

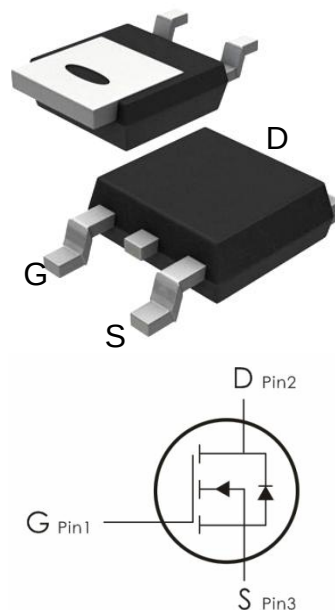
## Description:

This N-Channel MOSFET uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge.

It can be used in a wide variety of applications.

## Features:

- 1)  $V_{DS}=30V, I_D=25A, R_{DS(on)} < 20m\Omega @ V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low  $R_{DS(on)}$ .
- 5) Excellent package for good heat dissipation.



## Package Marking and Ordering Information:

| Part NO.      | Marking | Package | Packing       |
|---------------|---------|---------|---------------|
| MTD20N03HL-DO | 20N03HL | TO- 252 | 2500 pcs/Reel |

## Absolute Maximum Ratings: ( $T_C=25^{\circ}C$ unless otherwise noted)

| Symbol         | Parameter                                        | Ratings  | Units       |
|----------------|--------------------------------------------------|----------|-------------|
| $V_{DS}$       | Drain-Source Voltage                             | 30       | V           |
| $V_{GS}$       | Gate-Source Voltage                              | $\pm 20$ | V           |
| $I_D$          | Continuous Drain Current                         | 25       | A           |
|                | Continuous Drain Current- $T_C=100^{\circ}C$     | 12       |             |
| $I_{DM}$       | Pulsed Drain Current <sup>1</sup>                | 80       |             |
| $P_D$          | Power Dissipation                                | 22       | W           |
| $E_{AS}$       | Single pulse avalanche energy <sup>2</sup>       | 18       | mJ          |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55-+150 | $^{\circ}C$ |

## Thermal Characteristics:

| Symbol          | Parameter                            | Max | Units         |
|-----------------|--------------------------------------|-----|---------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 5.7 | $^{\circ}C/W$ |

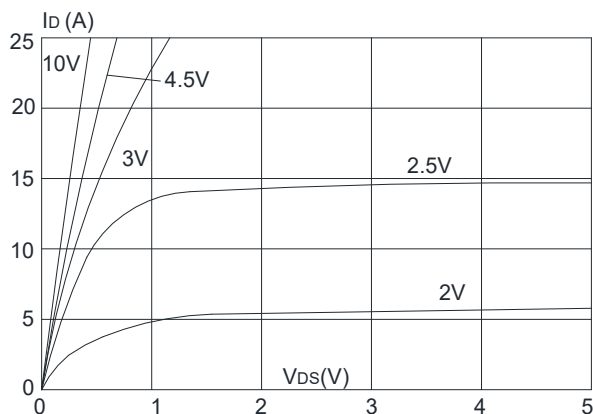
## Electrical Characteristics: ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Symbol                             | Parameter                               | Conditions                                                                               | Min | Typ  | Max   | Units |
|------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------|-----|------|-------|-------|
| Off Characteristics                |                                         |                                                                                          |     |      |       |       |
| BV <sub>DSS</sub>                  | Drain-Sourtce Breakdown Voltage         | V <sub>GS</sub> =0V, I <sub>D</sub> =250 μ A                                             | 30  | ---  | ---   | V     |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current         | V <sub>GS</sub> =0V, V <sub>DS</sub> =30V                                                | --- | ---  | 1     | μ A   |
| I <sub>GSS</sub>                   | Gate-Source Leakage Current             | V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0A                                              | --- | ---  | ± 100 | nA    |
| On Characteristics                 |                                         |                                                                                          |     |      |       |       |
| V <sub>GS(th)</sub>                | Gate-Source Threshold Voltage           | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 μ A                               | 1.2 | 1.5  | 2.5   | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =5A                                                 | --- | 15   | 20    | m Ω   |
|                                    |                                         | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A                                                | --- | 22   | 28    | m Ω   |
| Dynamic Characteristics            |                                         |                                                                                          |     |      |       |       |
|                                    |                                         |                                                                                          |     |      |       |       |
| C <sub>iss</sub>                   | Input Capacitance                       | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                        | --- | 489  | ---   | pF    |
| C <sub>oss</sub>                   | Output Capacitance                      |                                                                                          | --- | 78   | --    |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance            |                                                                                          | --- | 60   | ---   |       |
| Switching Characteristics          |                                         |                                                                                          |     |      |       |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                      | V <sub>DS</sub> =15V, I <sub>D</sub> =3A,<br>R <sub>ENG</sub> =3 Ω ,V <sub>GS</sub> =10V | --- | 4.4  | ---   | ns    |
| t <sub>r</sub>                     | Rise Time                               |                                                                                          | --- | 2.4  | ---   | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                     |                                                                                          | --- | 14.4 | ---   | ns    |
| t <sub>f</sub>                     | Fall Time                               |                                                                                          | --- | 3.4  | ---   | ns    |
| Q <sub>gs</sub>                    | Total Gate Charge                       | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V,<br>I <sub>D</sub> =5.8A                      | --- | 5.1  | ---   | nC    |
| Q <sub>gd</sub>                    | Gate-Source Charge                      |                                                                                          | --- | 0.8  | ---   | nC    |
| Q <sub>g</sub>                     | Gate-Drain “Miller” Charge              |                                                                                          | --- | 5.2  | ---   | nC    |
| Drain-Source Diode Characteristics |                                         |                                                                                          |     |      |       |       |
| V <sub>SD</sub>                    | Diode Forward Voltage                   | V <sub>GS</sub> =0V, I <sub>SD</sub> =12A                                                | --- | ---  | 1.2   | V     |
| I <sub>S</sub>                     | Continuous Drain Curren                 | V <sub>D</sub> =V <sub>G</sub> =0V                                                       | --- | ---  | 25    | A     |
| I <sub>SM</sub>                    | Pulsed Drain Current                    |                                                                                          | --- | ---  | 80    | A     |

