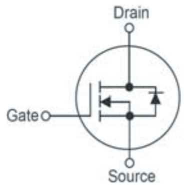
# RMP12N65TI
# THRU
# RMP12N65T2

## N-CHANNEL ENHANCEMENT MODE MOSFET

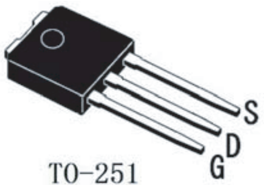
## General Description

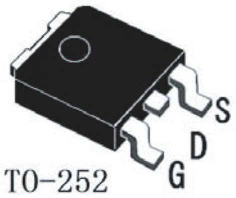
RMP12N65 is an N-channel enhancement mode MOSFET,which uses the self-aligned planar process and improved terminal technology,reducing the conduction loss, enhancing the avalanche energy.

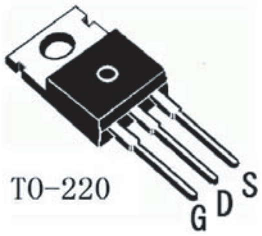
Symbol

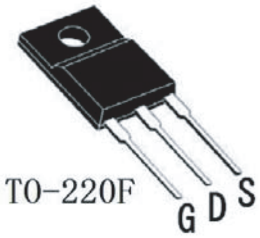


Package









## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $V_{DSS}$ | 650 | V |
| $I_D$ | 12 | A |
| $R_{DS(ON)}$ | 0.85 | Ω |
| Crss | 35 | pF |

### FEATURES

- Low Crss
- Low gate charge
- Fast switching
- Improved ESD capability
- Improved dv/dt capability
- 100% avalanche energy test

### APPLICATIONS

- High efficiency swith mode power supplies
- Electronic lamp ballasts
- UPS

### Package Marking And Ordering Information

| Device | Device Package | Marking |
|---|---|---|
| RMP12N65IP | TO-251 | 12N65 |
| RMP12N65LD | TO-252 | 12N65 |
| RMP12N65TI | TO-220F | 12N65 |
| RMP12N65T2 | TO-220 | 12N65 |

## ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25°C, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 650 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Avalanche Current (Note 2) | | $I_{AR}$ | 12 | A |
| Drain Current | Continuous | $I_D$ | 12 | A |
| | Pulsed (Note 2) | $I_{DM}$ | 48 | A |
| Avalanche Energy | Single Pulsed (Note 3) | $E_{AS}$ | 790 | mJ |
| | Repetitive (Note 2) | $E_{AR}$ | 24 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 4.5 | V/ns |
| Power Dissipation | TO-220/TO-251<br>TO-262 | $P_D$ | 225 | W |
| | TO-220F | | 51 | W |
| Junction Temperature | | $T_J$ | +150 | °C |
| Operating Temperature | | $T_{OPR}$ | -55 ~ +150 | °C |
| Storage Temperature | | $T_{STG}$ | -55 ~ +150 | °C |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating : Pulse width limited by maximum junction temperature.

3. L = 10mH, $I_{AS}$ = 12A, $V_{DD}$ = 50V, $R_G$ = 25Ω, Starting $T_J$ = 25°C

4. $I_{SD} \leq$ 12A, di/dt ≤200A/s, $V_{DD} \leq BV_{DSS}$ Starting $T_J$ = 25°C

## THERMAL DATA

| PARAMETER | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Junction to Ambient | TO-220/TO-220F<br>TO-251/TO-252 | $\theta_{JA}$ | 62.5 | °C/W |
| Junction to Case | TO-220/TO-251<br>TO-252 | $\theta_{JC}$ | 0.56 | °C/W |
| | TO-220F | | 2.43 | °C/W |

