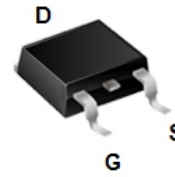


# CMS30N06D-HF

**N-Channel**  
**RoHS Device**  
**Halogen Free**

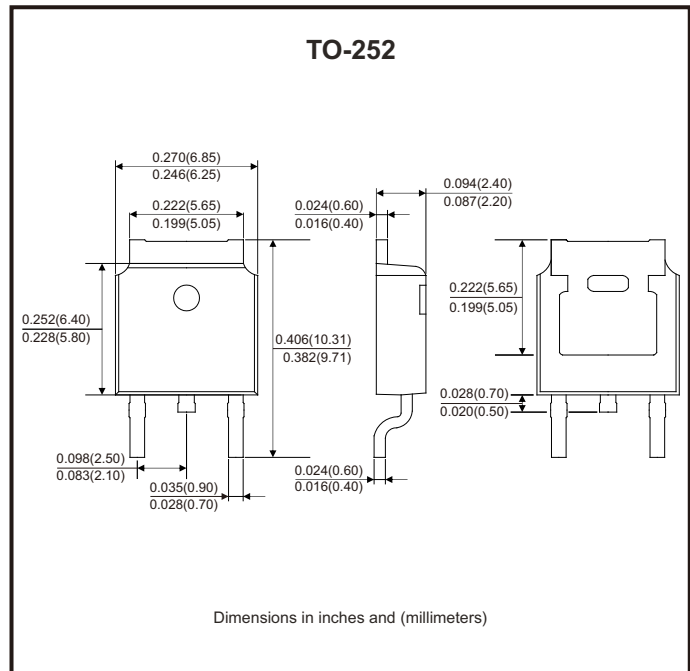


## Features

- Super low gate charge.
- Excellent  $C_{dv}/dt$  effect decline.
- Advanced high cell density tench technology.

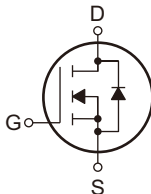
## Mechanical data

- Case: TO-252, molded plastic.
- Molding compound: UL flammability classification rating 94V-0.
- Terminals: Matte tin-plated leads, solderability-per MIL-STD-202, method 208.



## Circuit Diagram

- G : Gate
- S : Source
- D : Drain



## Maximum Ratings (at TA=25°C unless otherwise noted)

| Parameter   | Symbol          | Value       | Unit |
|---|-----------------|-------------|------|
| Drain-source voltage  | $V_{DSS}$       | 60          | V    |
| Gate-source voltage   | $V_{GSS}$       | ±20         | V    |
| Continuous drain current ( $T_C=25^\circ\text{C}$ ) (Note 1)  | $I_D$           | 30          | A    |
| Continuous drain current ( $T_C=100^\circ\text{C}$ ) (Note 1) | $I_D$           | 20          |      |
| Pulsed drain current  | $I_{DM}$        | 120         | A    |
| Single pulse avalanche energy (Note 3)                        | $E_{AS}$        | 40          | mJ   |
| Power dissipation ( $T_C=25^\circ\text{C}$ ) (Note 4)         | $P_D$           | 30          | W    |
| Thermal resistance junction to case (Note 1)                  | $R_{\theta JC}$ | 4.2         | °C/W |
| Operating junction temperature range                          | $T_J$           | -55 to +175 | °C   |
| Storage temperature range                                     | $T_{STG}$       | -55 to +175 | °C   |

