

## Features

- Low On-resistance and Low Conduction Loss
- Super Junction technology for High Voltage Application
- Soft Switching with Fast Reverse Recovery Diode
- Ultra Low Gate Charge Cause Lower Driving Requirement
- Low impedance Kelvin source pin-out
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free."Green "Device<sup>(Note 1)</sup>
- Lead Free Finish/RoHS Compliant. "P" Suffix Designates RoHS Compliant. See Ordering Information

## Maximum Ratings

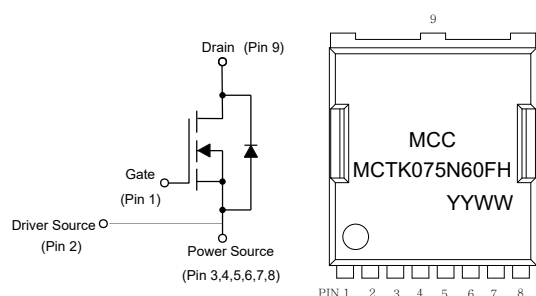
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance Junction to Ambient,Max<sup>(Note 2)</sup>: 62°C/W
- Thermal Resistance Junction to Case,Max : 1.42°C/W

| Parameter                                       | Symbol   | Value                   | Unit |
|-------------------------------------------------|----------|-------------------------|------|
| Drain-Source Voltage                            | $V_{DS}$ | 600                     | V    |
| Gate-Source Voltage                             | $V_{GS}$ | ±30                     | V    |
| Continuous Drain Current                        | $I_D$    | $T_C=25^\circ\text{C}$  | A    |
|                                                 |          | $T_C=100^\circ\text{C}$ |      |
| Pulsed Drain Current <sup>(Note 3)</sup>        | $I_{DM}$ | 78                      | A    |
| Total Power Dissipation, $T_C=25^\circ\text{C}$ | $P_D$    | 88                      | W    |
| Single Avalanche Energy <sup>(Note 4)</sup>     | $E_{AS}$ | 132                     | 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. Device mounted on 1 in2 FR-4 board with 2oz. single-sided Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .
3. Repetitive rating; pulse width limited by max. junction temperature.
4. Starting  $T_J=25^\circ\text{C}$ ,  $V_{DD}=50\text{V}$ ,  $I_{AS}=23\text{A}$ .

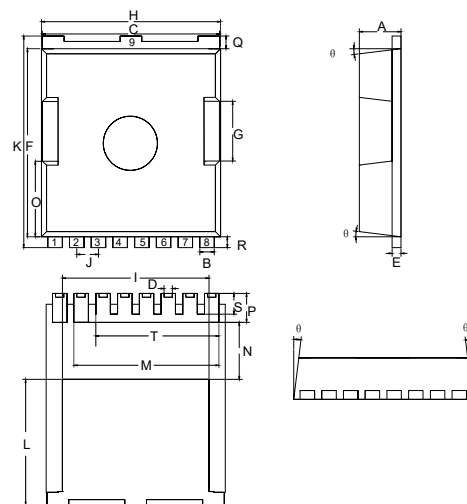
## Internal Structure and Marking Code



Device Code: MCTK075N60FH  
Date Code: YYWW (Year & Week)

