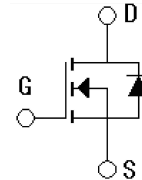
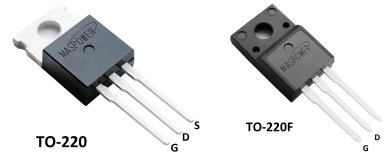


Features

- Low gate charge (typical 51.5nC)
- Low Crss(typical 16.9pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product



Applications

- LED power supplies
- High frequency switch mode power supplies
- Electronic lamp ballasts based on half bridge

Absolute Ratings (Tc=25°C)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	600	V
Transient Gate-Source Voltage	V_{GSM}	±30	V
Continuous Gate-Source Voltage	V_{GSS}	±20	V
Drain Current-continuous	I_D	$T_C=25^{\circ}C$	10*
		$T_C=100^{\circ}C$	6.0*
Drain Current-pulse (note 1)	I_{DM}	40*	A
Single pulse avalanche energy (note 2)	E_{AS}	1050	mJ
Avalanche Current (note 1)	I_{AR}	10	A
Repetitive Avalanche Energy(note 1)	E_{AR}	15.6	mJ
Power Dissipation (TO-220F)	$P_D, T_C=25^{\circ}C$ Derate above 25°C	40	W
		0.32	W/°C
Power Dissipation (TO-220)	$P_D, T_C=25^{\circ}C$ Derate above 25°C	160	W
		1.28	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	-55~+150	°C
Peak Diode Recovery dv/dt (note 3)	dv/dt	5.0	V/ns
Maximum Lead Temperature for Soldering Purposes	T_L	300	°C

*Drain current limited by maximum junction temperature

Electrical Characteristics($T_{CASE}=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Drain-Source Voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	600	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, referenced to 25°C	-	0.6	-	V/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V, T_C=25^\circ C$	-	-	10	μA
		$V_{DS}=480V, T_C=125^\circ C$	-	-	100	μA
Gate body leakage current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.0A$	-	0.65	0.85	Ω
Forward Transconductance	g_{FS}	$V_{DS}=40V, I_D=5.0A$ (note 4)	-	5.7	-	S
Dynamic Characteristics						
Input capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	-	1435	1800	pF
Output capacitance	C_{oss}		-	151.4	200	pF
Reverse transfer capacitance	C_{rss}		-	16.9	30	pF
Switching-Characteristics						
Turn-On delay time	$t_{d(on)}$	$V_{DD}=300V, I_D=10A, R_{GEN}=25\Omega$ (note 4,5)	-	31.2	65	ns
Turn-On rise time	t_r		-	57.6	95	ns
Turn-Off delay time	$t_{d(Off)}$		-	96	135	ns
Turn-Off rise time	t_f		-	52.8	95	ns
Total Gate Charge	Q_g	$V_{DS}=480V, I_D=10A, V_{GS}=10V$ (note 4,5)	-	51.5	75	nC
Gate-Source charge	Q_{gs}		-	7.3		nC
Gate-Drain charge	Q_{gd}		-	18		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (note 3)	V_{SD}	$V_{GS}=0V, I_S=10A$	-	-	1.2	V
Pulsed Drain-Source Diode Forward Current	I_{SM}	-	-	-	40	A
Continuous Drain Source Diode Forward Current	I_S	-	-	-	10	A

Reverse recovery time	t_{rr}	$V_{GS}=0V, I_S=10A$ $di_F/dt=100A/\mu s$ (note 4)	-	405	-	ns
Reverse recovery charge	Q_{rr}		-	9.0	-	μC

Thermal Characteristic

Parameter	Symbol	Value		Unit
		TO-220	TO-220F	
Thermal Resistance, junction to Case, Max	$R_{th(j-c)}$	0.78	3.1	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient, Max	$R_{th(j-a)}$	76	56	$^{\circ}C/W$

