# FR024N/FU024N

60V N-Channel MOSFET

## General Description

The FR024N/FU024N combines advanced trench MOSFET technology .This advanced technology has been especially tailored to minimize on-state resistance,provide superior switching performance.

These devices are well suited for low voltage applications such as automotive, DC/DC converters, and high efficiency switching for power management in portable and battery operated products.

## Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 60V | 46mΩ | 17A |

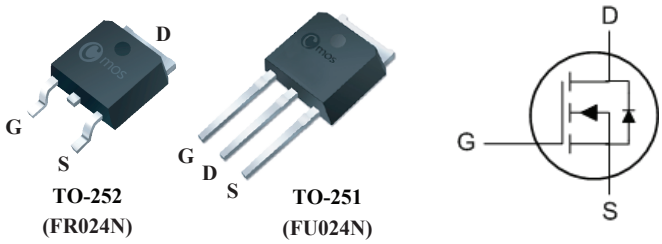
## Applications

- Power Supplies
- Converters
- Power Motor Controls
- Bridge Circuits

## Features

- 17A,60V,RDS(ON)=0.046Ω @VGS=10V
- Fast switching
- Advanced Process Technology

## TO-252/251 Pin Configuration




## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 60 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current | 17 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current | 12 | A |
| $I_{DM}$ | Pulsed Drain Current (Note 1) | 51 | A |
| EAS | Single Pulse Avalanche Energy (Note 2) | 25 | mJ |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 45 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ℃ |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient | --- | 110 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction -Case | --- | 3.3 | ℃/W |

## Electrical Characteristics ($T_J$=25℃ , unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250μA | 60 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | BVDSS Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | 0.061 | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=5A (Note 3) | --- | --- | 46 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250μA | 1 | --- | 3 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=60V , $V_{GS}$=0V | --- | --- | 25 | uA |
| | | $V_{DS}$=48V , $V_{GS}$=0V , $T_J$=150℃ | --- | --- | 250 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$ = ±20V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=10V , $I_D$=5A | --- | 8 | --- | S |
| $Q_g$ | Total Gate Charge | $V_{DS}$=30V , $V_{GS}$=5V , $I_D$=11A (Note 3) | --- | 14 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 3.2 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 5.5 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=30V , $V_{GS}$=5V , $R_G$=12Ω $I_D$=11A (Note 3) | --- | 9 | --- | ns |
| $T_r$ | Rise Time | | --- | 80 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 22 | --- | |
| $T_f$ | Fall Time | | --- | 35 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=25V , $V_{GS}$=0V , f=1MHz | --- | 1500 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 185 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 90 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 17 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 51 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=3A (Note 3) | --- | --- | 1.3 | V |

Notes :
1. Repetitive rating; pulse width limited by max. junction temperature.
2. $V_{DD}$ = 30V, starting $T_J$ = 25℃, L = 0.5mH ,$I_{AS}$ = 10A.
3. Pulse Test: Pulse Width ≤ 300 us, Duty Cycle ≤ 2%.