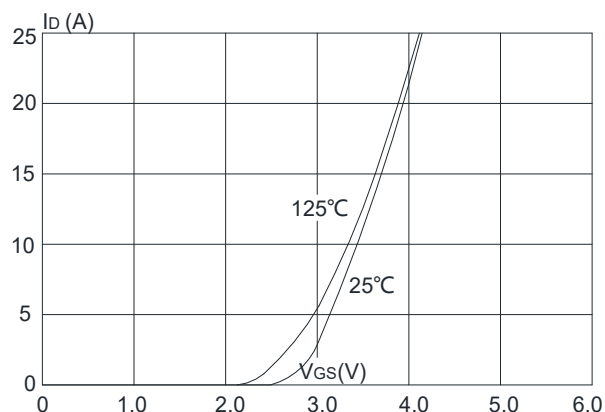
## Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition :  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=15\text{V}$ ,  $V_G=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$ ,  $I_{AS}=6.6\text{A}$
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$ , Duty Cycle $\leq 0.5\%$

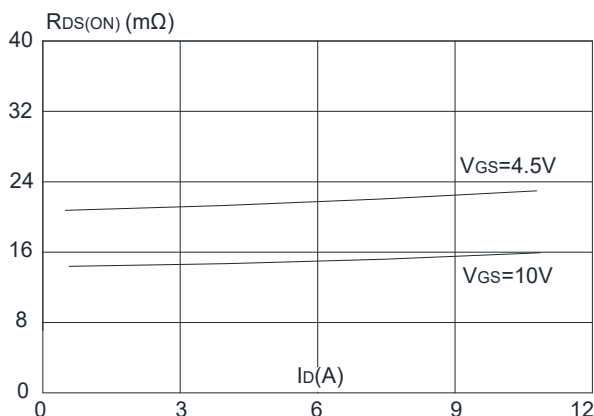
## Typical Characteristics: ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)