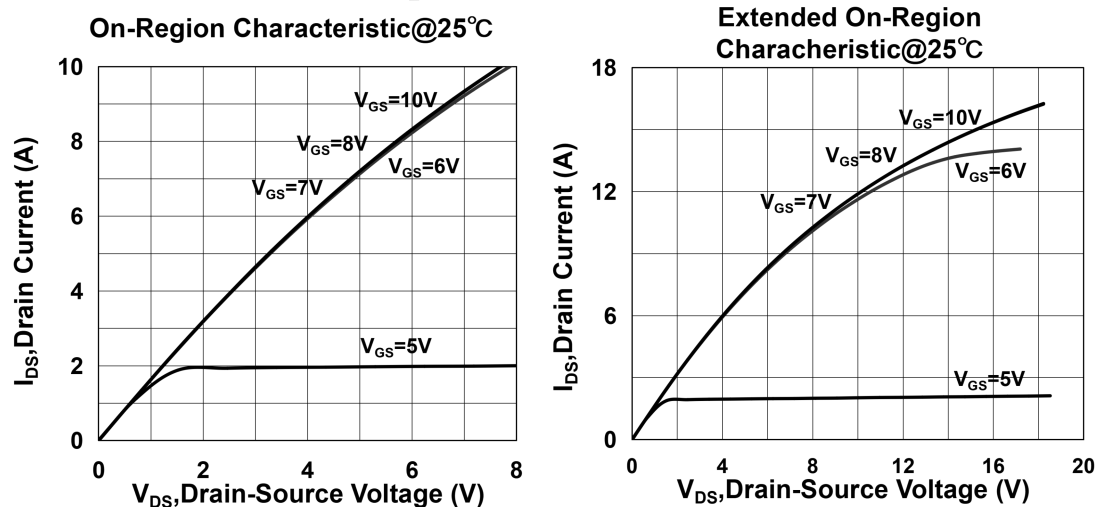
Order Message

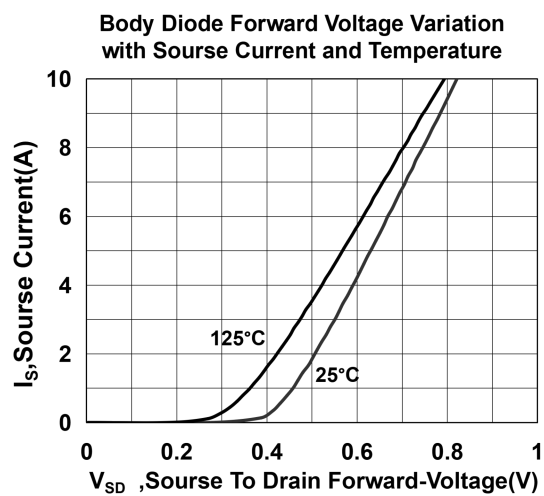
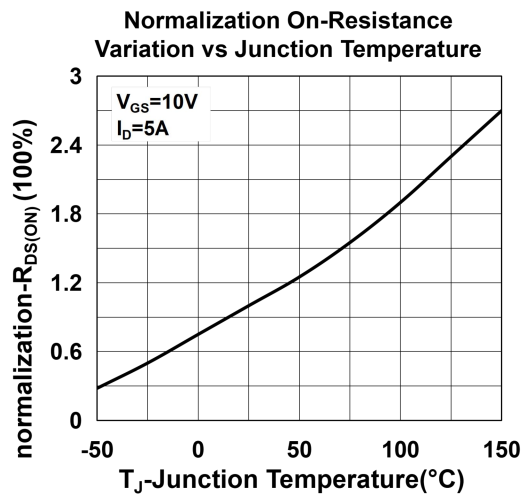
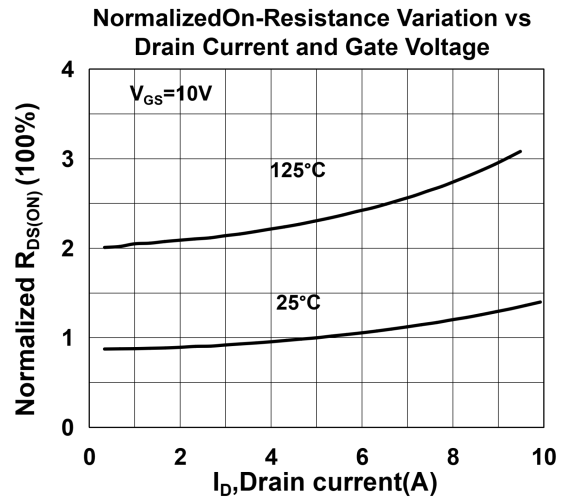
