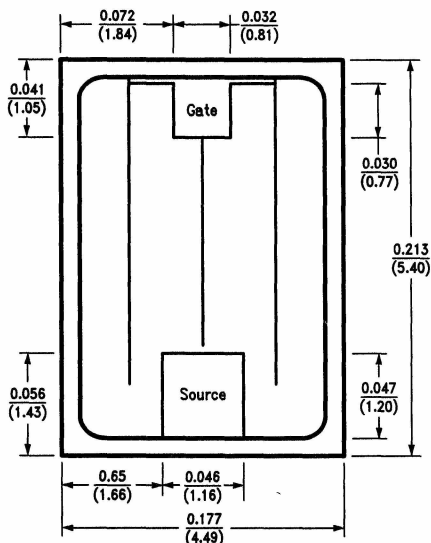




TL/G/10041-34

DESCRIPTION

These dice are n-channel, enhancement mode, power MOSFETs designed especially for high power, high speed applications, such as power supplies, AC and DC motor control and high energy pulse circuits.

This process is available in the following device types:

TO-204 (Case 42)	TO-220 (Case 37)
IRF440	IRF840CF
IRF441	IRF840
IRF442	IRF841
IRF443	IRF842
	IRF843

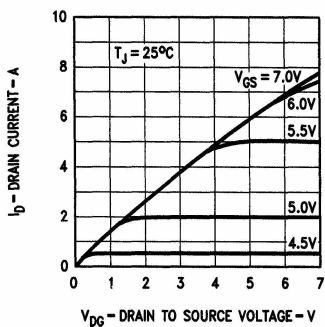
Electrical Characteristics $T_C = 25^\circ\text{C}$ (unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Max	Units
V_{DS}	Drain to Source Voltage (Note 1)	$I_D = 250 \mu\text{A}$; $V_{GS} = 0\text{V}$	500		V
I_{DSS}	Zero Gate Voltage Drain	$V_{DS} = \text{Rated Voltage}$ $V_{GS} = 0\text{V}$		250	μA
I_{GSS}	Gate Leakage Current	$V_{DS} = \pm 20\text{V}$; $V_{DS} = 0\text{V}$		± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$I_D = 250 \mu\text{A}$; $V_{DS} = V_{GS}$	2.0	4.0	V
$R_{DS(ON)}$	Static On-Resistance (Note 2)	$V_{GS} = 10\text{V}$; $I_D = 4.0\text{A}$		0.85	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{V}$; $I_D = 4.0\text{A}$	4.0		Siemens
C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}$; $V_{GS} = 0\text{V}$ $f = 1 \text{ MHz}$		1600	pF
C_{oss}	Output Capacitance			350	pF
C_{rss}	Reverse Transfer			150	pF
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 220\text{V}$; $I_D = 4\text{A}$ $V_{GS} = 10\text{V}$; $R_{GEN} = 4.7\Omega$		35	ns
t_r	Rise Time	$R_{GS} = 4.7\Omega$		15	ns
$t_{d(off)}$	Turn-Off Delay Time			90	ns
t_f	Fall Time			30	ns
Q_g	Total Gate Charge	$V_{GS} = 10\text{V}$; $I_D = 12\text{A}$ $V_{DD} = 400\text{V}$		60	nC

Note 1: $T_J = +25^\circ\text{C}$ to $+150^\circ\text{C}$.

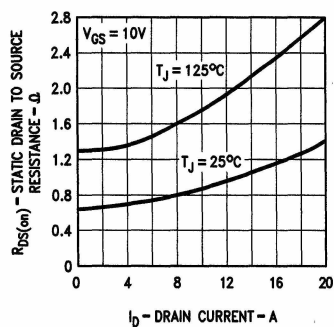
Note 2: Pulse Test: Pulse Width $\leq 80 \mu\text{s}$, Duty Cycle $\leq 1\%$.