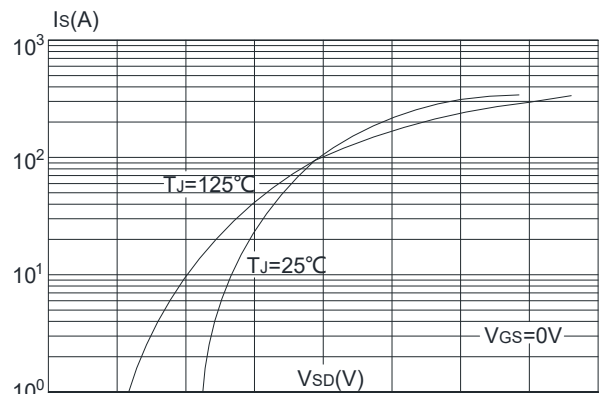
**Figure 1:** Output Characteristics



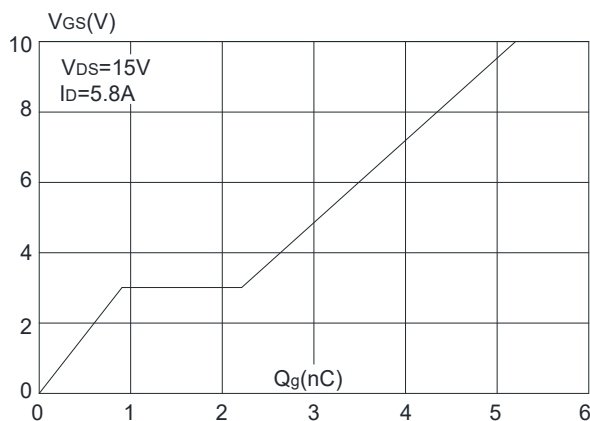
**Figure 2:** Typical Transfer Characteristics



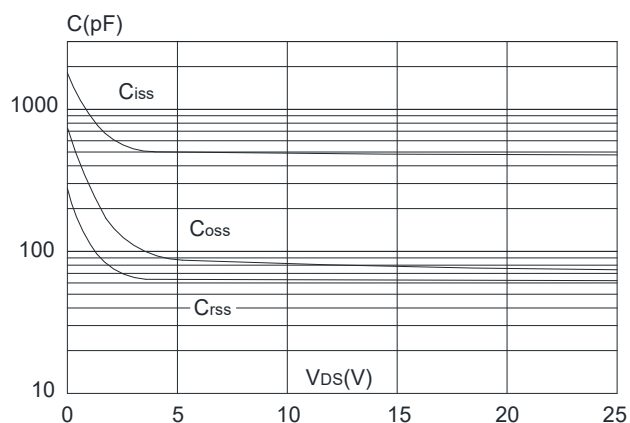
**Figure 3:** On-resistance vs. Drain Current



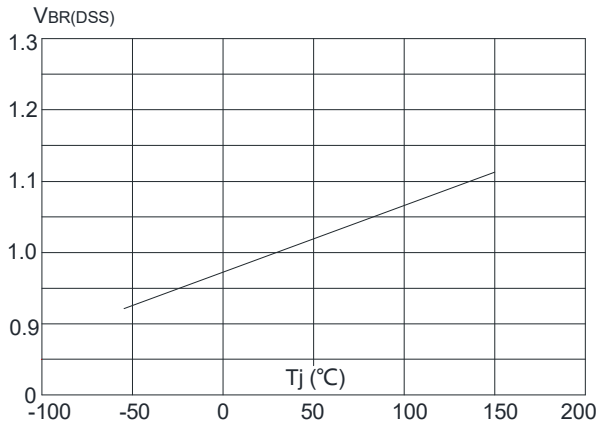
**Figure 4:** Body Diode Characteristics



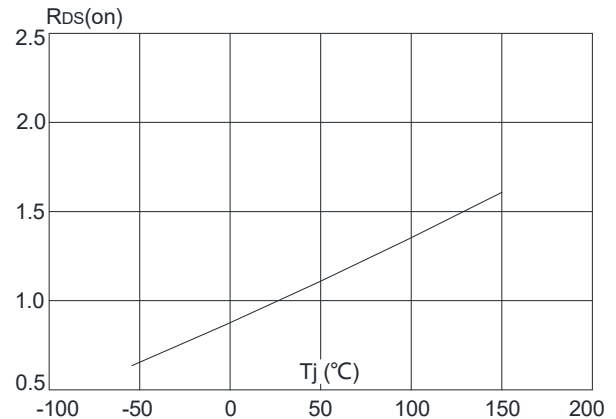
**Figure 5:** Gate Charge Characteristics