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

| Parameter                                    | Symbol       | Conditions   | Min | Typ  | Max       | Unit       |
|--|--------------|--|-----|------|-----------|------------|
| <b>Static Characteristics</b>                |              |  |     |      |           |            |
| Drain-source breakdown voltage               | $V_{DSS}$    | $V_{GS} = 0V, I_D = 250\mu A$                              | 60  |      |           | V          |
| Zero gate voltage drain current              | $I_{DSS}$    | $V_{DS} = 48V, V_{GS} = 0V$                                |     |      | 1         | $\mu A$    |
| Gate-body leakage current                    | $I_{GSS}$    | $V_{GS} = \pm 20V, V_{DS} = 0V$                            |     |      | $\pm 100$ | nA         |
| <b>On Characteristics</b>                    |              |  |     |      |           |            |
| Static drain-source on-resistance (Note 2)   | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 20A$                                  |     | 12   | 20        | m $\Omega$ |
|  | $R_{DS(on)}$ | $V_{GS} = 4.5V, I_D = 15A$                                 |     | 16   | 24        | m $\Omega$ |
| Gate threshold voltage                       | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$                          | 1   | 1.7  | 2.5       | V          |
| <b>Dynamic Characteristics</b>               |              |  |     |      |           |            |
| Input capacitance                            | $C_{iss}$    | $V_{GS} = 0V, V_{DS} = 15V, f = 1MHz$                      |     | 1880 |           | pF         |
| Output capacitance                           | $C_{oss}$    |  |     | 170  |           |            |
| Reverse transfer capacitance                 | $C_{rss}$    |  |     | 140  |           |            |
| <b>Switching Characteristics</b>             |              |  |     |      |           |            |
| Turn-on delay time                           | $t_{d(on)}$  | $V_{DD} = 30V, V_{GS} = 10V$<br>$R_G = 3\Omega, I_D = 15A$ |     | 7.4  |           | ns         |
| Turn-on rise time                            | $t_r$        |  |     | 5.1  |           |            |
| Turn-off delay time                          | $t_{d(off)}$ |  |     | 28.3 |           |            |
| Turn-off fall time                           | $t_f$        |  |     | 5.5  |           |            |
| Total gate charge                            | $Q_g$        | $V_{DD} = 48V, V_{GS} = 10V, I_D = 15A$                    |     | 36   |           | nC         |
| Gate to source charge                        | $Q_{gs}$     |  |     | 4.7  |           |            |
| Gate to drain (miller) charge                | $Q_{gd}$     |  |     | 9    |           |            |
| <b>Source-Drain Diode Characteristics</b>    |              |  |     |      |           |            |
| Diode forward voltage (Note 2)               | $V_{SD}$     | $I_{SD} = 5A, V_{GS} = 0V, T_J = 25^\circ\text{C}$         |     | 0.79 | 1.2       | V          |
| Drain continuous forward current (Note 1, 4) | $I_S$        |  |     |      | 30        | A          |
| Reverse recovery time                        | $t_{rr}$     | $V_R = 50V, I_F = 15A, di/dt = 100A/\mu s$                 |     | 26   |           | ns         |
| Reverse recovery charge                      | $Q_{rr}$     |  |     |      | 18        |            |

- Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.  
 2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .  
 3. The EAS data shows Max. rating. The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH$ .  
 4. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