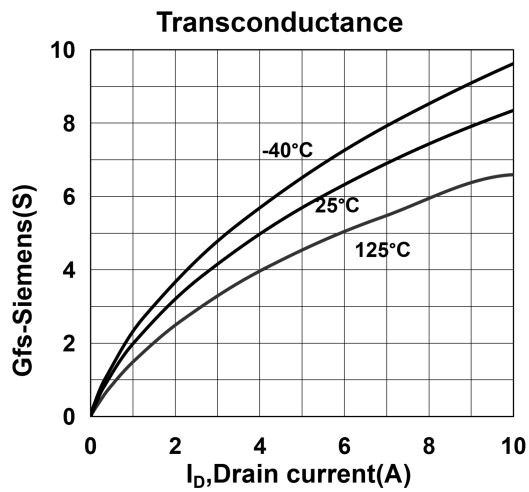
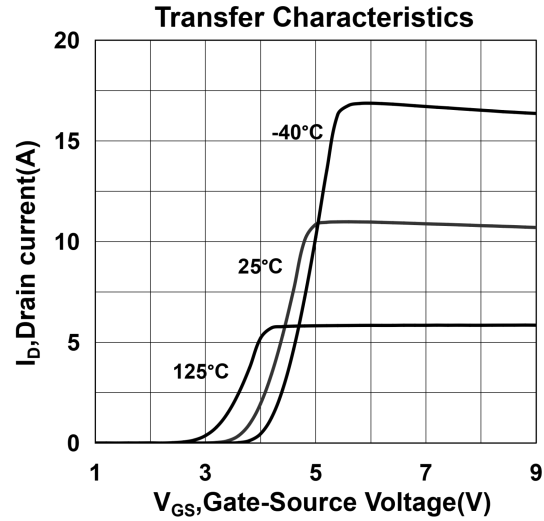
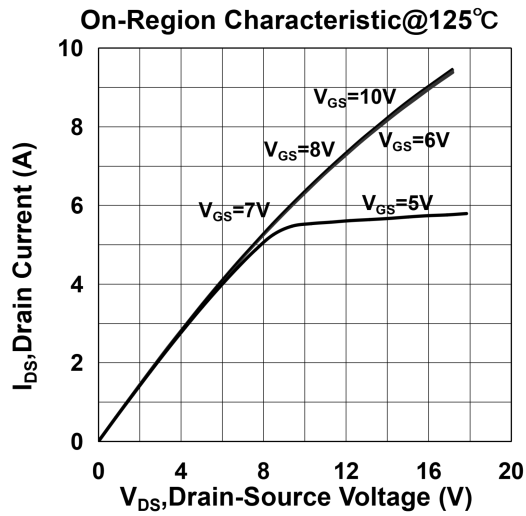
Order codes	Package	Packaging
MS10N60FT	TO-220	Tube
MS10N60FS	TO-220F	Tube

