

TL/G/10040-B6

**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)
IRF230	IRF630
IRF231	IRF631
IRF232	IRF632
IRF233	IRF633
	MTP12N18
	MTP12N20

**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)	$I_D = 250 \mu\text{A}; V_{GS} = 0\text{V}$	200		V
$I_{DSS}$	Zero Gate Voltage Drain	$V_{DS} = \text{Rated Voltage}$ $V_{GS} = 0\text{V}$		250	$\mu\text{A}$
$I_{GSS}$	Gate Leakage Current	$V_{DS} = \pm 20\text{V}; V_{GS} = 0\text{V}$		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)	$V_{GS} = 10\text{V}; I_D = 5\text{A}$		0.4	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{V}; I_D = 5\text{A}$	3.0		Siemens
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}; V_{GS} = 0\text{V}$ $f = 1 \text{ MHz}$		800	pF
$C_{oss}$	Output Capacitance			450	pF
$C_{rss}$	Reverse Transfer			150	pF
$t_{d(on)}$	Turn-On Delay Time (Note 3)	$V_{DD} = 25\text{V}; I_D = 6\text{A}$ $V_{GS} = 10\text{V}; R_{GEN} = 15\Omega$		50	ns
$t_r$	Rise Time	$R_{GS} = 15\Omega$		250	ns
$t_{d(off)}$	Turn-Off Delay Time			100	ns
$t_f$	Fall Time			120	ns
$Q_g$	Total Gate Charge	$V_{GS} = 10\text{V}; I_D = 12\text{A}$ $V_{DD} = 120\text{V}$		30	nC

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

**Note 2:** Pulse width limited by  $T_J$ .

**Note 3:** Switching time measurements performed on LEM TR-58 test equipment.

Typical Performance Characteristics

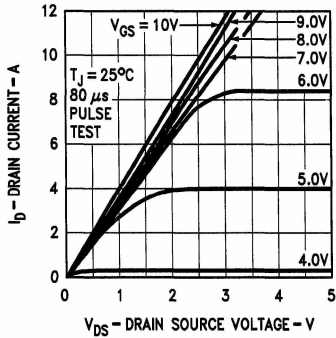


FIGURE 1. Output Characteristics

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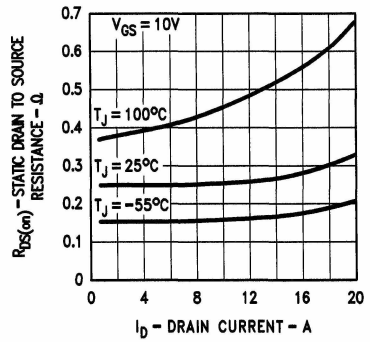


FIGURE 2. Static Drain to Source Resistance vs Drain Current

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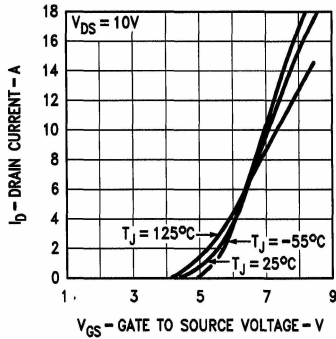


FIGURE 3. Transfer Characteristics

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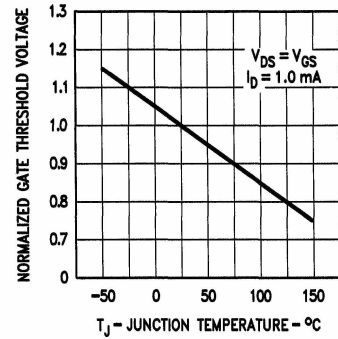


FIGURE 4. Temperature Variation of Gate to Source Threshold Voltage

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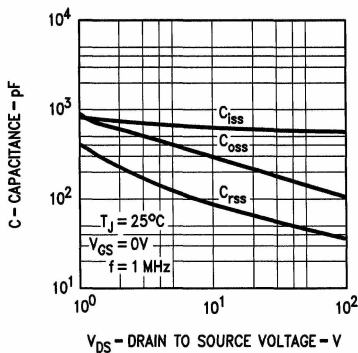