# N-CHANNEL Super-Junction Power MOSFET

## TOLL-8L-KS



### DIMENSIONS

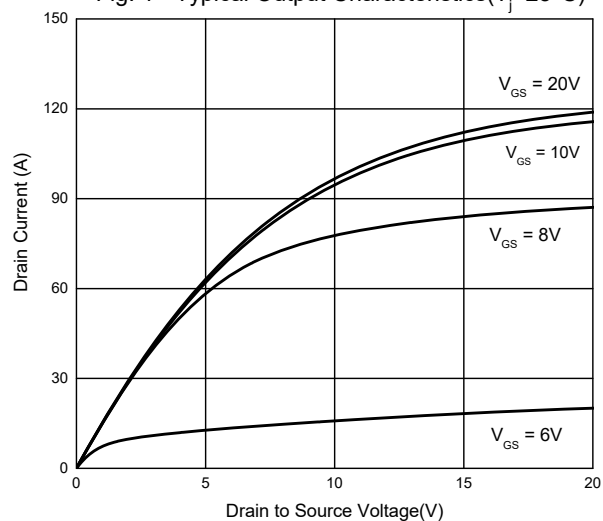
| DIM | INCHES |       | mm    |       | NOTE |
|-----|--------|-------|-------|-------|------|
|     | MIN    | MAX   | MIN   | MAX   |      |
| A   | 0.087  | 0.094 | 2.20  | 2.40  |      |
| B   | 0.028  | 0.035 | 0.70  | 0.90  |      |
| C   | 0.382  | 0.390 | 9.70  | 9.90  |      |
| D   | 0.017  | 0.020 | 0.42  | 0.50  |      |
| E   | 0.016  | 0.024 | 0.40  | 0.60  |      |
| F   | 0.405  | 0.417 | 10.28 | 10.58 |      |
| G   | 0.122  | 0.138 | 3.10  | 3.50  |      |
| H   | 0.382  | 0.398 | 9.70  | 10.10 |      |
| I   | 0.311  | 0.327 | 7.90  | 8.30  |      |
| J   | 0.047  |       | 1.20  |       | BSC  |
| K   | 0.452  | 0.468 | 11.48 | 11.88 |      |
| L   | 0.266  | 0.281 | 6.75  | 7.15  |      |
| M   | 0.315  |       | 8.00  |       |      |
| N   | 0.118  | 0.130 | 3.00  | 3.30  |      |
| O   | 0.157  | 0.172 | 3.98  | 4.38  |      |
| P   | 0.055  | 0.071 | 1.40  | 1.80  |      |
| Q   | 0.024  | 0.031 | 0.60  | 0.80  |      |
| R   | 0.020  | 0.028 | 0.50  | 0.70  |      |
| S   | 0.039  | 0.051 | 1.00  | 1.30  |      |
| θ   | 4°     | 10°   | 4°    | 10°   |      |
| T   | 0.268  |       | 6.80  |       | BSC  |