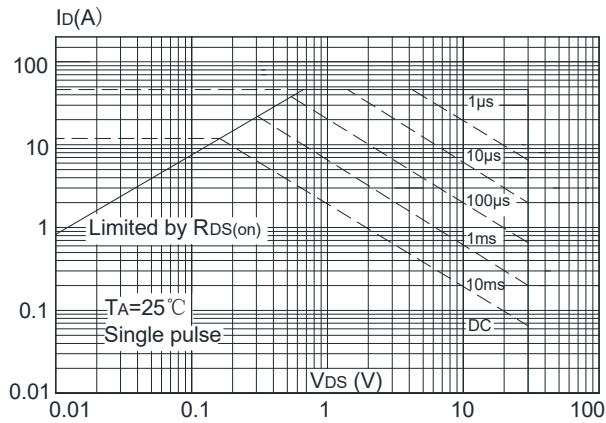
**Figure 6:** Capacitance Characteristics



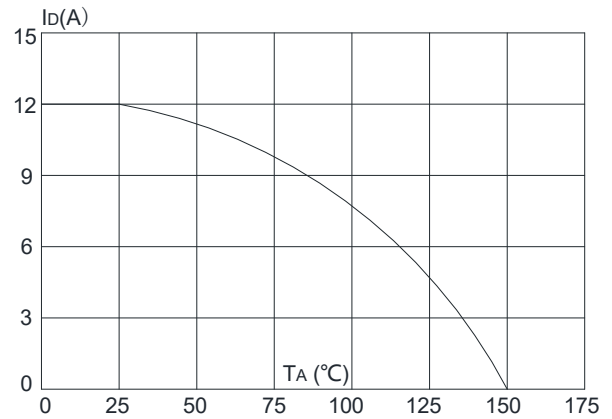
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



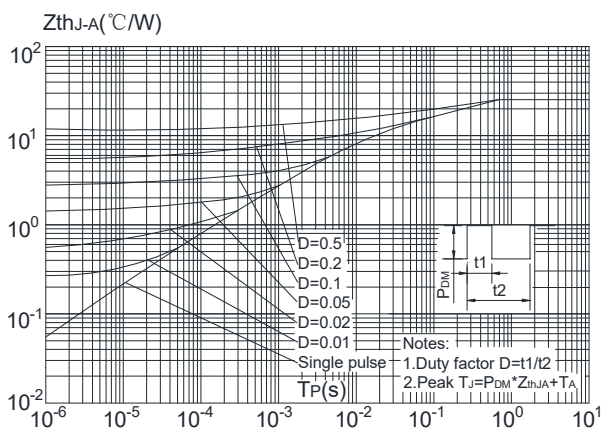
**Figure 8:** Normalized on Resistance vs. Junction Temperature



