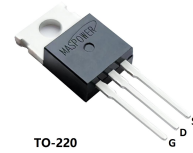
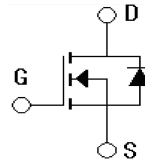
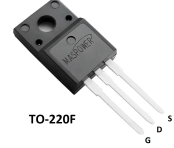


Features

- Low Crss (typical 22pF)
- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product


TO-220

TO-220F

TO-252

Applications

- UPS
- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge

Absolute Ratings (Tc=25°C)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	400	V
Transient Gate-Source Voltage	V_{GSM}	±30	V
Continuous Gate-Source Voltage	V_{GSS}	±20	V
Drain Current-continuous	I_D	10	A
Drain Current-pulse(note 1)	I_{DM}	30	A
Single Pulsed Avalanche Energy(note 2)	E_{AS}	450	mJ
Maximum Power Dissipation(TO-220/TO-252)	P_D	134	W
Maximum Power Dissipation(TO-220F)	P_D	68	
Operating and Storage Temperature Range	T_J, T_{STG}	-55~+150	°C

Electrical Characteristics(T_{CASE}=25°C unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Drain-Source Voltage	BV_{DSS}	$I_D=0.25mA, V_{GS}=0V$	400	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=V_{DSS}, V_{GS}=0V$	-	-	10	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=±30V, V_{DS}=0V$	-	-	±100	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25mA$	2.0	-	4.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$	-	0.43	0.54	Ω

Forward Transconductance	g_{fs}	$V_{DS}=40V, I_D=5A$	-	9.6	-	S
Dynamic Characteristics						
Input capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	-	650	809	pF
Output capacitance	C_{oss}		-	70	95	pF
Reverse transfer capacitance	C_{rss}		-	25	33	pF
Switching-Characteristics						
Turn-On delay time	$t_{d(on)}$	$V_{DS}=200V, I_D=10A,$ $R_G=25\Omega$	-	20	50	ns
Turn-On rise time	t_r		-	80	170	ns
Turn-Off delay time	$t_{d(Off)}$		-	125	260	ns
Turn-Off rise time	t_f		-	85	180	ns
Total Gate Charge	Q_g	$V_{DS}=320V, I_D=10A,$ $V_{GS}=10V$	-	19.7	25.6	nC
Gate-Source charge	Q_{gs}		-	7.38	-	nC
Gate-Drain charge	Q_{gd}		-	4.66	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=10A$	-	1.5	-	V
Diode Forward Current	I_S	$T_C=25^{\circ}C$	-	-	10	A
Reverse recovery time	T_{rr}	$I_S=10A,$ $di/dt=100A/\mu s$	-	-	217	ns
Reverse recovery charge	Q_{rr}		-	2.45	-	μC

Thermal Characteristics

Parameter	Symbol	Value		Unit
		TO-220/ TO-252	TO-220F	
Thermal Resistance, junction to Case, Max	$R_{th(j-c)}$	0.93	1.83	$^\circ C/W$
Thermal Resistance, junction to Ambient, Max	$R_{th(j-a)}$	62.5		$^\circ C/W$