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

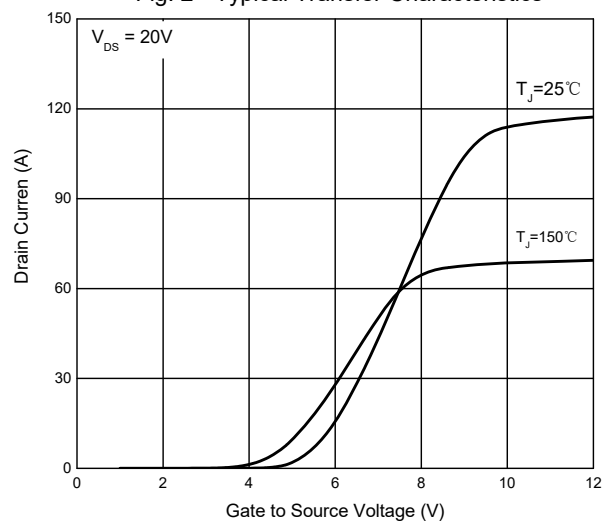
| Parameter                           | Symbol               | Test Conditions                                                                          | Min | Typ  | Max  | Unit |
|-------------------------------------|----------------------|------------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics              |                      |                                                                                          |     |      |      |      |
| Drain-Source Breakdown Voltage      | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =1mA                                                 | 600 |      |      | V    |
| Gate-Source Leakage Current         | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V                                               |     |      | ±100 | nA   |
| Zero Gate Voltage Drain Current     | I <sub>DSS</sub>     | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V                                               |     |      | 10   | μA   |
| Gate-Threshold Voltage              | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =2.8mA                                 | 3   | 4    | 5    | V    |
| Drain-Source On-Resistance          | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                                |     | 65   | 75   | mΩ   |
| Gate Resistance                     | R <sub>g</sub>       | f=1MHz, open drain                                                                       |     | 1    |      | Ω    |
| Diode Characteristics               |                      |                                                                                          |     |      |      |      |
| Diode Forward Voltage               | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                                 |     | 0.9  | 1.2  | V    |
| Reverse Recovery Time               | t <sub>rr</sub>      | V <sub>R</sub> =400V, I <sub>F</sub> =20A<br>dI <sub>F</sub> /dt=100A/μs                 |     | 115  |      | ns   |
| Reverse Recovery Charge             | Q <sub>rr</sub>      |                                                                                          |     | 723  |      | nC   |
| Peak Reverse Recovery Current       | I <sub>rrm</sub>     |                                                                                          |     | 11   |      | A    |
| Dynamic Characteristics             |                      |                                                                                          |     |      |      |      |
| Input Capacitance                   | C <sub>iss</sub>     | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1MHz                                       |     | 3202 |      | pF   |
| Output Capacitance                  | C <sub>oss</sub>     |                                                                                          |     | 135  |      |      |
| Output capacitance - energy related | C <sub>o(er)</sub>   | V <sub>DS</sub> =0 to 400V, V <sub>GS</sub> =0V                                          |     | 132  |      |      |
| Output capacitance - time related   | C <sub>o(tr)</sub>   |                                                                                          |     | 857  |      |      |
| Total Gate Charge                   | Q <sub>g</sub>       | V <sub>DS</sub> =400V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A                         |     | 81   |      | nC   |
| Gate-Source Charge                  | Q <sub>gs</sub>      |                                                                                          |     | 21   |      |      |
| Gate-Drain Charge                   | Q <sub>gd</sub>      |                                                                                          |     | 41   |      |      |
| Turn-On Delay Time                  | t <sub>d(on)</sub>   | V <sub>DD</sub> =400V, V <sub>GS</sub> =10V<br>R <sub>G</sub> =5.6Ω, I <sub>D</sub> =20A |     | 113  |      | ns   |
| Turn-On Rise Time                   | t <sub>r</sub>       |                                                                                          |     | 34   |      |      |
| Turn-Off Delay Time                 | t <sub>d(off)</sub>  |                                                                                          |     | 57   |      |      |
| Turn-Off Fall Time                  | t <sub>f</sub>       |                                                                                          |     | 15   |      |      |

**Typical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

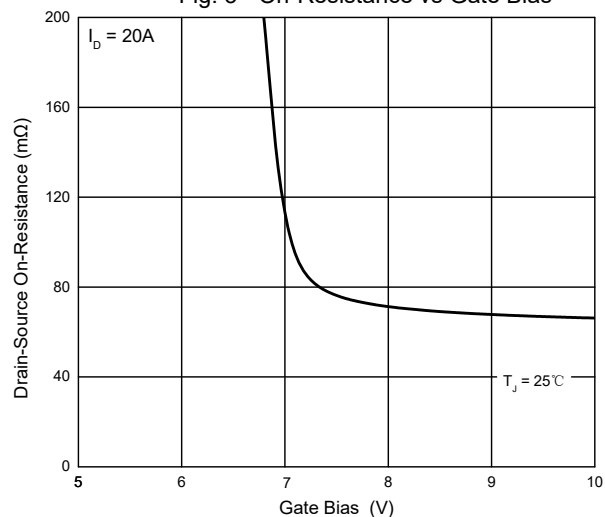
**Fig. 1 - Typical Output Characteristics**( $T_J=25^\circ\text{C}$ )



