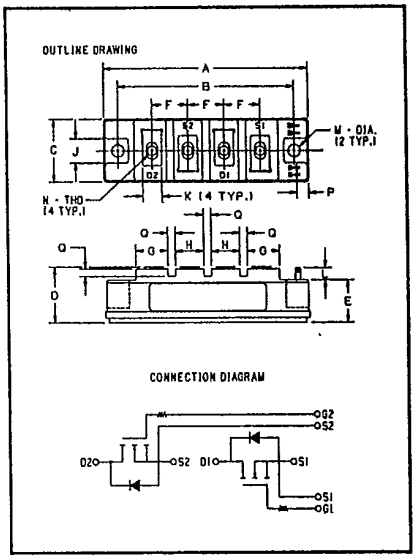
# POWEREX

**JT224505**
**JT225005** **Tentative**

*Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272*

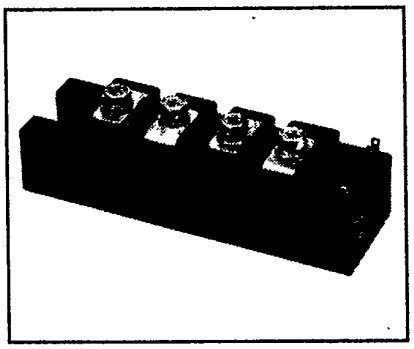
# Split-Dual FETMOD™ Power Modules

## 50 Amperes/450-500 Volts




**450-500 Volts JT224505, JT225005 Outline Drawing**

| Dimension | Inches | Millimeters |
|---|---|---|
| A | 4.252 Max. | 108 Max. |
| B | 3.661 ± .012 | 93 ± 0.3 |
| C | 1.338 Max. | 34 Max. |
| D | 1.181 Max. | 30 Max. |
| E | .906 | 23 |
| F | .748 | 19 |
| G | .650 | 16.5 |
| H | .591 | 15 |
| J | .512 | 13 |
| K | .394 | 10 |
| L | .256 Min. | 6.5 Min. |
| M | .256 Dia. | 6.5 Dia. |
| N | M5 Metric | M5 |
| P | .197 | 5 |
| Q | .157 | 4 |



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**Power Modules**
50 Amperes/450-500 Volts

### Description

Powerex Split-Dual FETMOD™ Power Modules are designed for use in applications requiring high-frequency switching and low loss control. The modules are isolated, consisting of two MOSFETs with internal series gate resistors and independent connections.

### Features:

- ☐ Isolated Mounting
- ☐ Vertical DMOS Chips
- ☐ High Speed Body Diode
- ☐ Low Drive Requirement
- ☐ Low $R_{DS(on)}$
- ☐ Internal Series Gate Resistors
- ☐ Fast Switching

### Applications:

- ☐ Choppers
- ☐ UPS Inverters
- ☐ Switch Mode Power Supply
- ☐ PWM Regulators
- ☐ Welding Power Supply

### Ordering Information

Example: Select the complete eight digit module part number you desire from the table - i.e. JT225005 is a 500 Volt, 50 Ampere Split-Dual FETMOD™ Module.

| Type | $V_{DSS}$ Volts (×10) | Current Rating Amperes (×10) |
|---|---|---|
| JT22 | 45 | 05 |
| JT22 | 50 | 05 |

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## Maximum Ratings $T_J$ = 25°C unless otherwise specified

| | Symbol | JT224505/JT225005 | Units |
|---|---|---|---|
| Junction Temperature | $T_J$ | −40 to 150 | °C |
| Storage Temperature | $T_{STG}$ | −40 to 125 | °C |
| Drain Source Voltage | $V_{DSS}$ | 450/500 | Volts |
| Gate-Source Voltage | $V_{GSS}$ | ±20 | Volts |
| Continuous Drain Current | $I_D$ | 40 | Amperes |
| Continuous Source Current | $I_S$ | 40 | Amperes |
| Pulsed Drain Current Repetitive | $I_{DM}$ | 150 | Amperes |
| Power Dissipation | $P_T$ | 420 | Watts |
| Max. Mounting Torque Terminal Screws (M5) | — | 17 | in.-lb. |
| Max. Mounting Torque Mounting Screws (M6) | — | 26 | in.-lb. |
| Module Weight | — | 250 | Grams |
| V isolation | $V_{RMS}$ | 2500 | Volts |

