POWEREX

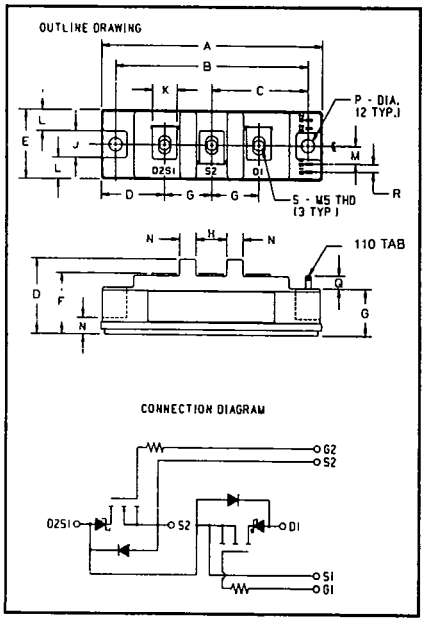
JD224505
JD225005

T-39-27

Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272
Powerex Europe, S.A., 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

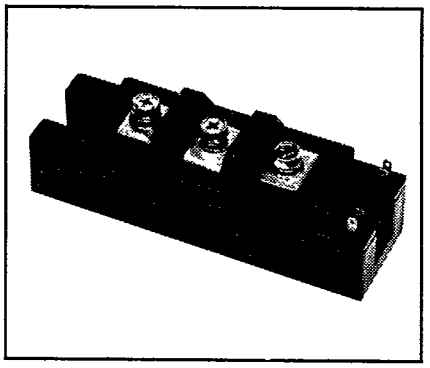
Dual FETMOD™ Power Modules

50 Amperes/450-500 Volts



450-500 Volts JD224505, JD225005 Outline Drawing

Dimension	Inches	Millimeters
A	4 252 Max	108 Max.
B	3 661 ± 012	93 ± 0.3
C	1 831	46.5
D	1 457	37
E	1.339	34
F	1 181 Max	30 Max.
G	906	23
H	.591	15
J	512	13
K	472	12
L	413	10 5
M	344	8.75
N	315	8
P	256 Dia	6.5 Dia.
Q	256 Min	6 5 Min
R	157	4
S	M5 Metric	M5



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Dual FETMOD™ Power Modules
50 Amperes/450/500 Volts

Description

Powerex 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 MOSFET Transistors with each MOSFET having a series Schottky blocking diode and a reverse parallel connected high speed diode.

Features:

- ☐ Isolated Mounting
- ☐ Vertical DMOS Chips
- ☐ Discrete Fast Recovery Feed-Back Diode and Series Schottky Diodes
- ☐ Low $R_{DS(on)}$
- ☐ Low Drive Requirement
- ☐ Internal Series Gate Resistors
- ☐ Fast Switching

Applications:

- ☐ AC Motor Control
- ☐ UPS Inverters
- ☐ Switch Mode Power Supply
- ☐ PWM Regulators

Ordering Information

Example: Select the complete eight digit module part number you desire from the table - i.e. JD225005 is a 500 Volt, 50 Ampere Dual FETMOD™ Module.

Type	V_{DSS} Volts (×10)	Current Rating Amperes (×10)
JD22	45	05
JD22	50	05

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Maximum Ratings T_J = 25°C unless otherwise specified

	Symbol	JD224505/JD225005	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	30	Amperes
Continuous Diode Forward Current	I_{FM}	50	Amperes
Pulsed Drain Current Repetitive	I_{DM}	150	Amperes
Power Dissipation	P_T	310	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

			JD224505/JD225005			
Characteristics	Symbol	Test Conditions	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}	$V_{DS}=0.8\ V_{DSS}$, $V_{GS}=0V$ $T_J=125°C$	—	—	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*	$R_{DS(on)}$	$V_{GS}=15V$, $I_D=50A$	—	.16	0.2	Ω
		$V_{GS}=15V$, $I_D=50A$, $T_J=150°C$	—	—	0.32	Ω
Drain Source On State Voltage*	$V_{DS(on)}$	$V_{GS}=15V$, $I_D=50A$	—	8	10	Volts
		$V_{GS}=15V$, $I_D=50A$, $T_J=150°C$	—	15	16	Volts
Thermal Resistance, Case to Sink Lubricated	$R_{\theta CS}$	—	—	—	1.3	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	Transistor Part	—	—	0.41	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	Diode Part	—	—	1.3	°C/W