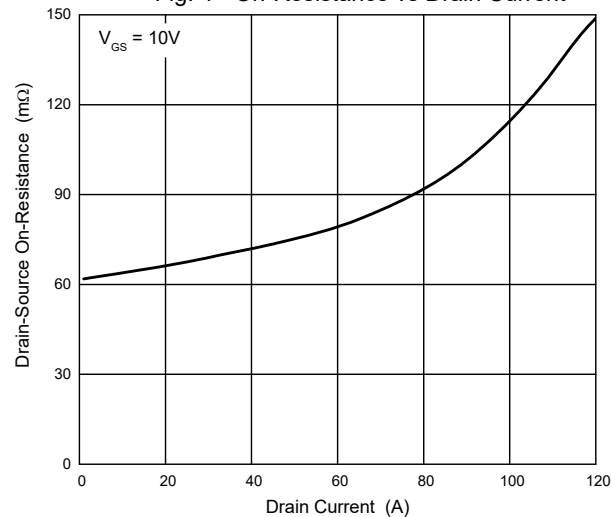
**Fig. 2 - Typical Transfer Characteristics**



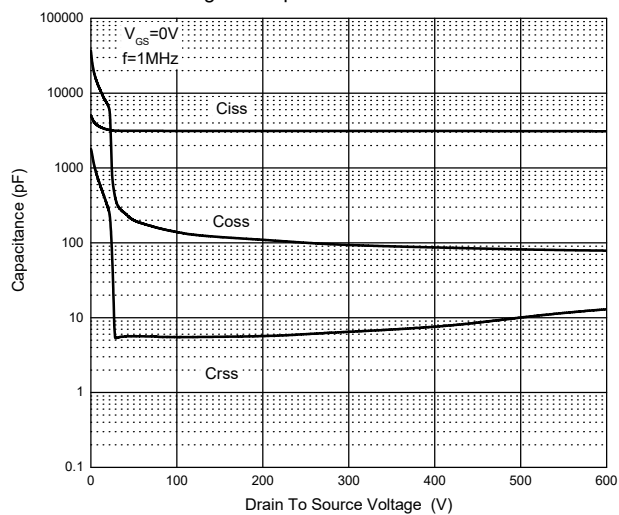
**Fig. 3 - On-Resistance vs Gate Bias**



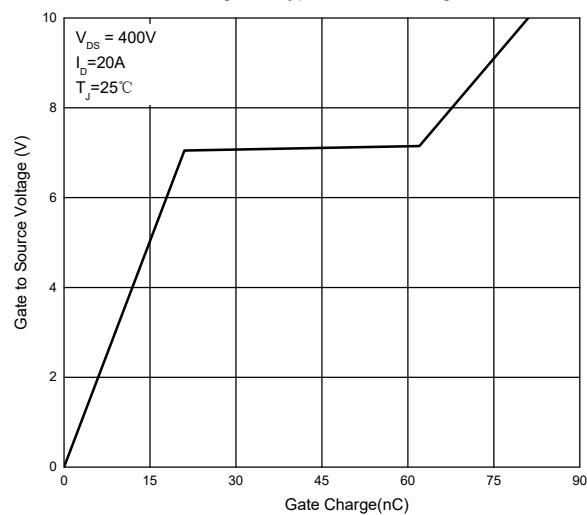
**Fig. 4 - On-Resistance vs Drain Current**



**Fig. 5 - Capacitance Characteristic**



**Fig. 6 - Typical Gate Charge**



Typical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Fig. 7 - Gate-Threshold Voltage vs Junction Temperature