## Static Electrical Characteristics $T_J$ = 25°C unless otherwise specified

| Characteristics | Symbol | Test Conditions | JT224505/JT225005 Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}=V_{DSS}$, $V_{GS}=0V$ | — | — | 1 | mA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}=0.8\ V_{DSS}$, $V_{GS}=0V$, $T_J=150°C$ | — | — | 10 | mA |
| Gate Source Threshold | $V_{GS(th)}$ | $I_D=1$ mA, $V_{DS}=10V$ | 2 | 3 | 4 | Volts |
| Gate Source Leakage | $\pm I_{GSS}$ | $\pm V_{GS}=\pm 20V$, $V_{DS}=0V$ | — | — | 0.5 | μA |
| Drain Source On State Resistance* | $R_{DS(on)}$ | $V_{GS}=15V$, $I_D=50A$ | — | — | 0.12 | Ω |
| | | $V_{GS}=15V$, $I_D=50A$, $T_J=150°C$ | — | — | 0.24 | Ω |
| Drain Source On State Voltage* | $V_{DS(on)}$ | $V_{GS}=15V$, $I_D=50A$ | — | — | 6 | Volts |
| | | $V_{GS}=15V$, $I_D=50A$, $T_J=150°C$ | — | — | 12 | Volts |
| Thermal Resistance, Case to Sink Lubricated | $R_{\theta CS}$ | — | — | — | — | °C/W |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | Per Device | — | — | 0.3 | °C/W |

* Pulse Test: Pulse width ≤ 10μs

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## Source-Drain Diode Characteristics $T_J$ = 25°C unless otherwise specified

| Characteristics | Symbol | Test Conditions | JT224505/JT225005 Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Source-Drain Voltage | $V_{SD}$ | $I_S$ = 50A, $V_{GS}$ = 0V | — | — | 2.5 | Volts |
| Reverse Recovery Time | $t_{rr}$ | $I_S$ = 50A, $dI_S/dt$ = 100A/μs, $V_{GS}$ = 0V | — | — | 200 | μs |

## Dynamic Electrical Characteristics $T_J$ = 25°C unless otherwise specified

| Characteristics | Symbol | Test Conditions | JT224505/JT225005 Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Forward Transconductance | $g_{fs}$ | $I_D$ = 25A, $V_{DS}$ = 10V, $t_w \leq 300\mu s$, Duty = 2% | 10 | — | — | mhos |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 10V, f = 1 Mhz | — | 5500 | 9000 | pf |
| Output Capacitance | $C_{oss}$ | | — | — | 2500 | pf |
| Reverse Transfer Capacitance | $C_{rss}$ | | — | — | 1000 | pf |
| Total Gate Charge | $Q_G$ | $V_{DD}$ = 0.8 $V_{DSS}$, $V_{GS}$ = 10V, $I_D$ = 50A | — | 600 | — | nC |
| Turn On Time** | $t_{on}$ | $V_{DD}$ = 0.5 $V_{DSS}$, $I_D$ = 25A, $V_{GS}$ = 15V, $R_{GEN}$ = $R_{GS}$ = 50Ω | — | — | 500 | ns |
| Turn Off Time** | $t_{off}$ | | — | — | 1300 | ns |

** Turn on Time ($t_{on}$) = Turn on Delay ($t_{d(on)}$) + Rise Time ($t_r$)
Turn-off Time ($t_{off}$) = Turn off Delay ($t_{d(off)}$) + Fall Time ($t_f$)

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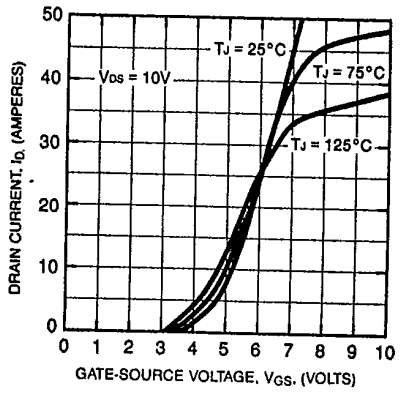
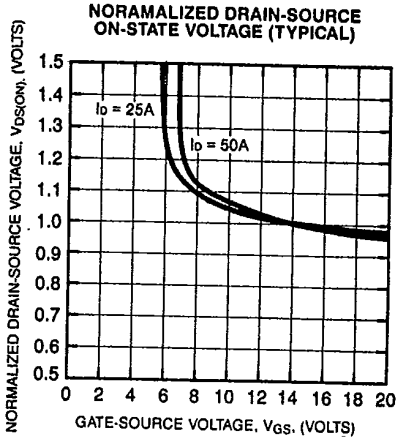
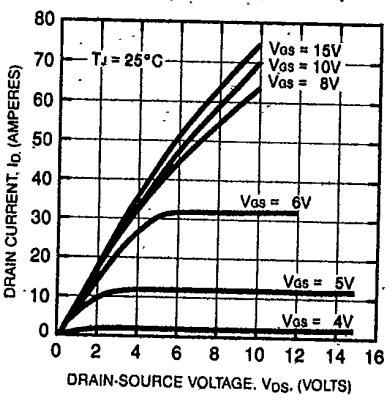
TRANSFER CHARACTERISTICS (TYPICAL)