## Rating and Characteristic Curves (CMS30N06D-HF)

Fig.1 - Output Characteristics

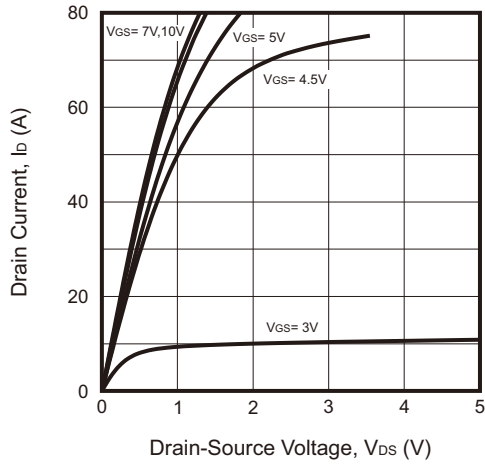


Fig.2 - On-Resistance vs. Drain Current and Gate Voltage

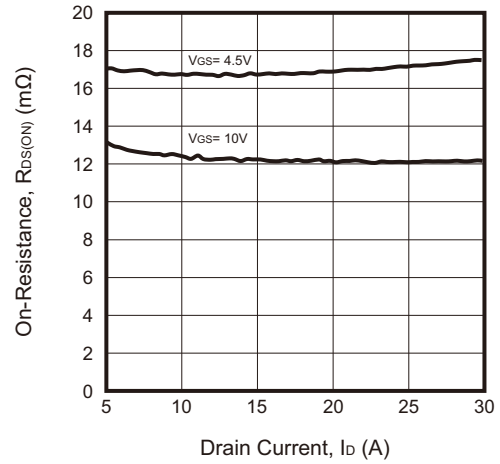


Fig.3 - On-Resistance vs. Gate-Source Voltage

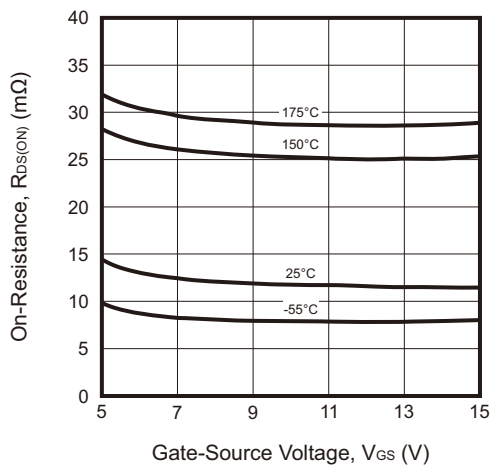


Fig.4 - Body-Diode Characteristics

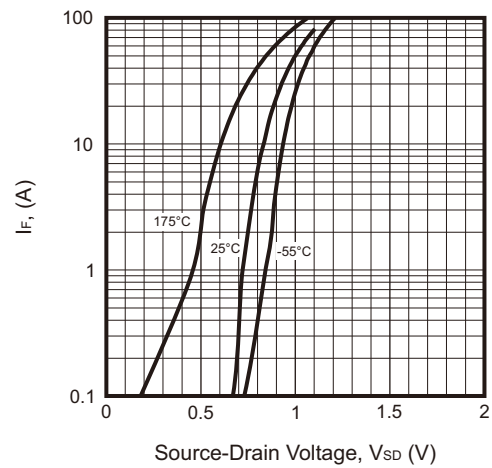


Fig.5 - On-Resistance vs. Junction Temperature

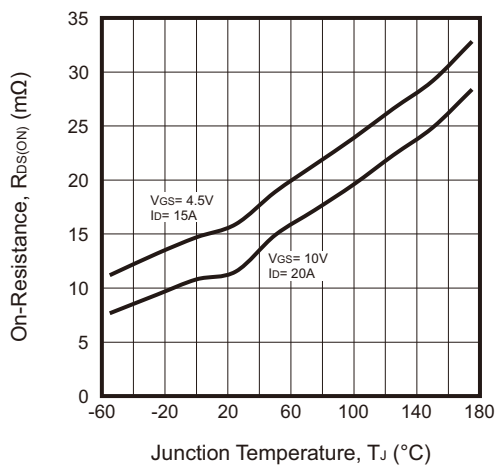
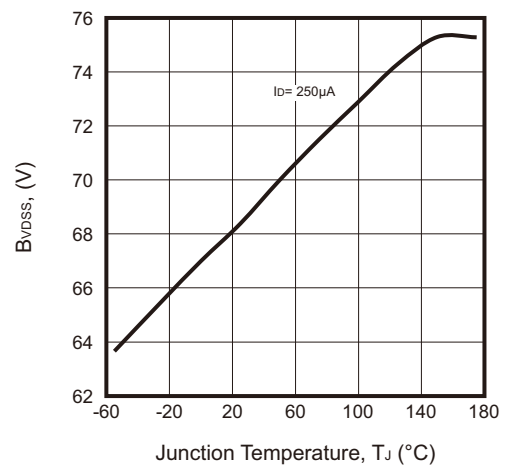