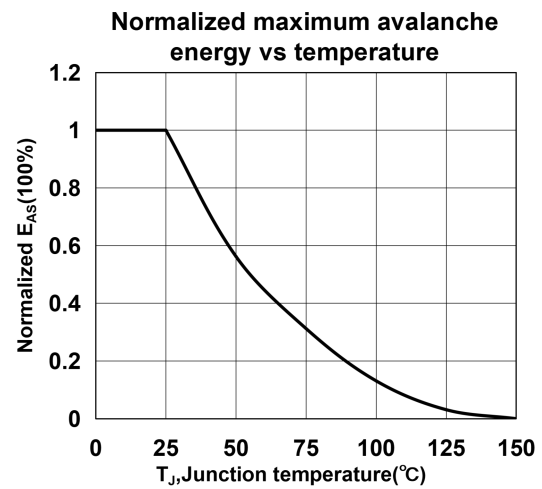
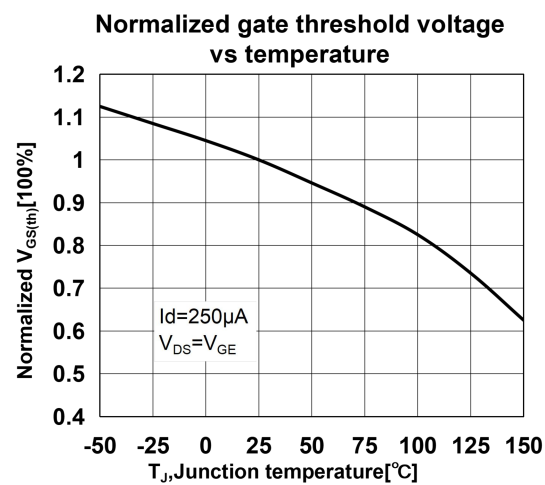
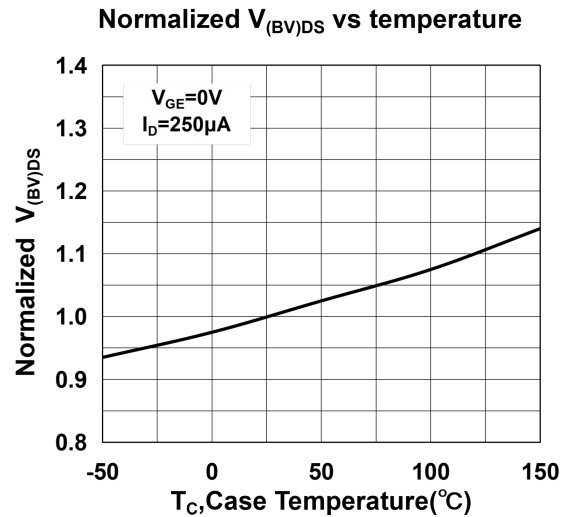
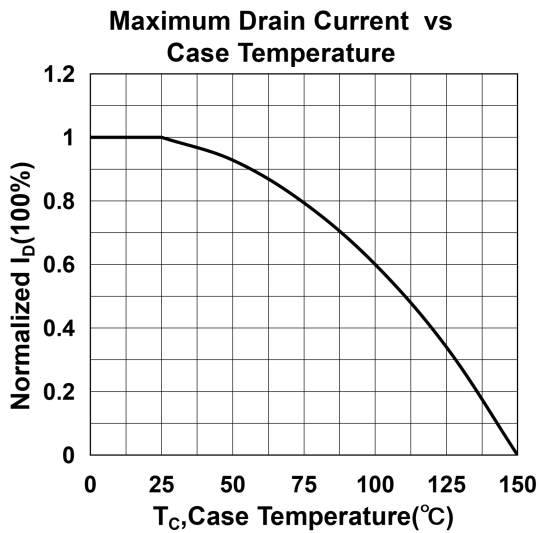
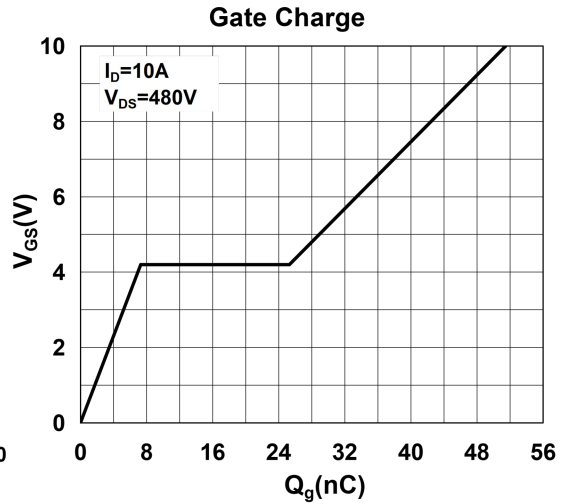
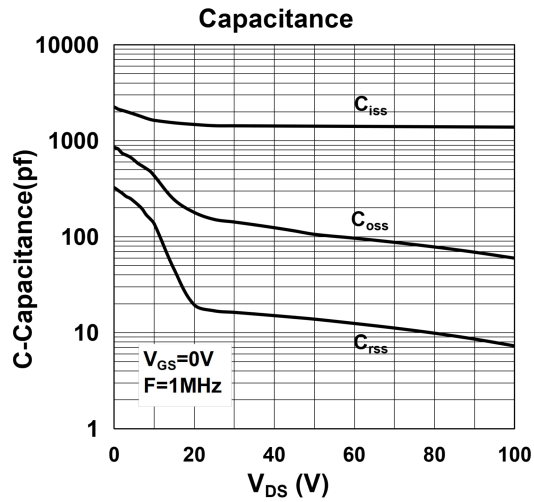
Notes:

