## RFM12N08, RFM12N10, RFP12N08, RFP12N10

File Number **1386**

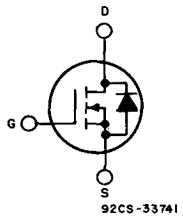
# N-Channel Enhancement-Mode Power Field-Effect Transistors

12 A, 80 and 100 V

$r_{DS\ (on)}$: 0.2 Ω

**Features:**

- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*




**N-CHANNEL ENHANCEMENT MODE**

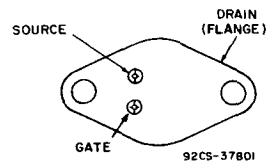
The RFM12N08 and RFM12N10 and the RFP12N08 and RFP12N10 are n-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring high speed and low gate-drive power. These types can be operated directly from integrated circuits.

The RFM-series types are supplied in the JEDEC TO-204AA steel package and the RFP-series types in the JEDEC TO-220AB plastic package.

The RFM and RFP series were formerly RCA developmental numbers TA9284 and TA9285.

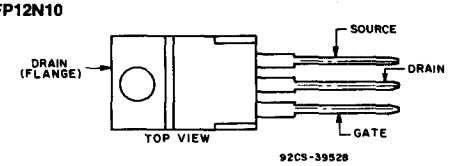
**TERMINAL DESIGNATIONS**

**RFM12N08**
**RFM12N10**




**JEDEC TO-204AA**

**RFP12N08**
**RFP12N10**




**JEDEC TO-220AB**

**MAXIMUM RATINGS,** *Absolute-Maximum Values ($T_C$=25° C):*

| | RFM12N08 | RFM12N10 | | RFP12N08 | RFP12N10 | |
|---|---|---|---|---|---|---|
| DRAIN-SOURCE VOLTAGE ..... $V_{DSS}$ | 80 | 100 | | 80 | 100 | V |
| DRAIN-GATE VOLTAGE ($R_{GS}$=1 MΩ) ... $V_{DGR}$ | 80 | 100 | | 80 | 100 | V |
| GATE-SOURCE VOLTAGE ..... $V_{GS}$ | | | ±20 | | | V |
| DRAIN CURRENT, RMS Continuous ..... $I_D$ | | | 12 | | | A |
| Pulsed ..... $I_{DM}$ | | | 30 | | | A |
| POWER DISSIPATION @ $T_C$=25°C ..... $P_T$ | 75 | 75 | | 60 | 60 | W |
| Derate above $T_C$=25°C | 0.6 | 0.6 | | 0.48 | 0.48 | W/°C |
| OPERATING AND STORAGE TEMPERATURE ..... $T_J$, $T_{stg}$ | | | -55 to +150 | | | °C |