Fig.6 - Drain Source vs. Junction Temperature



## Rating and Characteristic Curves (CMS30N06D-HF)

Fig.7 - Capacitance Characteristics

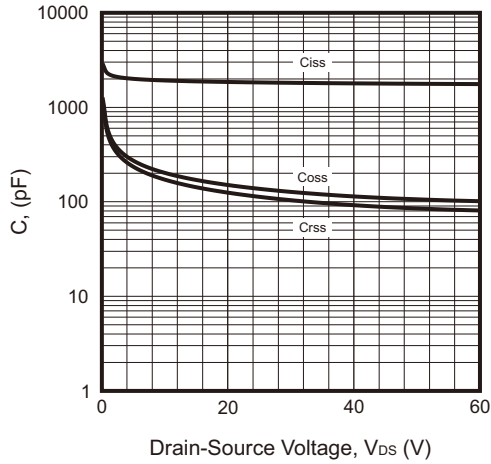


Fig.8 - Gate Voltage vs. Junction Temperature

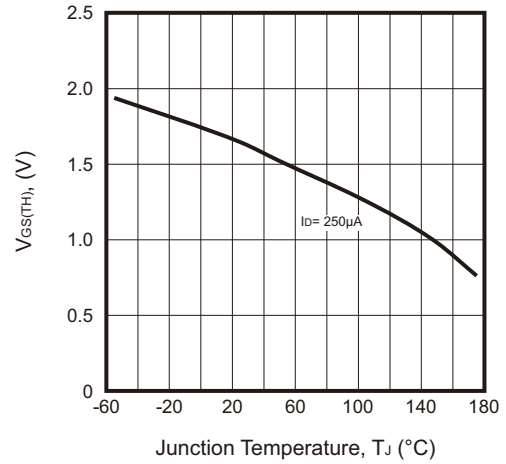


Fig.9 - Transfer Characteristics

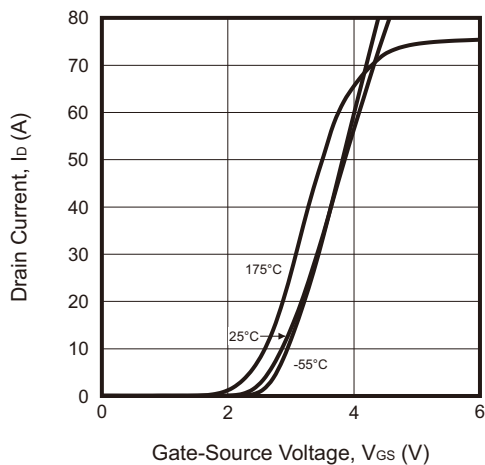


Fig.10 - Gate-Charge Characteristics

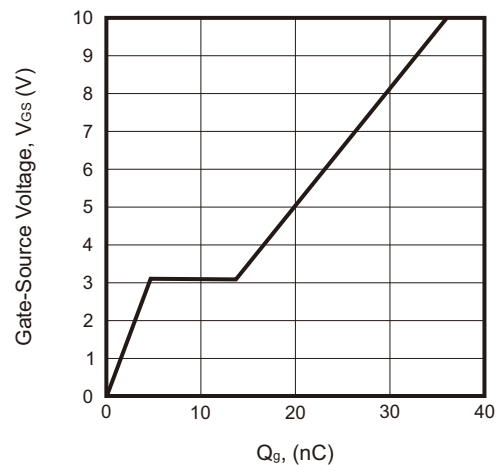
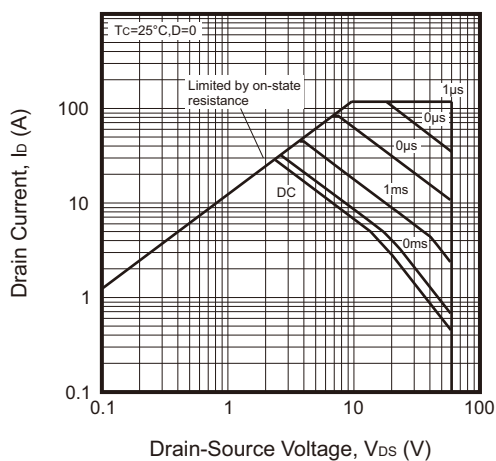
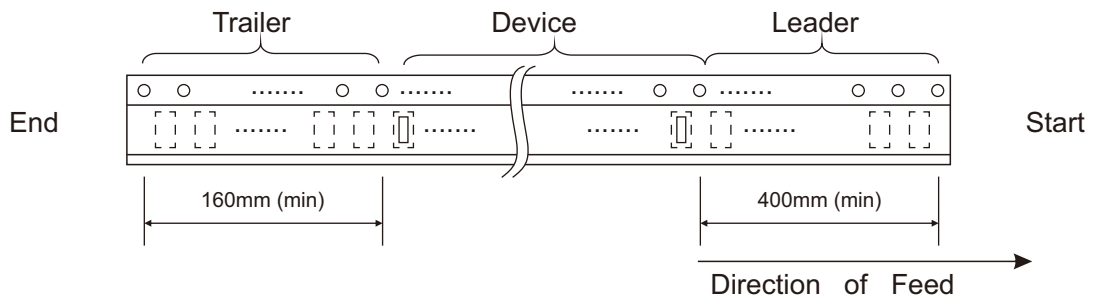
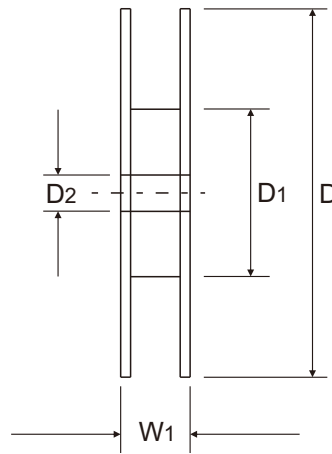
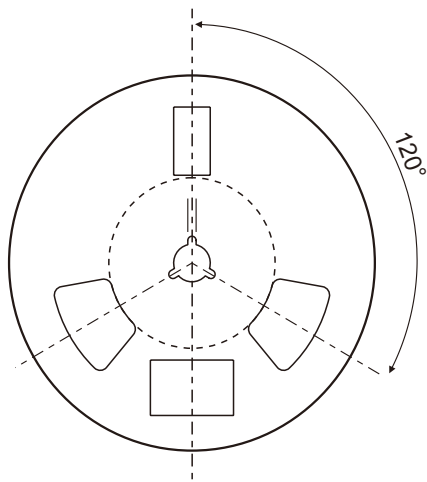
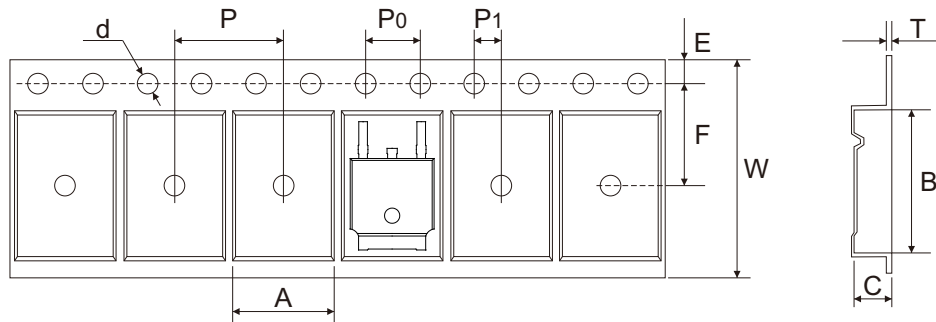