* Pulse Test: Pulse width ≤ 10μs

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Free Wheel Diode Characteristics T_J=25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	JD224505/JD225005 Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{FM}	I_{FM}=50A, V_{GS}=0V	—	—	2.5	Volts
Reverse Recovery Time	t_{rr}	I_{FM}=50A, dI_F/dt=100A/μs, V_{GS}=0V	—	120	200	ns
Reverse Recovery Charge	Q_{rr}		—	650	—	μc

Dynamic Electrical Characteristics T_J = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	JD224505/JD225005 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}		—	—	2000	pf
Reverse Transfer Capacitance	C_{rss}		—	—	700	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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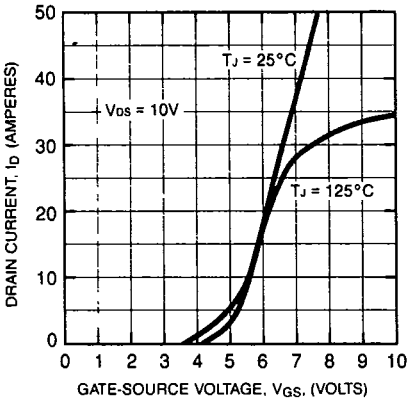
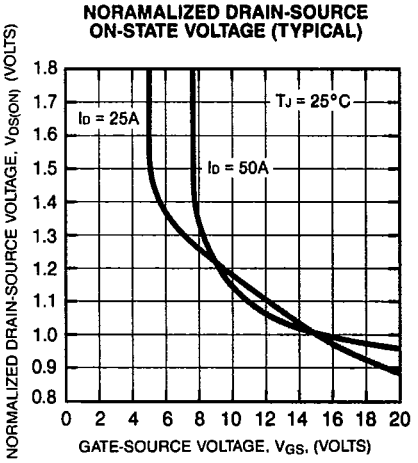
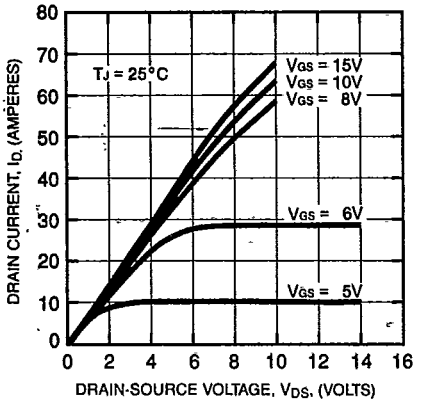
TRANSFER CHARACTERISTICS (TYPICAL)



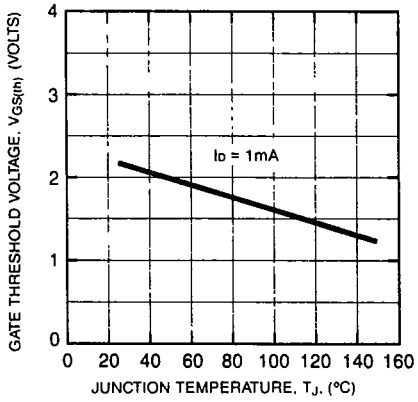
NORAMALIZED DRAIN-SOURCE ON-STATE VOLTAGE (TYPICAL)



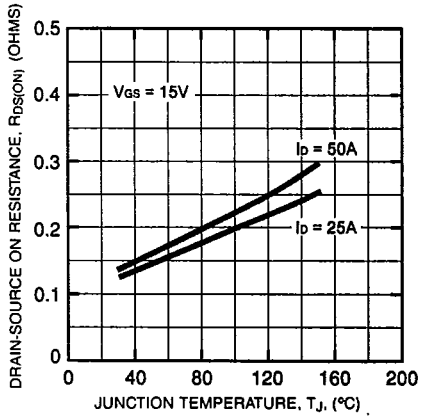
COMMON SOURCE OUTPUT CHARACTERISTICS (TYPICAL)