**Figure 9:** Maximum Safe Operating Area



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

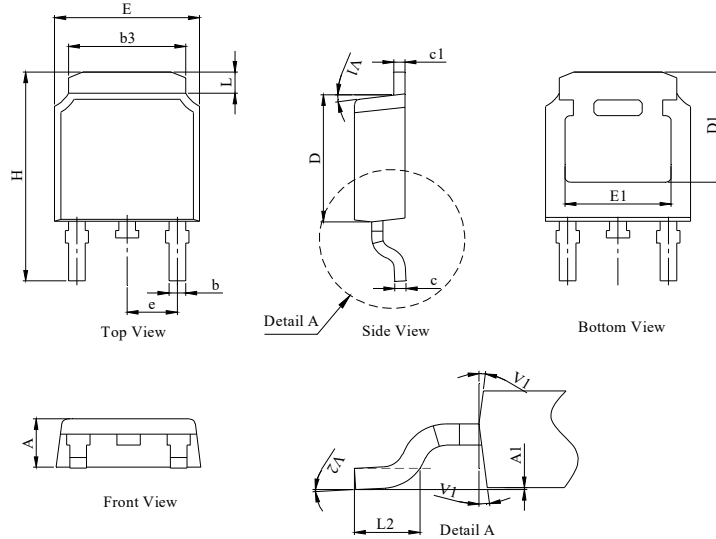


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

## TO-252 Package Information

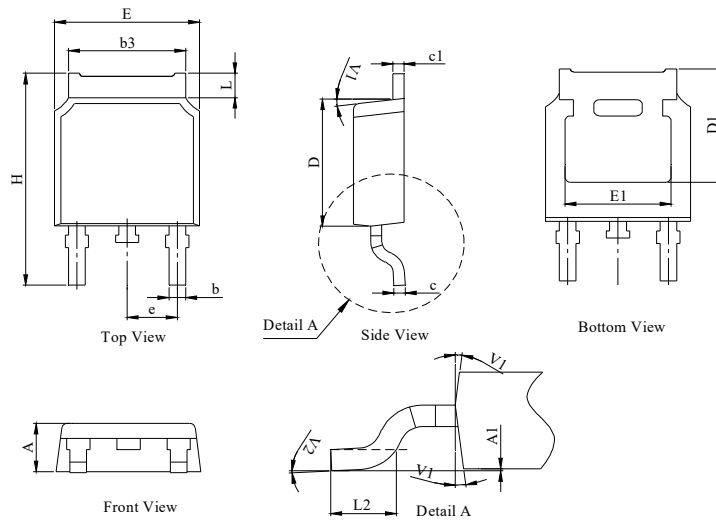
**Package Outline Type-A**

UNIT: mm



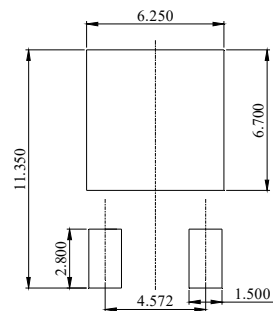
| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 2.18       | 2.30  | 2.39  |
| A1   | 0          | --    | 0.13  |
| b    | 0.64       | 0.76  | 0.89  |
| c    | 0.40       | 0.50  | 0.61  |
| c1   | 0.46       | 0.50  | 0.58  |
| D    | 5.97       | 6.10  | 6.23  |
| D1   | 5.05       | --    | --    |
| E    | 6.35       | 6.60  | 6.73  |
| E1   | 4.32       | --    | --    |
| b3   | 5.21       | 5.38  | 5.55  |
| e    | 2.29 BSC   |       |       |
| H    | 9.40       | 10.00 | 10.40 |
| L    | 0.89       | --    | 1.27  |
| L2   | 1.40       | --    | 1.78  |
| V1   | 7° REF     |       |       |
| V2   | 0°         | --    | 6°    |

**Package Outline Type-B**



| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 2.10       | 2.30  | 2.40  |
| A1   | 0          | --    | 0.13  |
| b    | 0.66       | 0.76  | 0.86  |
| b3   | 5.21       | 5.38  | 5.55  |
| c    | 0.40       | 0.50  | 0.60  |
| c1   | 0.44       | 0.50  | 0.58  |
| D    | 5.90       | 6.10  | 6.30  |
| D1   | 5.30REF    |       |       |
| E    | 6.40       | 6.60  | 6.80  |
| E1   | 4.63       | -     | -     |
| e    | 2.29 BSC   |       |       |
| H    | 9.50       | 10.00 | 10.70 |
| L    | 1.09       | --    | 1.21  |
| L2   | 1.35       | --    | 1.65  |
| V1   | 7° REF     |       |       |
| V2   | 0°         | --    | 6°    |

**Recommended Soldering Footprint**



## Marking Information:

①. Doingter LOGO

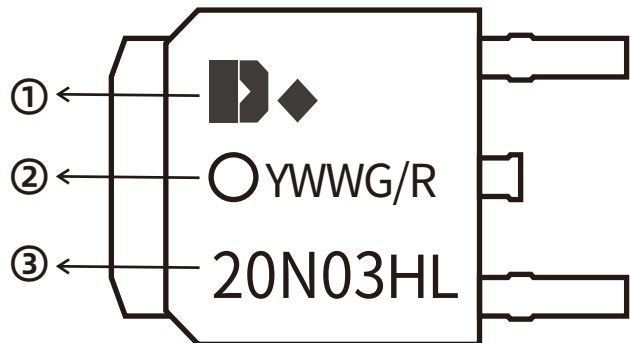
②. Date Code(YWWG / R)

Y : Year Code , last digit of the year

WW : Week Code(01-53)

G/R : G(Green) /R(Lead Free)

③. Part NO.



## Previous Version

| Version | Date       | Subjects (major changes since last revision) |
|---------|------------|----------------------------------------------|
| 1.0     | 2024-07-08 | Release of final version                     |

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