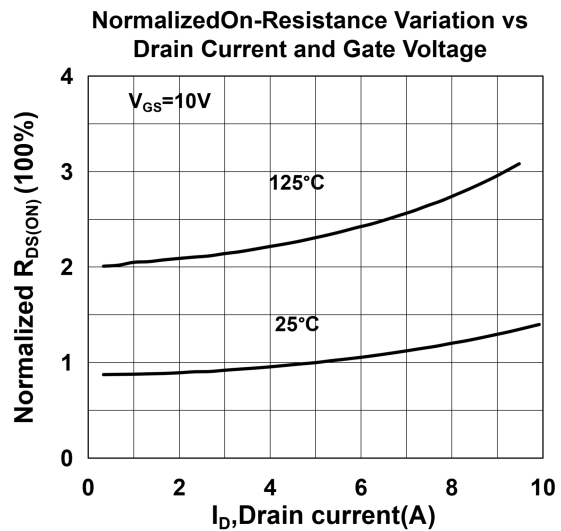
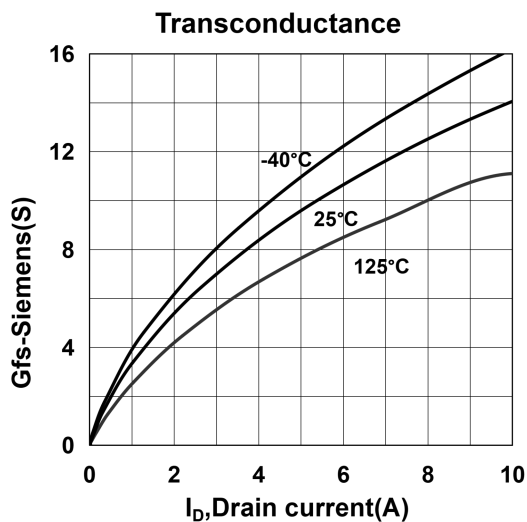
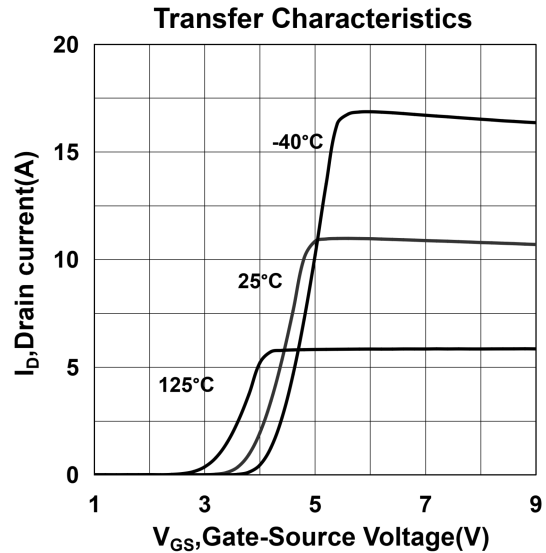
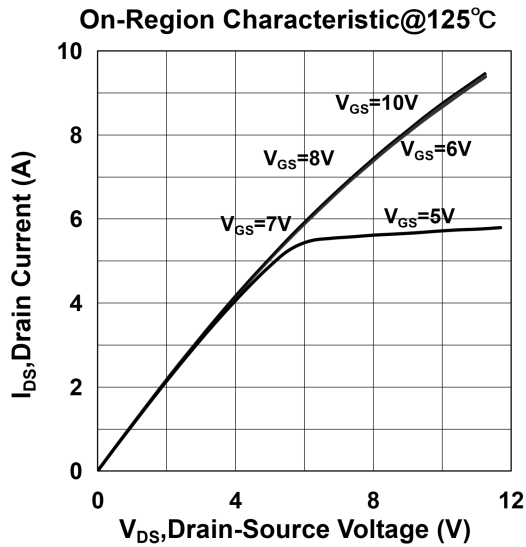
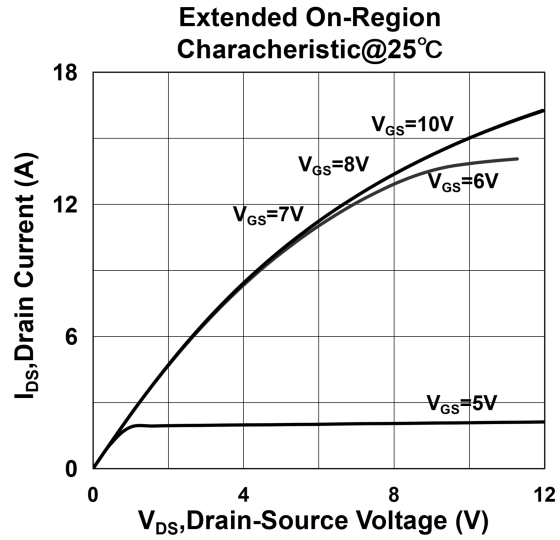
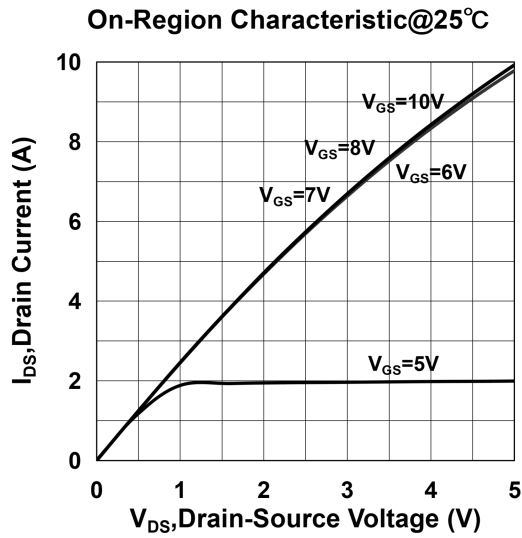
Notes:

1. Pulse width limited by maximum junction temperature
2. $L=7.9mH, I_{AS}=10A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ C$
3. $I_{SD} \leq 10A, di/dt \leq 300A/\mu s, V_{DD} \leq BVDSS$, Starting $T_J=25^\circ C$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycles $\leq 2\%$
5. Essentially independent of operating temperature

