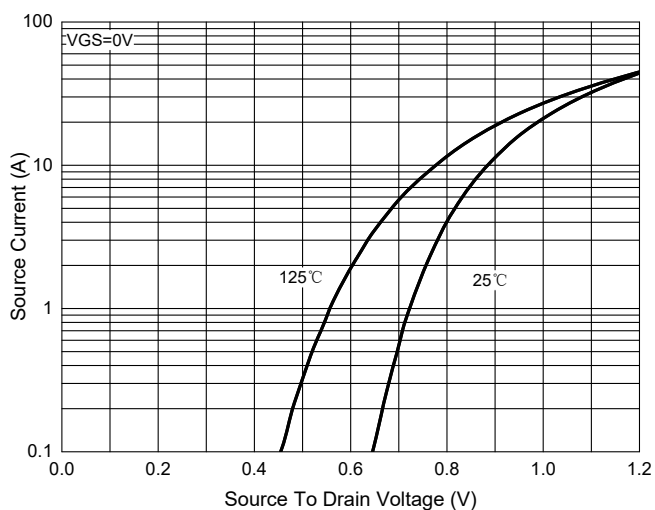


Fig. 10 - Drain Current

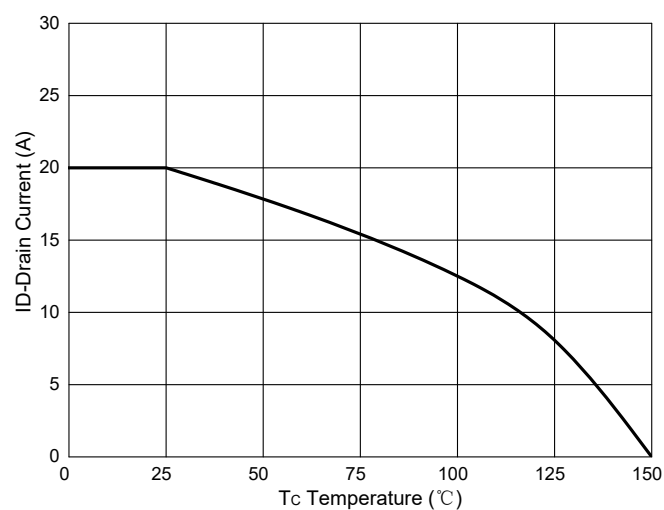
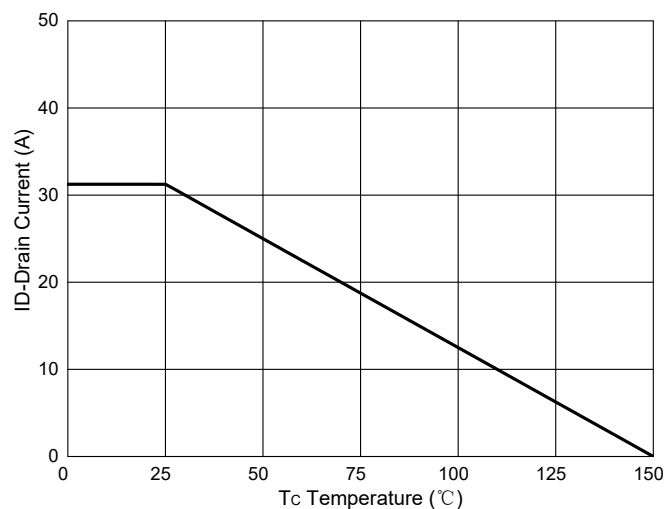