1. Pulse width limited by maximum junction temperature
2. $L=19mH$, $I_{AS}=10A$, $V_{DD}=50V$, $R_G=25\ \Omega$, Starting $T_J=25^{\circ}C$
3. $I_{SD} \leq 10A$, $di/dt \leq 300A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^{\circ}C$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
5. Essentially independent of operating temperature

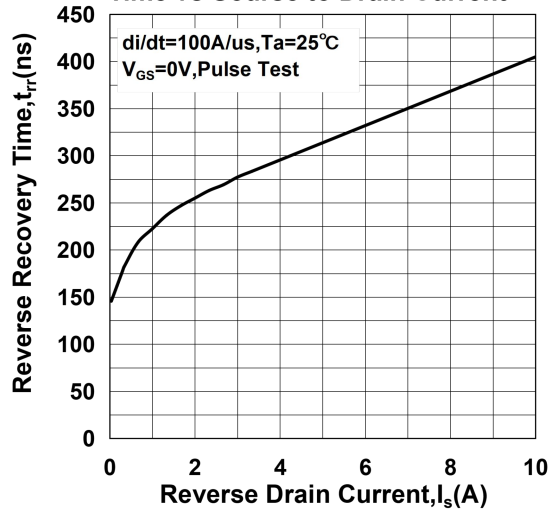
ELECTRICAL CHARACTERISTICS (curves)