# RFM12N08, RFM12N10, RFP12N08, RFP12N10

**ELECTRICAL CHARACTERISTICS,** *At Case Temperature ($T_C$)=25° C unless otherwise specified*

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | LIMITS | | | | UNITS |
|---|---|---|---|---|---|---|---|
| | | | RFM12N08 RFP12N08 | | RFM12N10 RFP12N10 | | |
| | | | Min. | Max. | Min. | Max. | |
| Drain Source Breakdown Voltage | $BV_{DSS}$ | $I_D$=1 mA<br>$V_{GS}$=0 | 80 | — | 100 | — | V |
| Gate-Threshold Voltage | $V_{GS}(th)$ | $V_{GS}$=$V_{DS}$<br>$I_D$=1 mA | 2 | 4 | 2 | 4 | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=65 V | — | 1 | — | — | μA |
| | | $V_{DS}$=80 V | — | — | — | 1 | |
| | | $T_C$=125° C<br>$V_{DS}$=65 V | — | 50 | — | — | |
| | | $V_{DS}$=80 V | — | — | — | 50 | |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20 V<br>$V_{DS}$=0 | — | 100 | — | 100 | nA |
| Drain-Source On Voltage | $V_{DS}(on)$[a] | $I_D$=6 A<br>$V_{GS}$=10 V | — | 1.2 | — | 1.2 | V |
| | | $I_D$=12 A<br>$V_{GS}$=10 V | — | 3.3 | — | 3.3 | |
| Static Drain-Source On Resistance | $r_{DS}(on)$[a] | $I_D$=6 A<br>$V_{GS}$=10 V | — | 0.2 | — | 0.2 | Ω |
| Forward Transconductance | $g_{fs}$[a] | $V_{DS}$=10 V<br>$I_D$=6 A | 2 | — | 2 | — | mho |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=25 V<br>$V_{GS}$=0 V<br>f = 1MHz | — | 850 | — | 850 | pF |
| Output Capacitance | $C_{oss}$ | | — | 300 | — | 300 | |
| Reverse-Transfer Capacitance | $C_{rss}$ | | — | 150 | — | 150 | |
| Turn-On Delay Time | $t_d(on)$ | $V_{DD}$=50 V<br>$I_D$=6 A<br>$R_{gen}$=$R_{gs}$=50 Ω<br>$V_{GS}$=10 V | 45(Typ) | 70 | 45(Typ) | 70 | ns |
| Rise Time | $t_r$ | | 250(Typ) | 375 | 250(Typ) | 375 | |
| Turn-Off Delay Time | $t_d(off)$ | | 85(Typ) | 130 | 85(Typ) | 130 | |
| Fall Time | $t_f$ | | 100(Typ) | 150 | 100(Typ) | 150 | |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | RFM12N08, RFM12N10 | — | 1.67 | — | 1.67 | °C/W |
| | | RFP12N08, RFP12N10 | — | 2.083 | — | 2.083 | |

[a]Pulsed: Pulse duration=300 μs max., duty cycle=2%.

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | LIMITS | | | | UNITS |
|---|---|---|---|---|---|---|---|
| | | | RFM12N08 RFM12N10 | | RFP12N08 RFP12N10 | | |
| | | | MIN. | MAX. | MIN. | MAX. | |
| Diode Forward Voltage | $V_{SD}$ | $I_{SD}$=6 A | — | 1.4 | — | 1.4 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=4 A<br>$d_{IF}/d_t$=100 A/μs | 150(typ) | | 150(typ) | | ns |

*Pulse Test: Width ≤ 300 μs, duty cycle ≤ 2%.