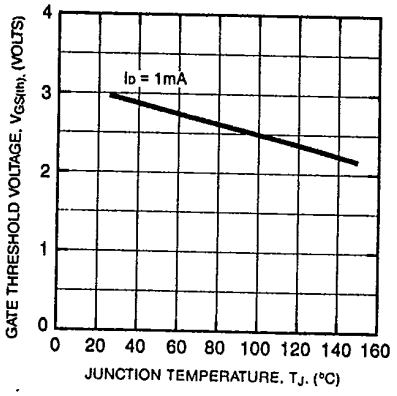

NORAMALIZED DRAIN-SOURCE ON-STATE VOLTAGE (TYPICAL)



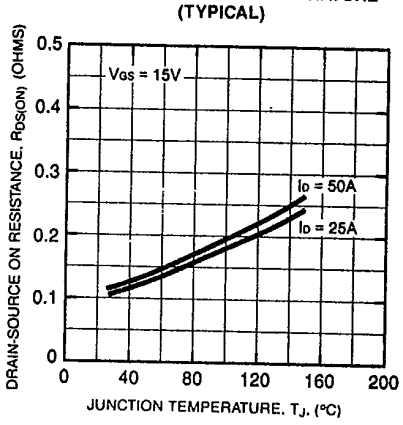

COMMON SOURCE OUTPUT CHARACTERISTICS (TYPICAL)



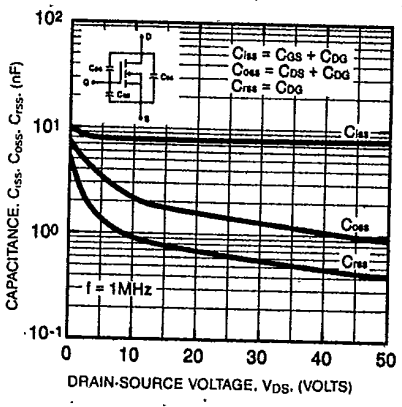

GATE THRESHOLD VOLTAGE VS. TEMPERATURE (TYPICAL)



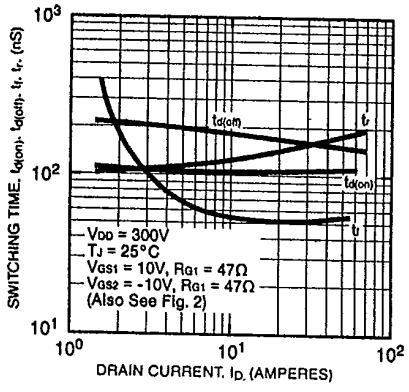

ON-RESISTANCE VS. TEMPERATURE (TYPICAL)



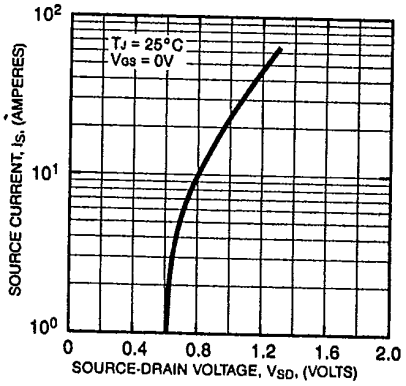

CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)



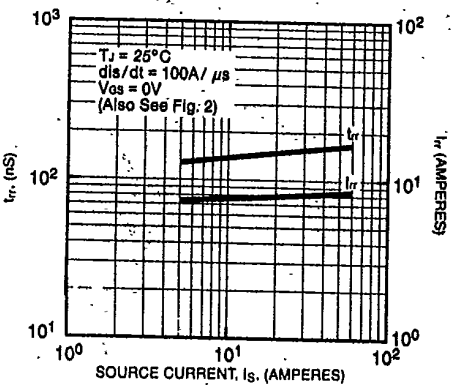

SWITCHING CHARACTERISTICS (TYPICAL)




SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)




SOURCE-DRAIN DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



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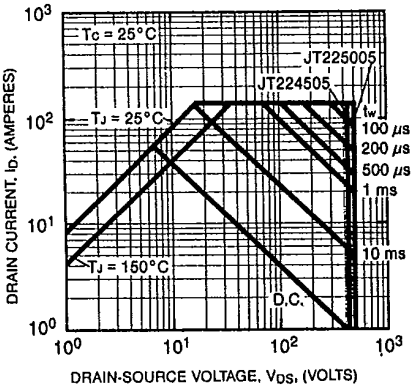
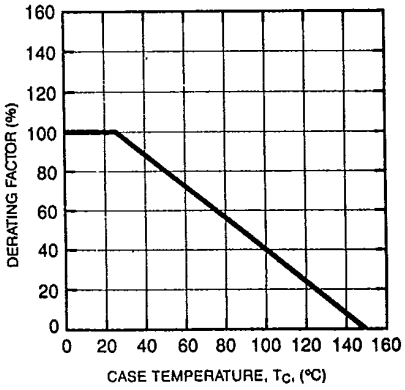
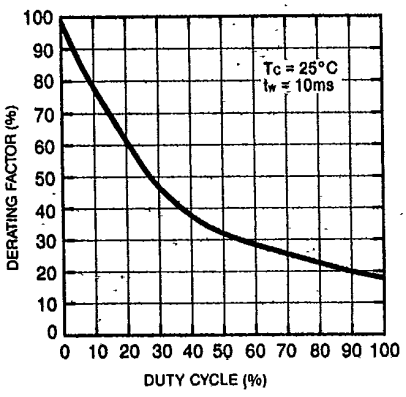
**FORWARD BIAS SAFE OPERATING AREA (S.O.A.)**