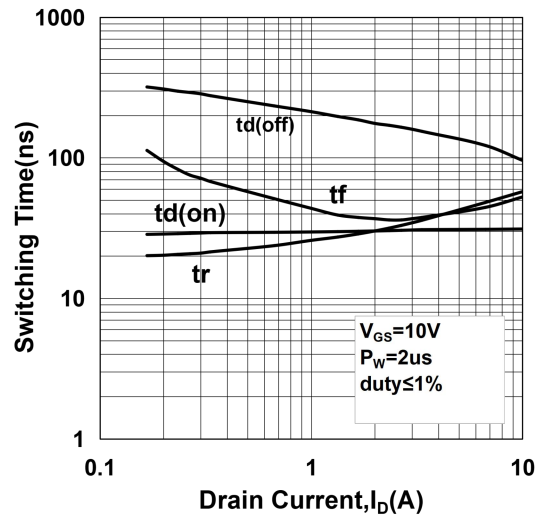




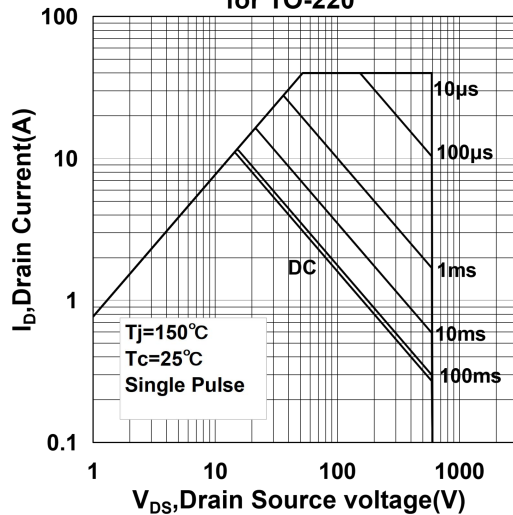
Body Diode Reverse Recovery Time vs Source to Drain Current



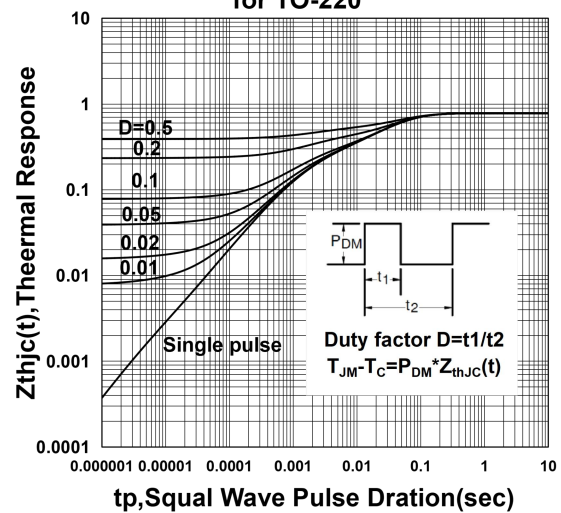
Switching Characteristics



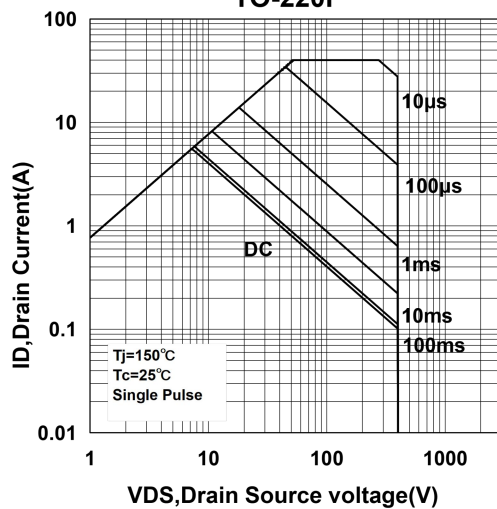
Safe Operating Area for TO-220



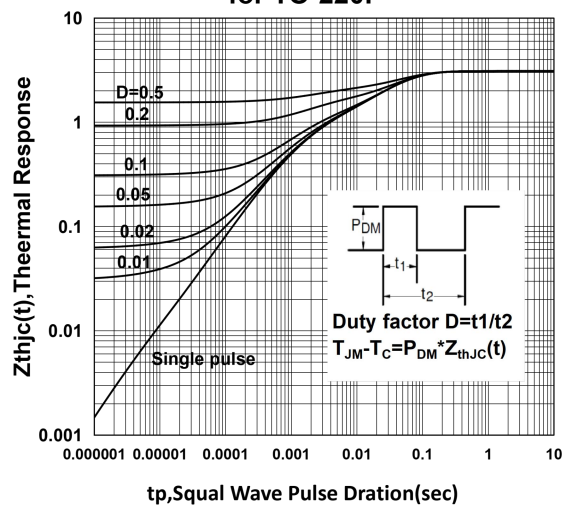
Transient response Curve for TO-220



Safe Operating Area for TO-220F



Transient response Curve for TO-220F



PACKAGE MECHANICAL DATA