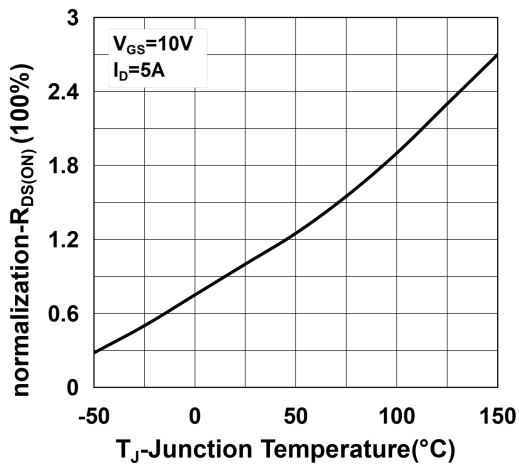
Ordering information

Order codes	Package	Packaging
MS10N40HGT0	TO-220	Tube
MS10N40HGT1	TO-220F	Tube
MS10N40HGD0	TO-252	Reel

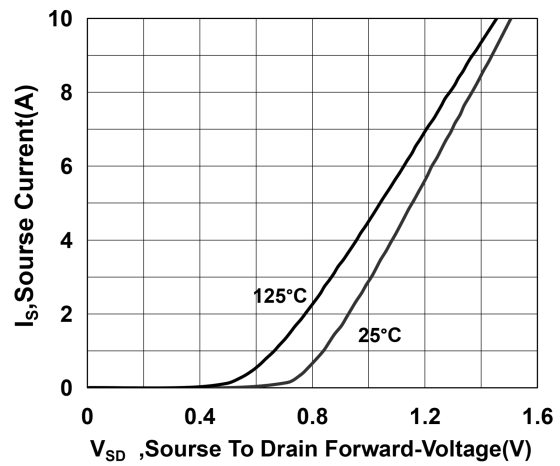
Electrical Characteristics



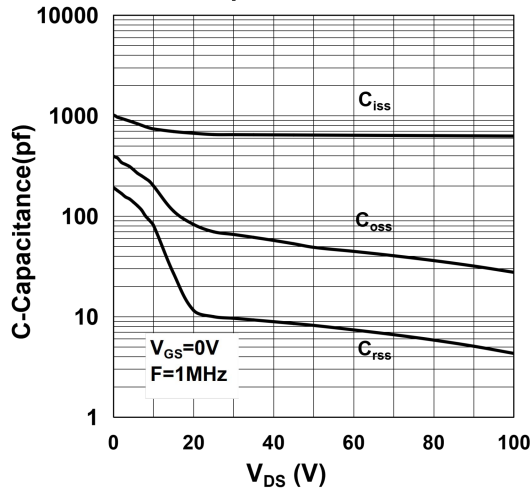
Normalization On-Resistance
Variation vs Junction Temperature



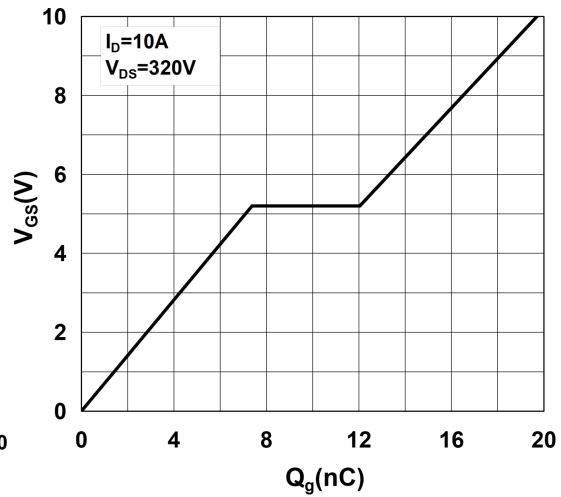
Body Diode Forward Voltage Variation
with Source Current and Temperature