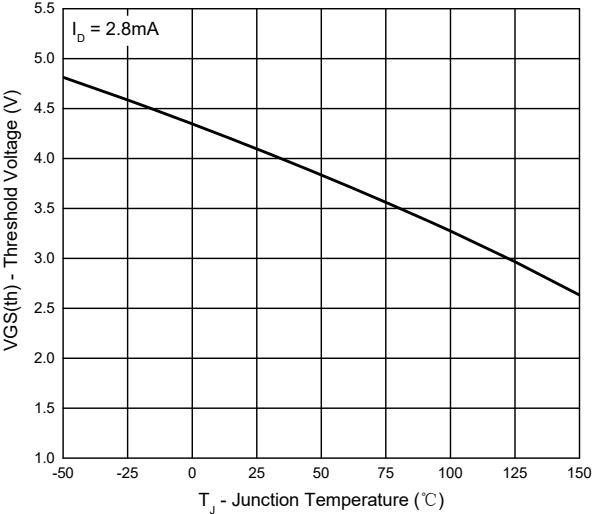


Fig. 8 - Normalized On-Resistance

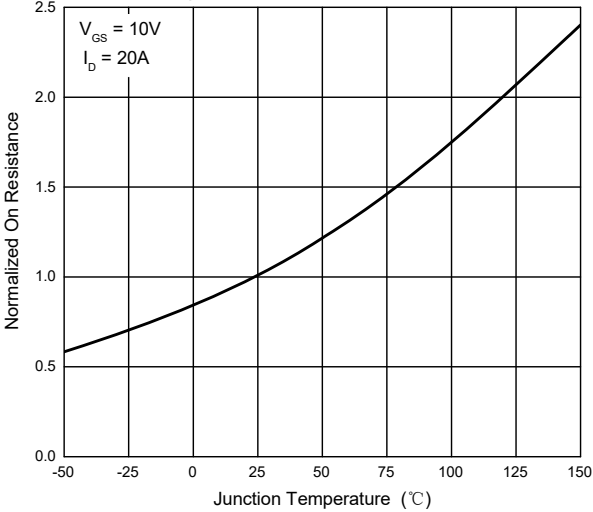


Fig. 9 - Forward Characteristics

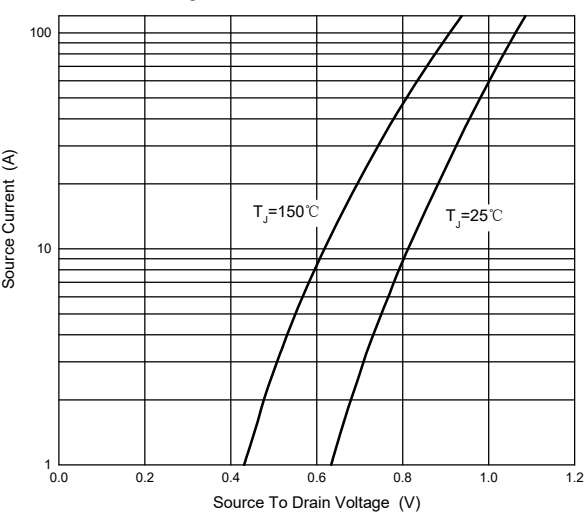


Fig. 10 - Drain Current

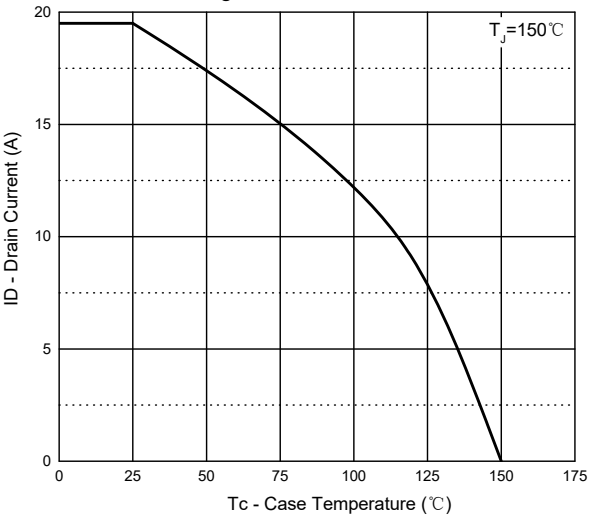


Fig. 11 - Power Dissipation

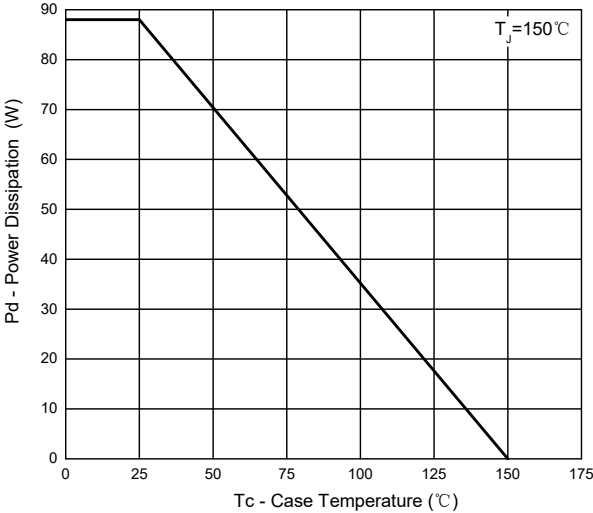