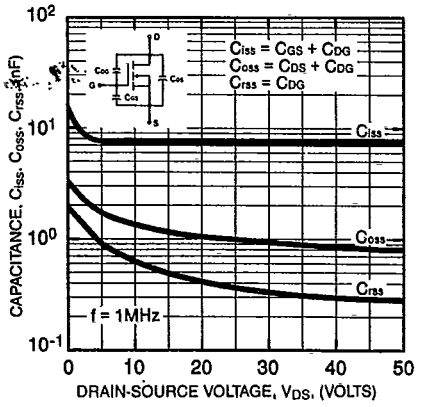
GATE THRESHOLD VOLTAGE VS. TEMPERATURE (TYPICAL)



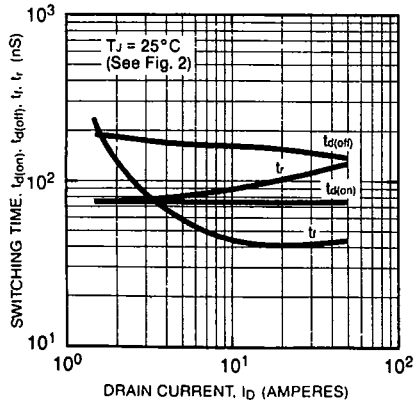
ON-RESIRTANCE VS. TEMPERATURE (TYPICAL)



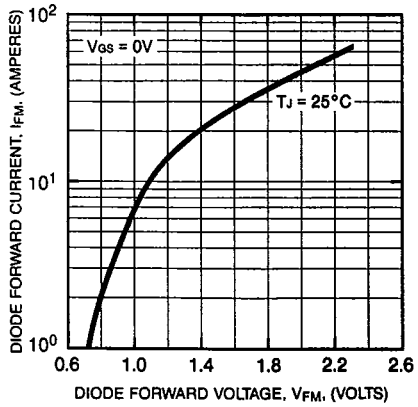
CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)



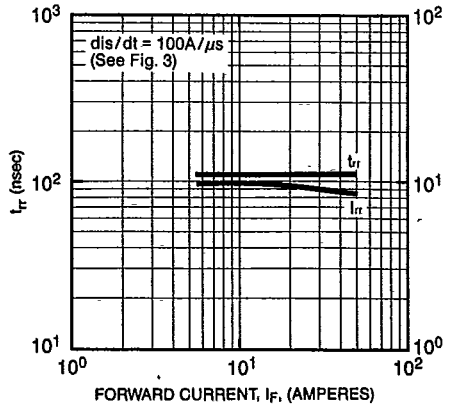
SWITCHING CHARACTERISTICS (TYPICAL)



DIODE CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



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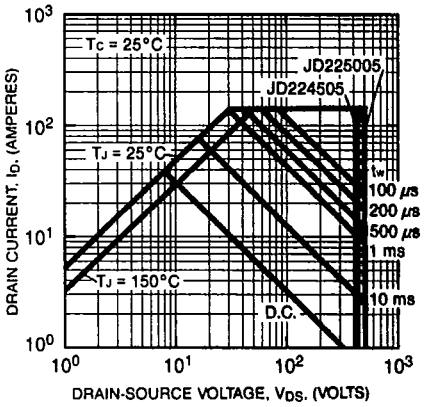
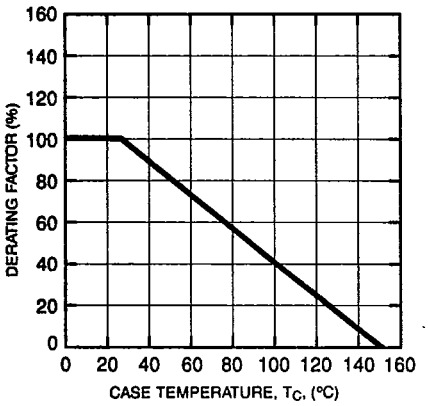
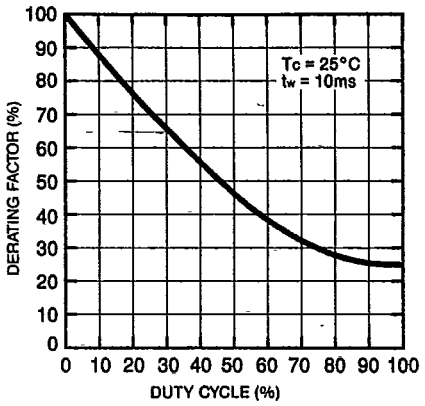
FORWARD BIAS SAFE OPERATING AREA (S.O.A.)