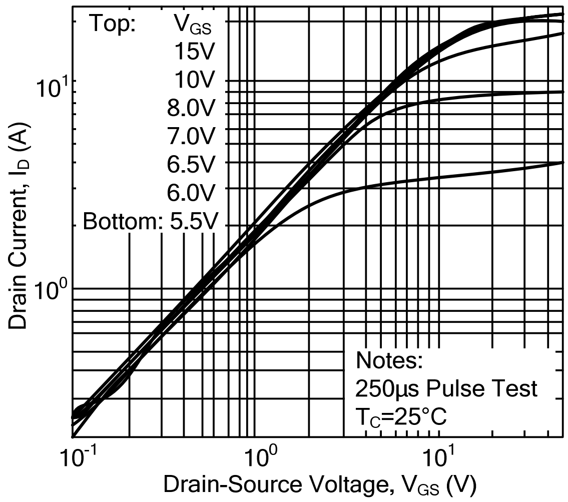
## ELECTRICAL CHARACTERISTICS ($T_C$ =25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 650 | | | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$ = 650 V, $V_{GS}$ = 0 V | | | 1 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±30 V, $V_{DS}$ = 0 V | | | ±100 | nA |
| Breakdown Voltage Temperature Coefficient | $\triangle BV_{DSS}/\triangle T_J$ | $I_D$=250μA,Referenced to 25°C | | 0.7 | | V/°C |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 2.0 | | 4.0 | V |
| Static Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 6.0A | | 0.65 | 0.85 | Ω |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V,<br>f = 1MHz | | 1480 | 1900 | pF |
| Output Capacitance | $C_{OSS}$ | | | 200 | 270 | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 25 | 35 | pF |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Total Gate Charge | $Q_G$ | $V_{DS}$= 520V,$I_D$= 12A,<br>$V_{GS}$= 10 V (Note 1, 2) | | 42 | 54 | nC |
| Gate-Source Charge | $Q_{GS}$ | | | 8.6 | | nC |
| Gate-Drain Charge | $Q_{GD}$ | | | 21 | | nC |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}$ = 325V, $I_D$ = 12A,<br>$R_G$ = 25Ω (Note 1, 2) | | 30 | 70 | ns |
| Turn-On Rise Time | $t_R$ | | | 115 | 240 | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 95 | 200 | ns |
| Turn-Off Fall Time | $t_F$ | | | 85 | 180 | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | | | 12 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | | | 48 | A |
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = 12A | | | 1.4 | V |
| Reverse Recovery Time | $t_{rr}$ | $V_{GS}$ = 0 V, $I_S$ = 12A,<br>$dI_F/dt$ = 100 A/μs (Note 1) | | 380 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 3.5 | | μC |

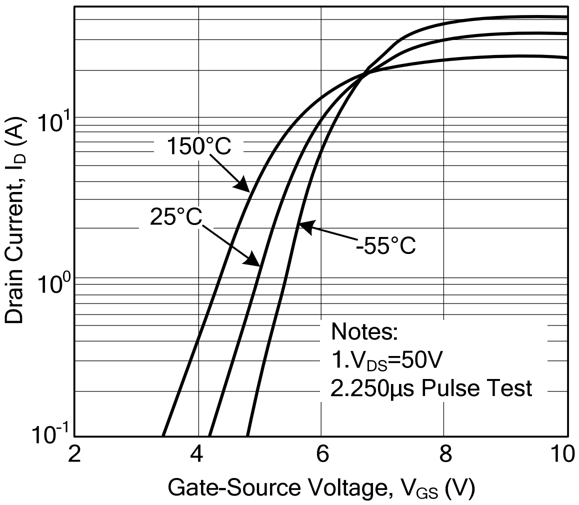
Notes: 1. Pulse Test : Pulse width ≤300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