# RFM12N08, RFM12N10, RFP12N08, RFP12N10

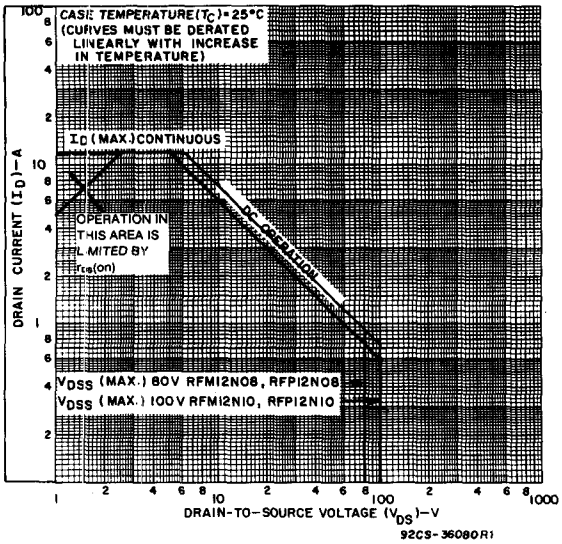



*Fig. 1 - Maximum operating areas for all types.*

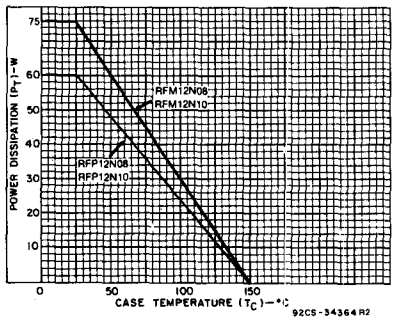



*Fig. 2 - Power dissipation vs. temperature derating curve for all types.*

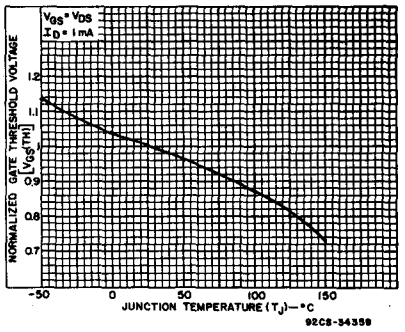



*Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.*

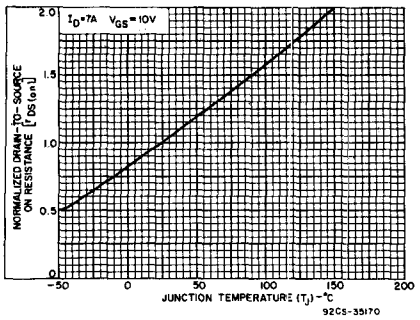



*Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.*

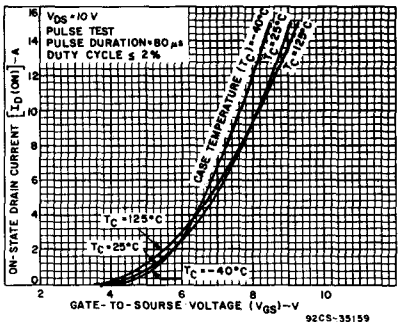



*Fig. 5 - Typical transfer characteristics for all types.*

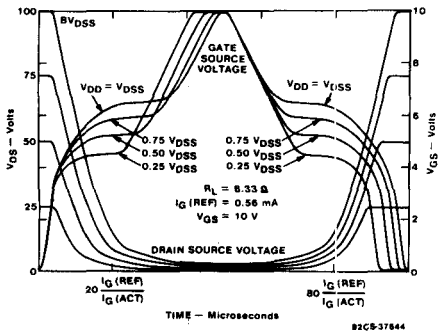



*Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.*

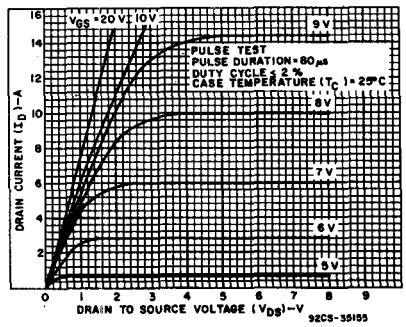



*Fig. 7 - Typical saturation characteristics for all types.*

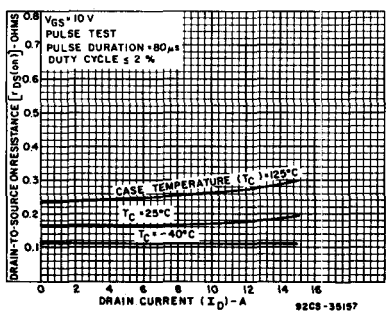



*Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.*

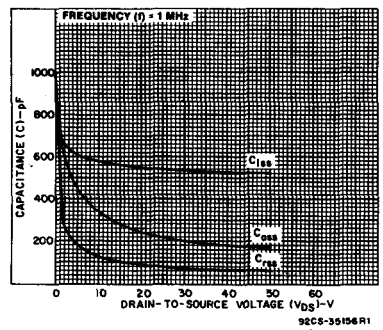



*Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.*

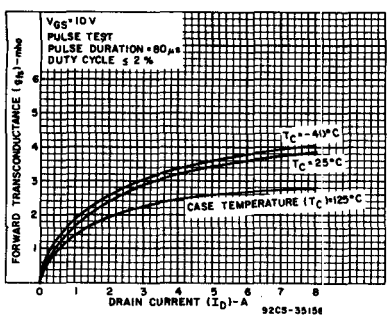



*Fig. 10 - Typical forward transconductance as a function of drain current for all types.*