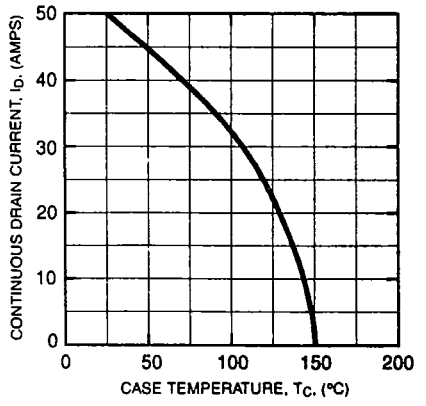
TEMPERATURE DERATING FACTOR OF SAFE OPERATING AREA (S.O.A.)



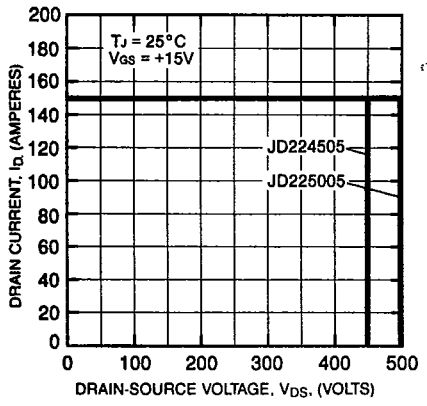
DUTY CYCLE DERATING FACTOR OF SAFE OPERATING AREA (S.O.A.)



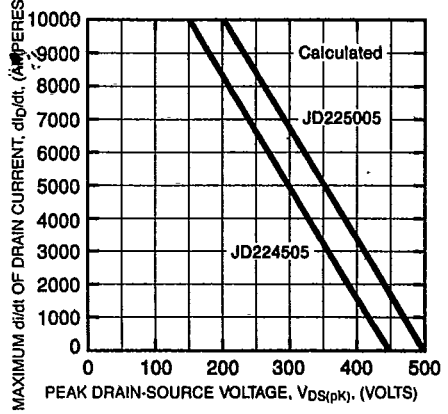
MAXIMUM DRAIN CURRENT VS. CASE TEMPERATURE



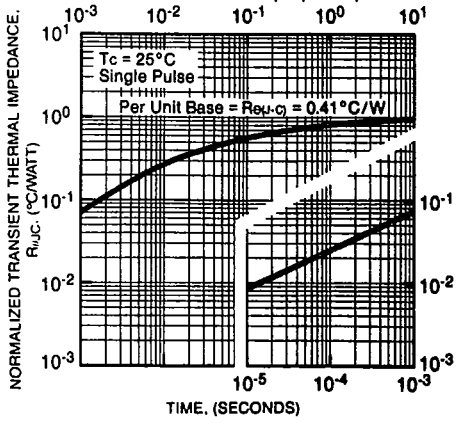
CLAMPED INDUCTIVE LOAD SWITCHING SAFE OPERATING AREA (S.S.O.A.)



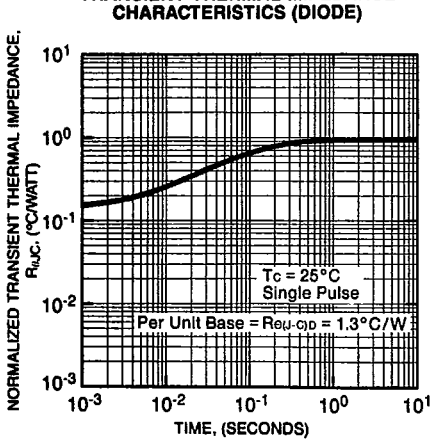
MAXIMUM TURN-OFF dI/dt VS. PEAK DRAIN-SOURCE VOLTAGE