Typical Performance Characteristics



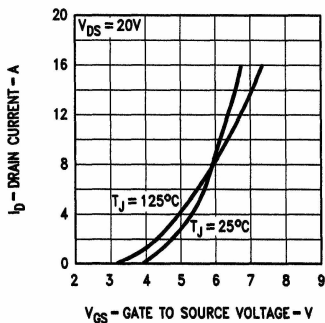
TL/G/10041-35

FIGURE 1. Output Characteristics



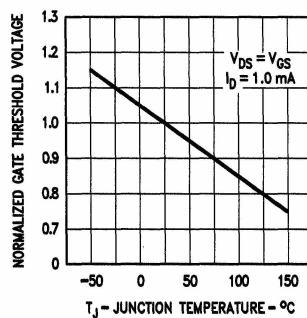
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FIGURE 2. Static Drain to Source Resistance vs Drain Current



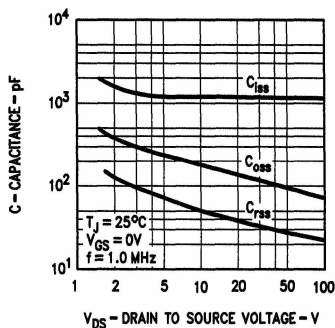
TL/G/10041-37

FIGURE 3. Transfer Characteristics



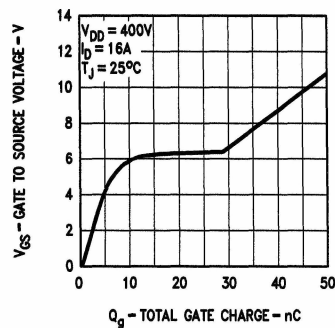
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FIGURE 4. Temperature Variation of Gate to Source Threshold Voltage



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FIGURE 5. Capacitance vs Drain to Source Voltage

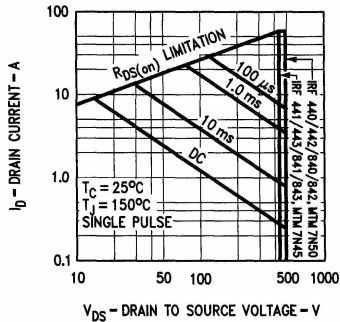


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FIGURE 6. Gate to Source Voltage vs Total Gate Charge

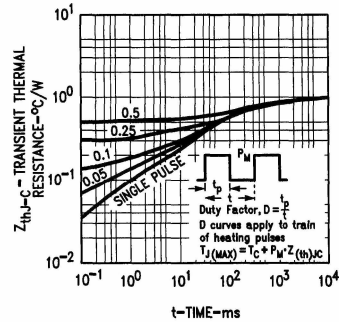
Process E4

Typical Performance Characteristics (Continued)



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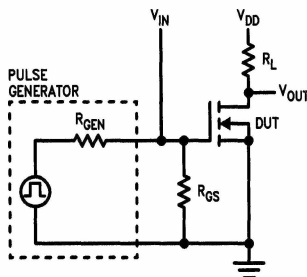
FIGURE 7. Forward Biased Safe Operating Area Curves



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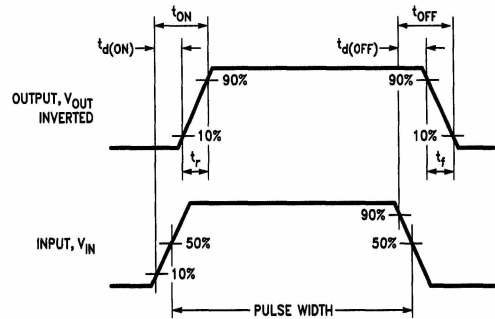
FIGURE 8. Transient Thermal Resistance vs Time

Typical Electrical Characteristics



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FIGURE 9. Switching Test Circuit



TL/G/10041-44

FIGURE 10. Switching Waveforms

Probe Testing

Each die is probed and electrically tested to the limits specified in the Electrical Characteristics Table. However, high current parameters and thermal characteristics specified in the packaged device data sheets cannot be tested or guaranteed in die form because of the power dissipation limits of unmounted die and current handling limits of probe tips.

These parameters are:

- Thermal Resistance
- Forward Voltage Drop at Rated Current
- Reverse Recovery Characteristics at Rated Current
- Surge Current