Fig. 10 - Drain Current



## Curve Characteristics

Fig. 12 - Safe Operation Area

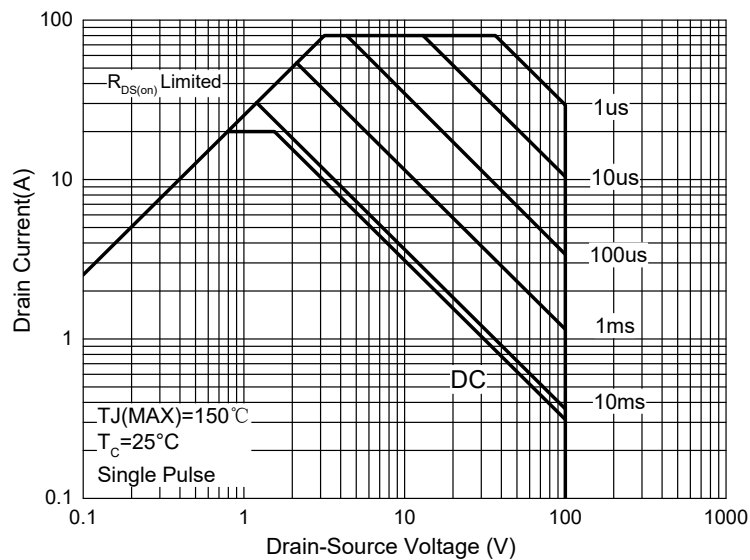
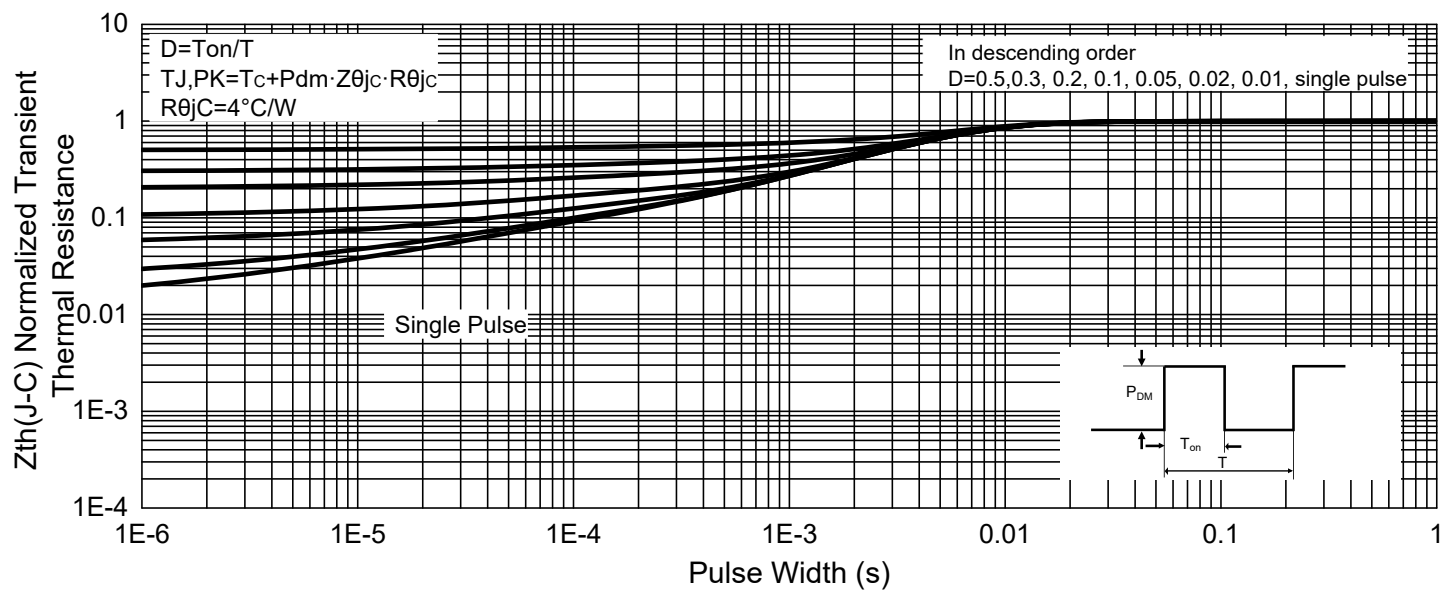


Fig. 13 -Normalized Transient Thermal Impedance



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 5Kpcs/Reel |

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