FIGURE 5. Capacitance vs Drain to Source Voltage

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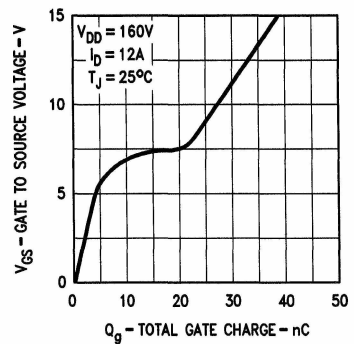
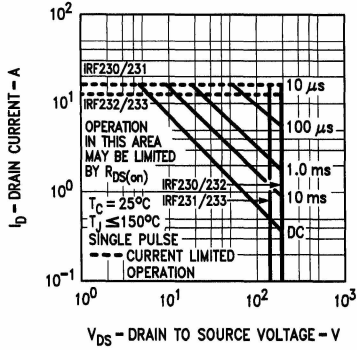


FIGURE 6. Gate to Source Voltage vs Total Gate Charge

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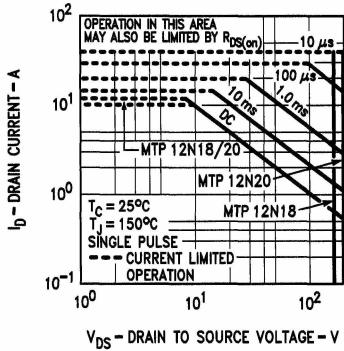
# Process C2

## Typical Performance Characteristics (Continued)



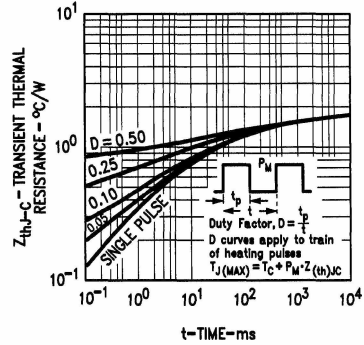
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FIGURE 7. Forward Biased Safe Operating Area for IRF230-233 and IRF630-633



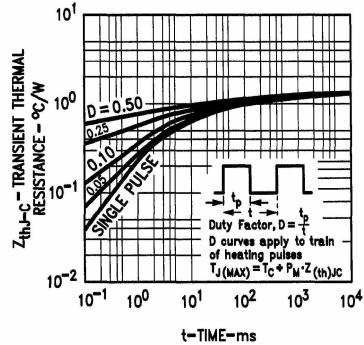
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FIGURE 9. Forward Biased Safe Operating Area for MTP12N18/12N20



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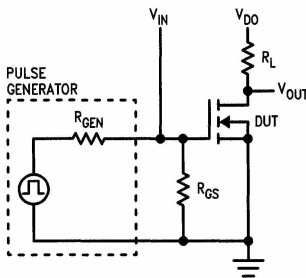
FIGURE 8. Transient Thermal Resistance vs Time for IRF230-233 and IRF630-633



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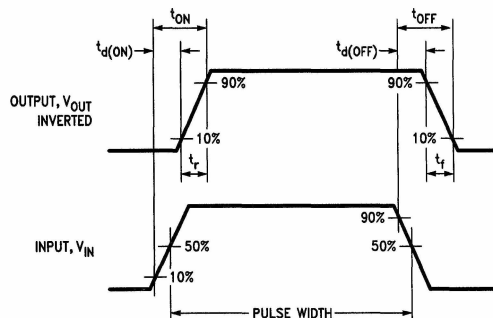
FIGURE 10. Transient Thermal Resistance vs Time for MTP12N18/12N20

## Typical Electrical Characteristics



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FIGURE 11. Switching Test Circuit



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FIGURE 12. Switching Waveforms