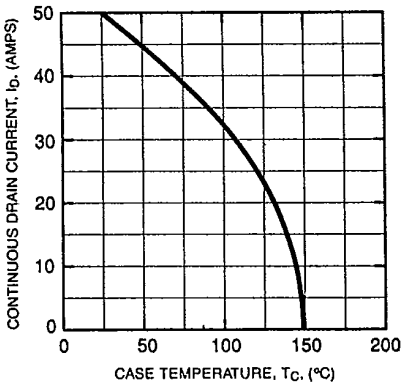

**TEMPERATURE DERATING FACTOR OF SAFE OPERATING AREA (S.O.A.)**



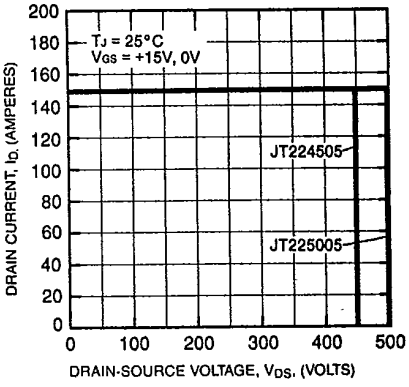

**DUTY CYCLE DERATING FACTOR OF SAFE OPERATING AREA (S.O.A.)**



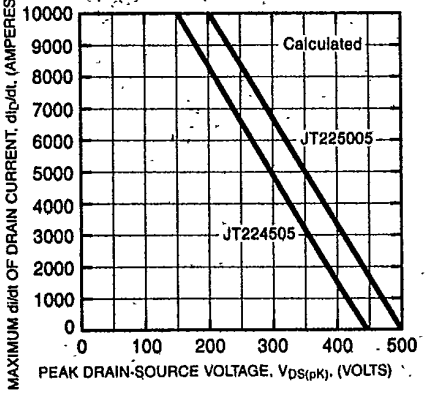

**MAXIMUM DRAIN CURRENT VS. CASE TEMPERATURE**



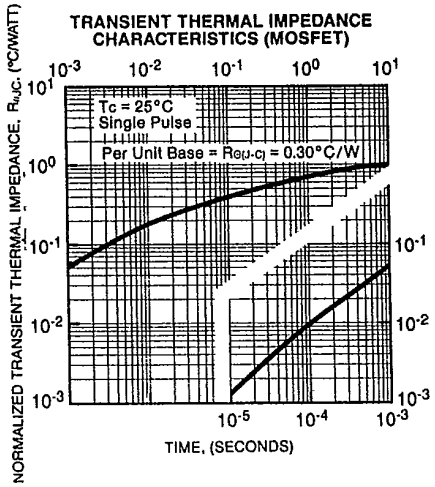

**CLAMPED INDUCTIVE LOAD SWITCHING SAFE OPERATING AREA (S.S.O.A.)**



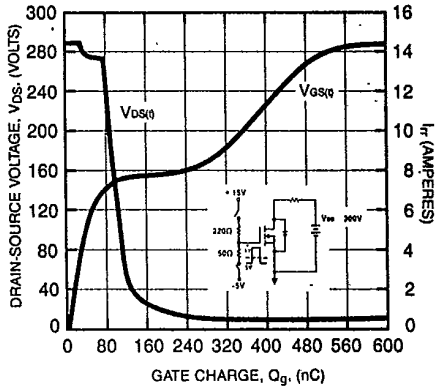

**MAXIMUM TURN-OFF di/dt VS. PEAK DRAIN-SOURCE VOLTAGE**



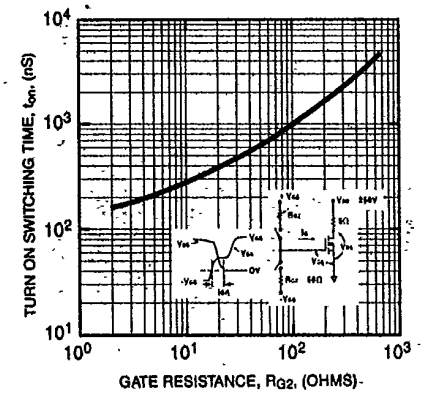

**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MOSFET)**




**GATE CHARGE VS. $V_{DS}$ AND $V_{GS}$ (TYPICAL)**




**TURN-ON SPEED VS. GATE RESISTANCE (TYPICAL)**



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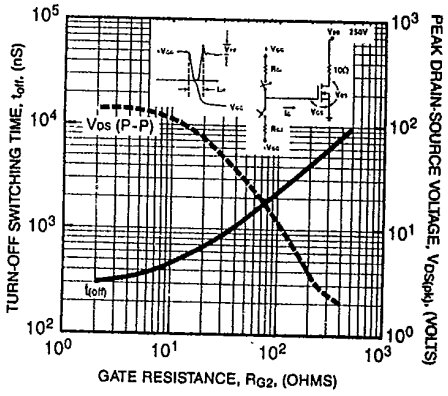
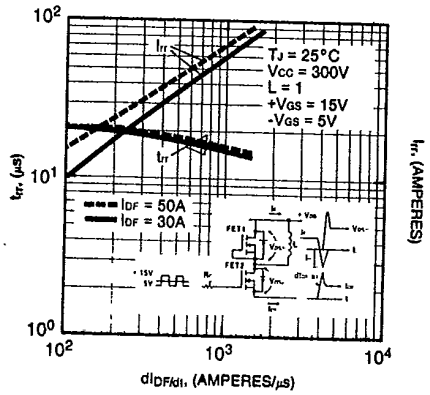
**TURN-OFF SPEED AND DRAIN-SOURCE VOLTAGE SPIKE VS. GATE RESISTANCE (TYPICAL)**




**SOURCE-DRAIN DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL FOR HALF BRIDGE OPERATION)**

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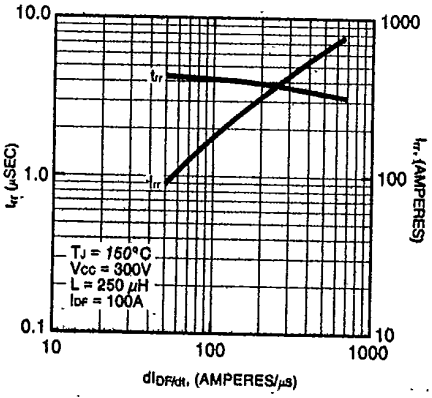


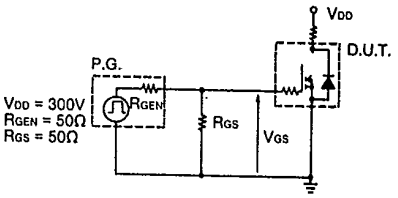


Fig. 1 Switching Time Test Circuit 1

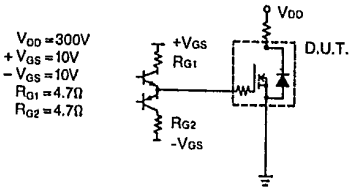


Fig. 2 Switching Time Test Circuit 2