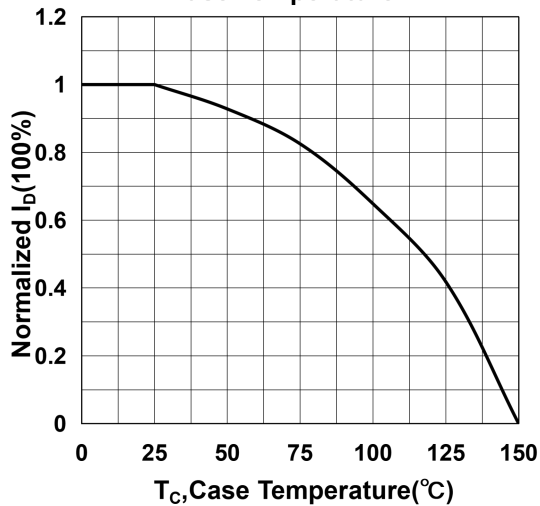
Capacitance



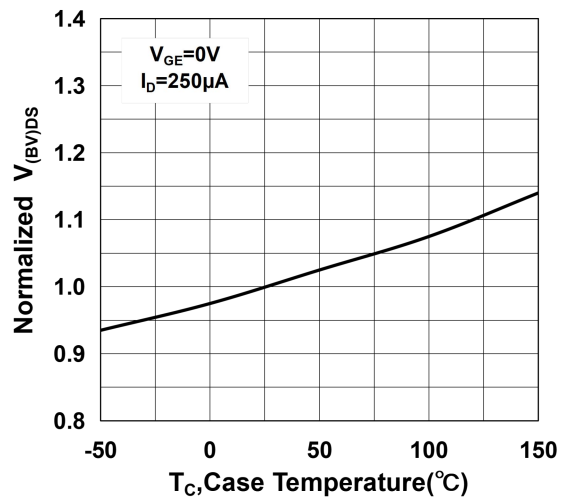
Gate Charge



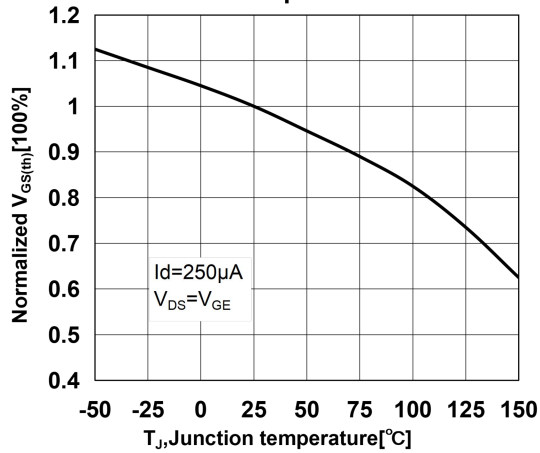
Maximum Drain Current vs
Case Temperature



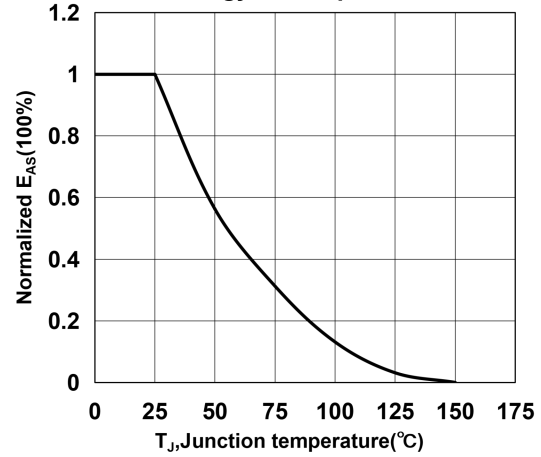
Normalized $V_{(BV)DS}$ vs temperature



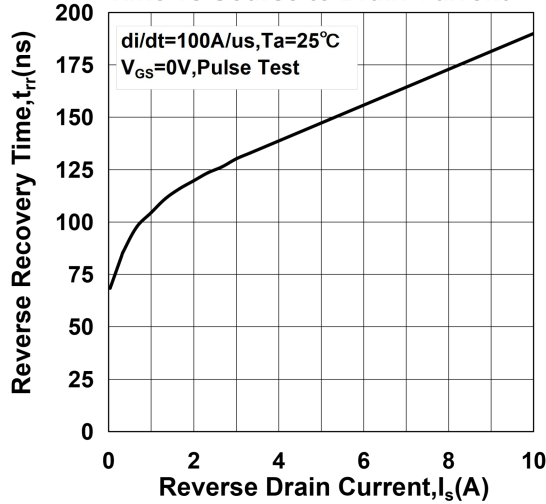
Normalized gate threshold voltage vs temperature