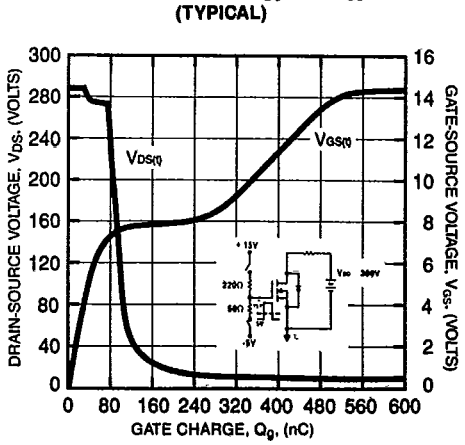
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MOSFET)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)



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



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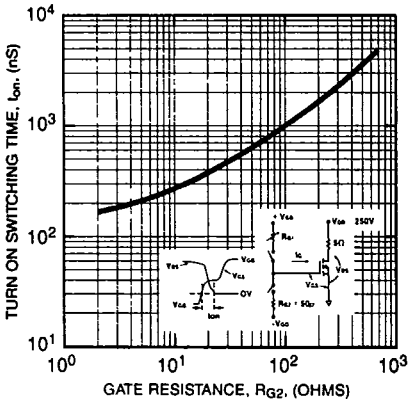
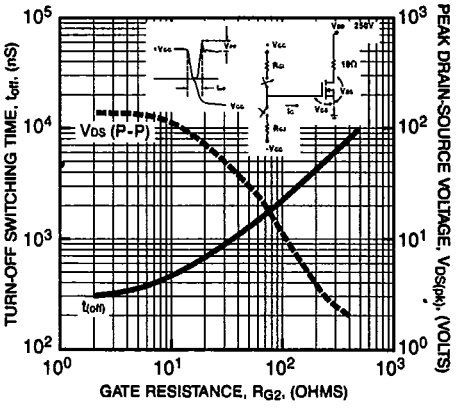
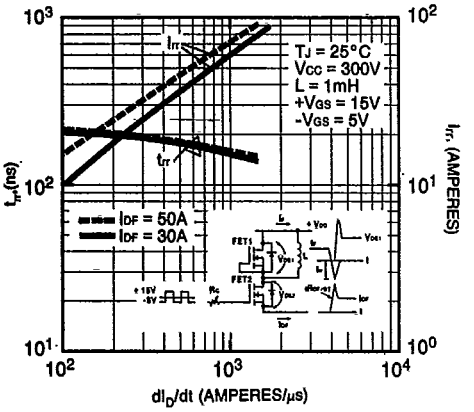
TURN-ON SPEED VS. GATE RESISTANCE (TYPICAL)



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



FREE-WHEEL DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL FOR HALF BRIDGE OPERATION)



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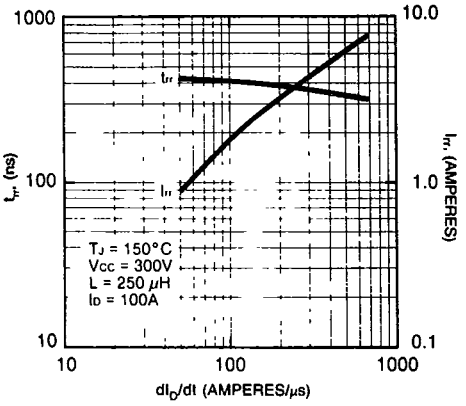

Figure 1 Switching Time Test Circuit 1

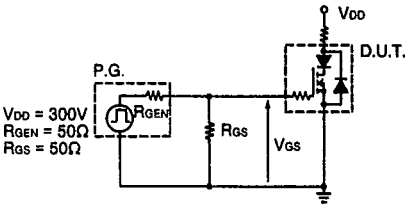

Figure 2 Switching Time Test Circuit 2

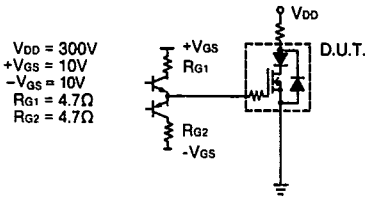

Figure 3 Reverse Recovery Test Circuit