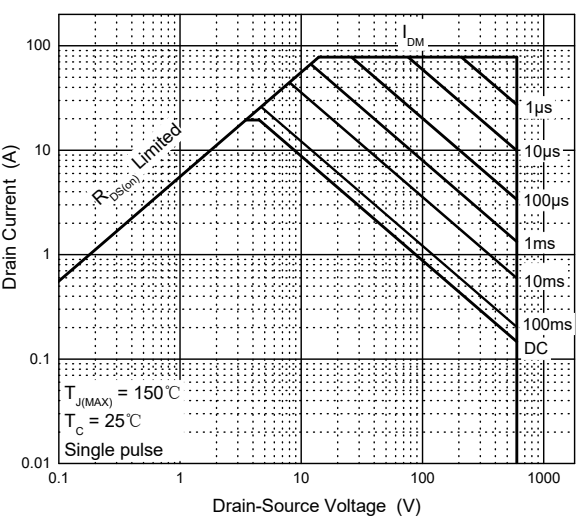
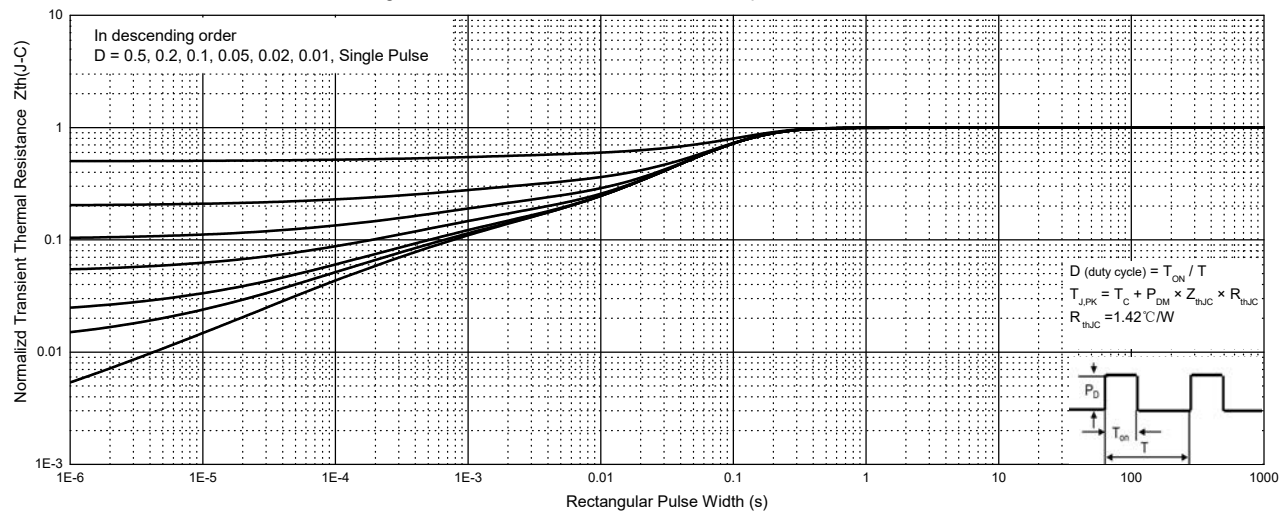


Fig. 12- Safe Operating Area



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

Fig.13 - Normalized Transient Thermal Impedance, Junction-Case



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 2Kpcs/Reel |

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