# RATING AND CHARACTERISTICS CURVES ( RMP12N65TI/T2/LD/IP )

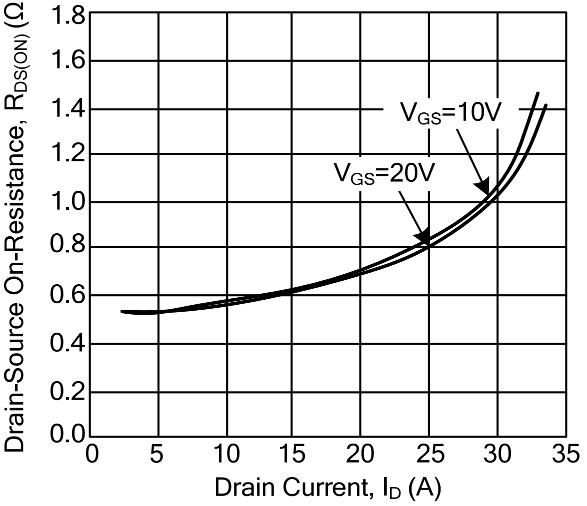
On-Resign Characteristics



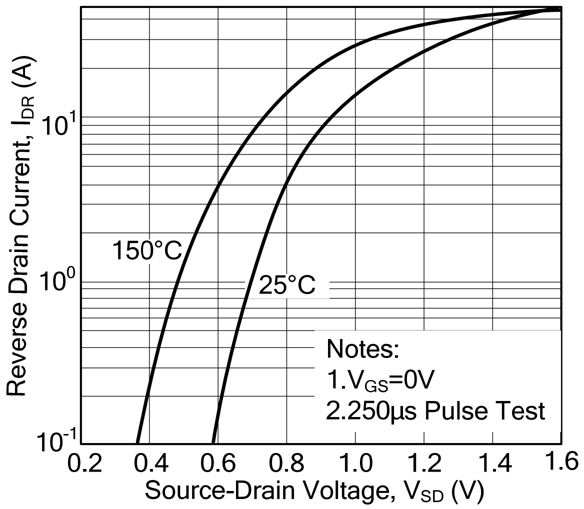
Transfer Characteristics



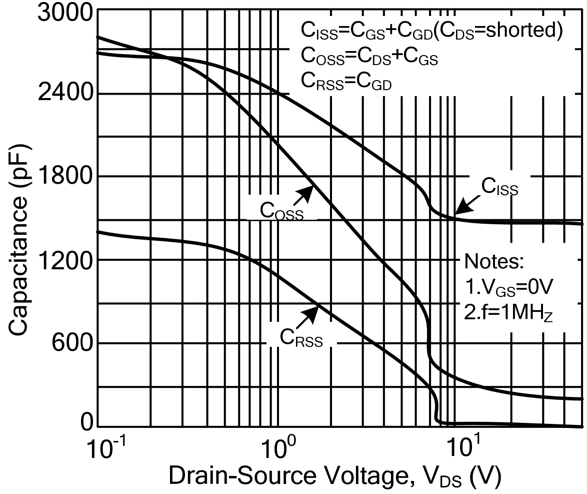
On-Resistance Variation vs.Drain Current and Gate Voltage



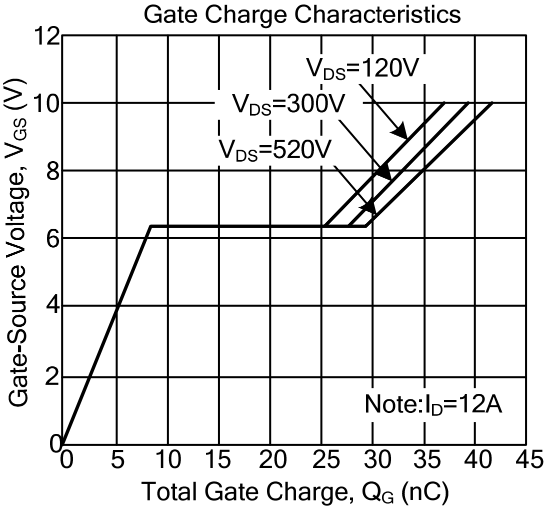
Body Diode Forward Voltage Variation vs. Source Current and Temperature