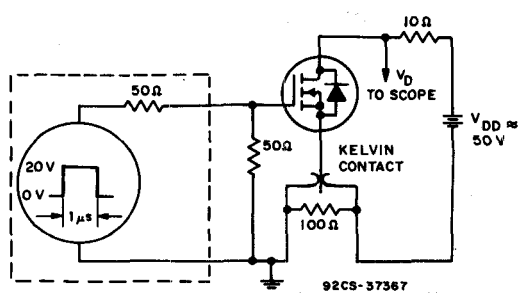
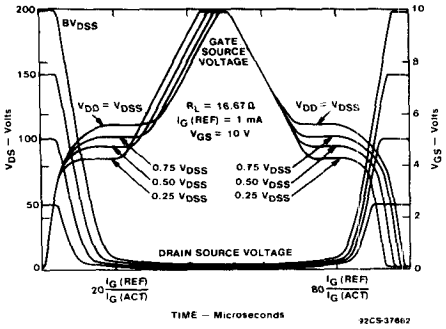



*Fig. 11 — Switching Time Test Circuit*

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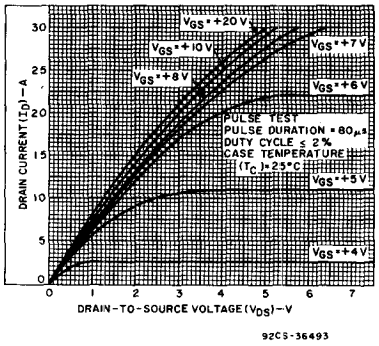



*Fig. 7 - Typical saturation characteristics for all types.*

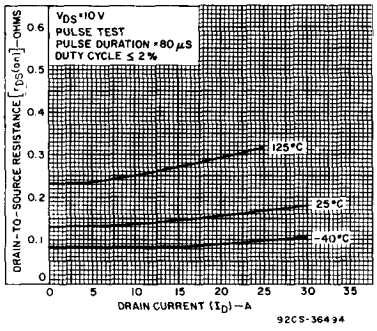
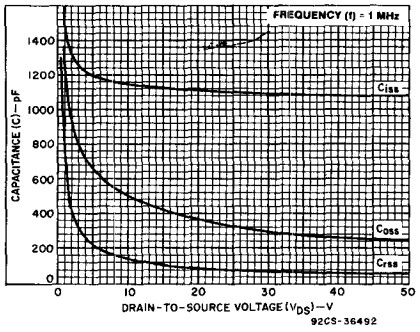



*Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.*

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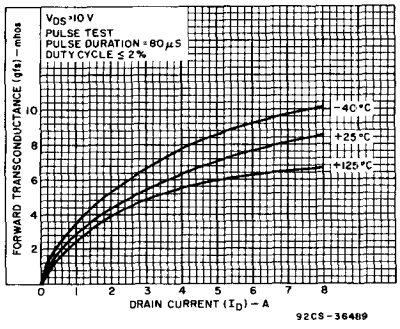


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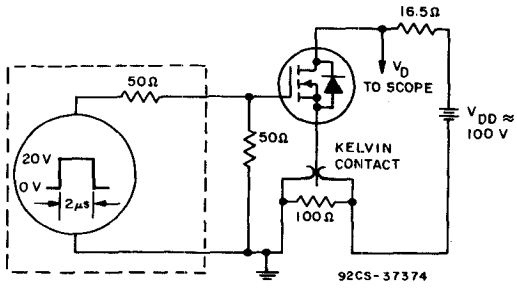


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