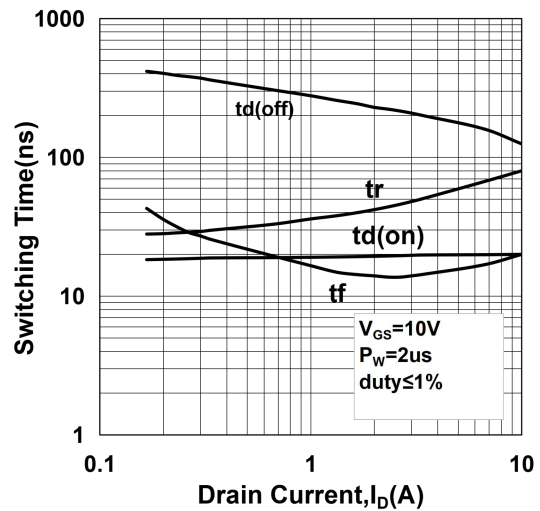
Normalized maximum avalanche energy vs temperature



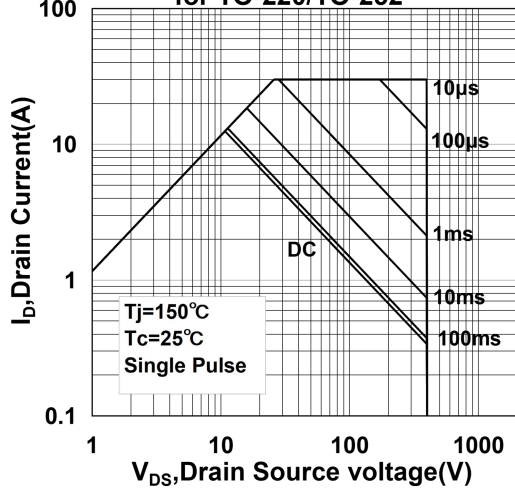
Body Diode Reverse Recovery Time vs Source to Drain Current



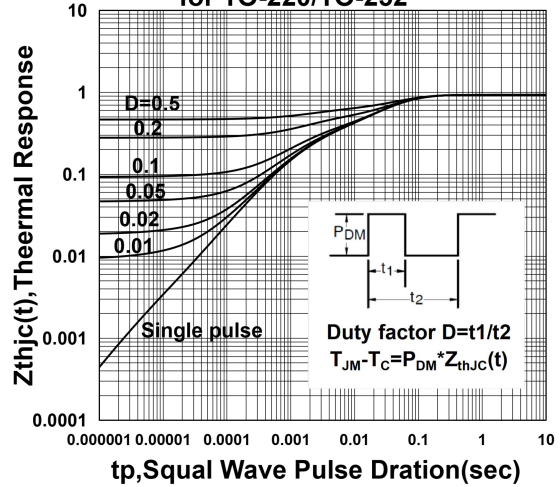
Switching Characteristics

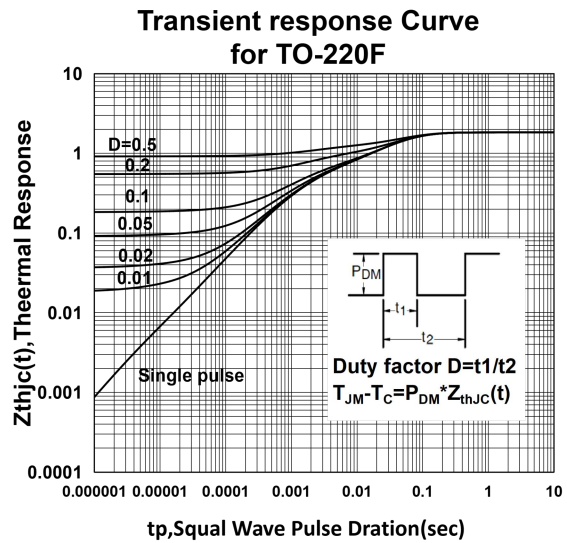
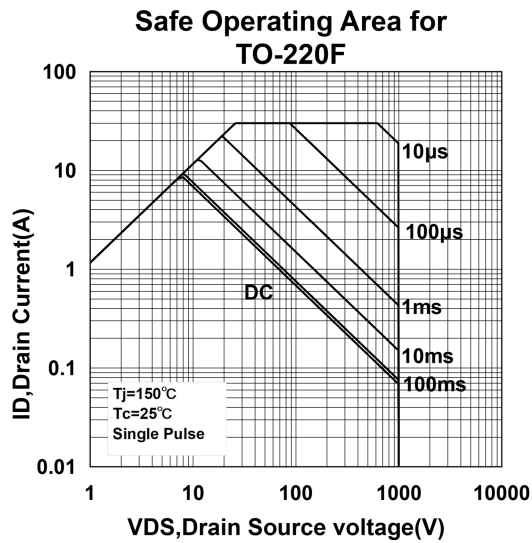


Safe Operating Area for TO-220/TO-252



Transient response Curve for TO-220/TO-252





Package Mechanical DATA