Fig.11 - Maximum Safe Operating Area



Reel Taping Specification

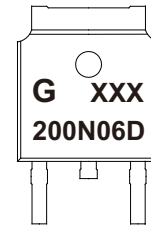


|        | SYMBOL | A             | B             | C             | d             | D              | D1            | D2            |
|--------|--------|---------------|---------------|---------------|---------------|----------------|---------------|---------------|
| TO-252 | (mm)   | 6.90 ± 0.10   | 10.50 ± 0.10  | 2.70 ± 0.10   | 1.50 + 0.25   | 330 ± 1.00     | 100 ± 1.00    | 13.00 ± 0.20  |
|        | (inch) | 0.272 ± 0.004 | 0.413 ± 0.004 | 0.106 ± 0.004 | 0.059 + 0.010 | 12.992 ± 0.039 | 3.937 ± 0.039 | 0.512 ± 0.008 |

|        | SYMBOL | E             | F             | P             | P0            | P1            | T             | W                        | W1            |
|--------|--------|---------------|---------------|---------------|---------------|---------------|---------------|--------------------------|---------------|
| TO-252 | (mm)   | 1.75 ± 0.10   | 7.50 ± 0.10   | 8.00 ± 0.10   | 4.00 ± 0.10   | 2.00 ± 0.10   | 0.30 ± 0.10   | 16.00 + 0.30<br>- 0.20   | 21.00 ± 0.30  |
|        | (inch) | 0.069 ± 0.004 | 0.295 ± 0.004 | 0.315 ± 0.004 | 0.157 ± 0.004 | 0.079 ± 0.004 | 0.012 ± 0.004 | 0.630 + 0.012<br>- 0.008 | 0.827 ± 0.012 |

## Marking Code

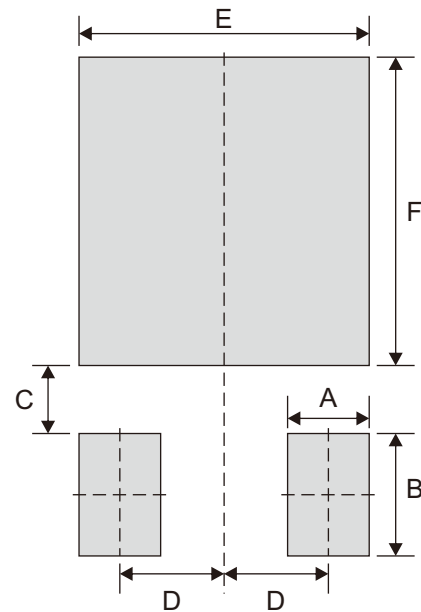
| Part Number  | Marking Code |
|--------------|--------------|
| CMS30N06D-HF | 200N06D      |



XXX = Control code

## Suggested P.C.B. PAD Layout

| SIZE | TO-252 |        |
|------|--------|--------|
|      | (mm)   | (inch) |
| A    | 1.80   | 0.071  |
| B    | 2.70   | 0.106  |
| C    | 1.50   | 0.059  |
| D    | 2.30   | 0.091  |
| E    | 6.40   | 0.252  |
| F    | 6.80   | 0.268  |



## Standard Packaging

| Case Type | REEL PACK  |                  |
|-----------|------------|------------------|
|           | REEL (pcs) | Reel Size (inch) |
| TO-252    | 2,500      | 13               |