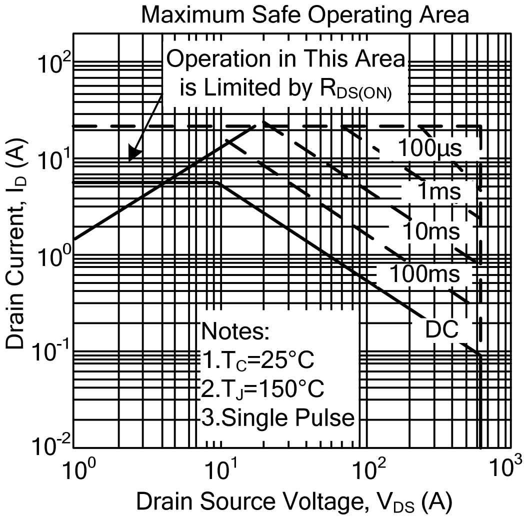
Capacitance Characteristics

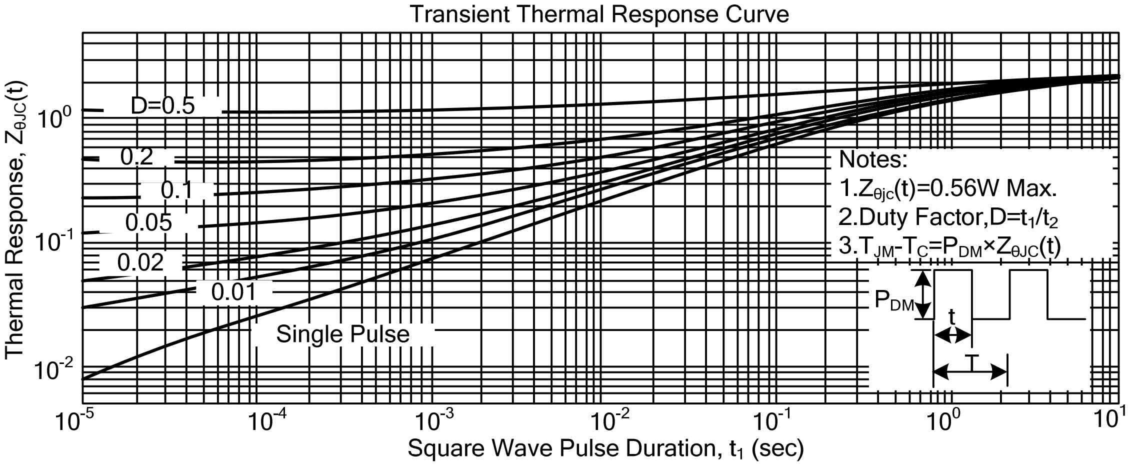


Gate Charge Characteristics



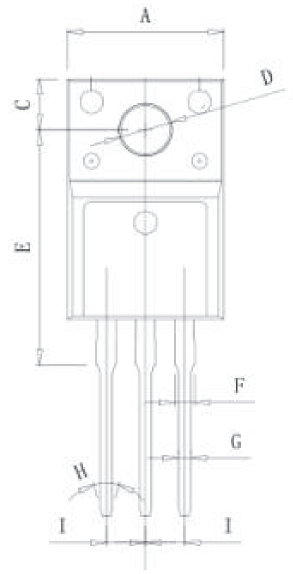
# RATING AND CHARACTERISTICS CURVES ( RMP12N65TI/T2/LD/IP )

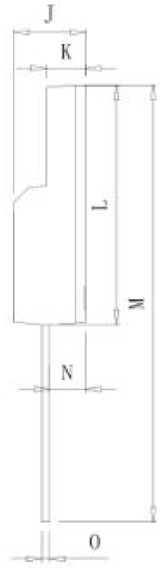




# PACKAGE MECHANICAL DATA

## TO-220F 外形尺寸

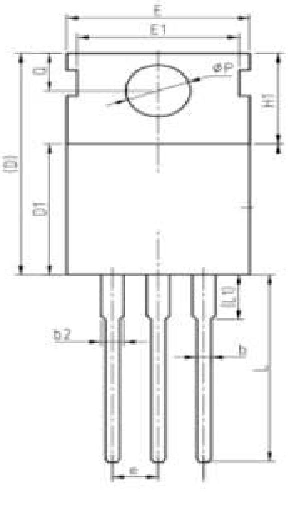


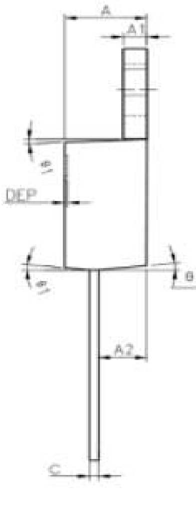


单位：MM

| SYMBOL | MILLIMETERS |  | SYMBOL | MILLIMETERS |  |
|---|---|---|---|---|---|
|  | Min | Max |  | Min | Max |
| A | 9.96 | 10.36 | K | 2.34 | 2.74 |
| J | 4.5 | 4.9 | O | 0.4 | 0.6 |
| M | 28 | 29.6 | G | 0.7 | 0.9 |
| E | 15.4 | 15.6 | D | 2.9 | 3.3 |
| L | 15.5 | 16.1 | C | 3.25 | 3.5 |
| N | 2.2 | 2.9 | I | 2.54 TYP |  |
| F |  | 1.4 |  |  |  |

## TO-220A 外形尺寸





单位：MM

| SYMBOL | MILLIMETERS |  | SYMBOL | MILLIMETERS |  |
|---|---|---|---|---|---|
|  | Min | Max |  | Min | Max |
| A | 4.2 | 4.8 | C | 0.4 | 0.6 |
| D1 | 8.9 | 9.4 | b | 0.7 | 0.9 |
| E | 9.7 | 10.3 | A1 | 1.2 | 1.4 |
| H1 | 6.3 | 6.9 | Q | 2.7 | 2.9 |
| b2 | 1.27 | 1.43 | A2 | 2.3 | 2.5 |
| ØP | 3.6 | 3.9 | e | 2.54 TYP |  |
| D | 15.5 | 15.7 |  |  |  |

# DISCLAIMER NOTICE

Rectron Inc reserves the right to make changes without notice to any product specification herein, to make corrections, modifications, enhancements or other changes. Rectron Inc or anyone on its behalf assumes no responsibility or liability for any errors or inaccuracies. Data sheet specifications and its information contained are intended to provide a product description only. "Typical" parameters which may be included on RECTRON data sheets and/ or specifications can and do vary in different applications and actual performance may vary over time. Rectron Inc does not assume any liability arising out of the application or use of any product or circuit.

Rectron products are not designed, intended or authorized for use in medical, life-saving implant or other applications intended for life-sustaining or other related applications where a failure or malfunction of component or circuitry may directly or indirectly cause injury or threaten a life without expressed written approval of Rectron Inc. Customers using or selling Rectron components for use in such applications do so at their own risk and shall agree to fully indemnify Rectron Inc and its subsidiaries harmless against all claims, damages and expenditures.