

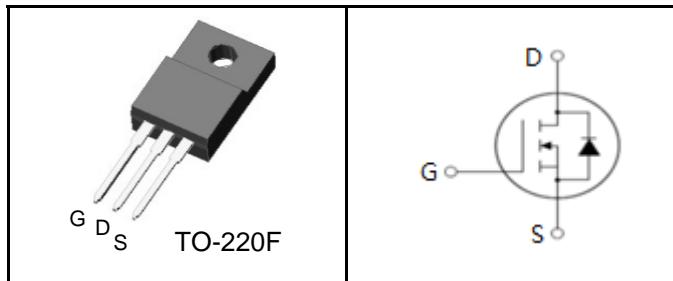
600V Super-Junction Power MOSFET

FEATURES

- Very low FOM $R_{DS(on)} \times Q_g$
- 100% avalanche tested
- RoHS compliant
- Ultra-fast body diode
- Very high commutation ruggedness

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- Resonant switching stages



Device Marking and Package Information

Device	Package	Marking
MPSA60M160CFD	TO-220F	MP60M160CFD

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS} = 0\text{V}$)	V_{DSS}	600	V
Continuous Drain Current	I_D	20	A
Pulsed Drain Current (note1)	I_{DM}	60	A
Gate-Source Voltage	V_{GSS}	± 30	V
Single Pulse Avalanche Energy (note2)	E_{AS}	605	mJ
Repetitive Avalanche Current (note1)	I_{AR}	6	A
Repetitive Avalanche Energy (note1)	E_{AR}	0.7	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\ldots 400\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\ldots 400\text{ V}$, $I_{SD} \leq I_D$	dv/dt	50	V/ns
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	34	W
Operating Junction and Storage Temperature Range	T_J , T_{stg}	-55~+150	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	3.9	K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	



懋普电源

MPSA60M160CFD

Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_D = 250\mu\text{A}$	600	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 600\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 25^\circ\text{C}$	--	--	2	μA
		$V_{\text{DS}} = 600\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 150^\circ\text{C}$	--	--	500	
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = \pm 30\text{V}$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = 250\mu\text{A}$	3	--	5	V
Drain-Source On-Resistance (Note3)	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, I_D = 10\text{A}$	--	0.150	0.160	Ω
Gate Resistance	R_G	$f = 1.0\text{MHz}$, open drain	--	8	--	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V}, V_{\text{DS}} = 100\text{V}, f = 1.0\text{MHz}$	--	1951	--	pF
Output Capacitance	C_{oss}		--	70	--	
Reverse Transfer Capacitance	C_{rss}		--	6	--	
Total Gate Charge	Q_g	$V_{\text{DD}} = 400\text{V}, I_D = 20\text{A}, V_{\text{GS}} = 10\text{V}$	--	42	--	nC
Gate-Source Charge	Q_{gs}		--	8	--	
Gate-Drain Charge	Q_{gd}		--	15	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 400\text{V}, I_D = 20\text{A}, V_{\text{GS}} = 10\text{V}, R_G = 25\Omega$	--	15	--	ns
Turn-on Rise Time	t_r		--	59	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	121	--	
Turn-off Fall Time	t_f		--	44	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	20	A
Pulsed Diode Forward Current	I_{SM}		--	--	60	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{\text{SD}} = 10\text{A}, V_{\text{GS}} = 0\text{V}$	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$V_R = 400\text{V}, I_F = 20\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	--	132	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.65	--	
Peak Reverse Recovery Current	I_{rrm}		--	9.2	--	μC

Notes

- Repetitive Rating: Pulse width limited by maximum junction temperature
- $I_{\text{AS}} = 6\text{A}, V_{\text{DD}} = 50\text{V}, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 1\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

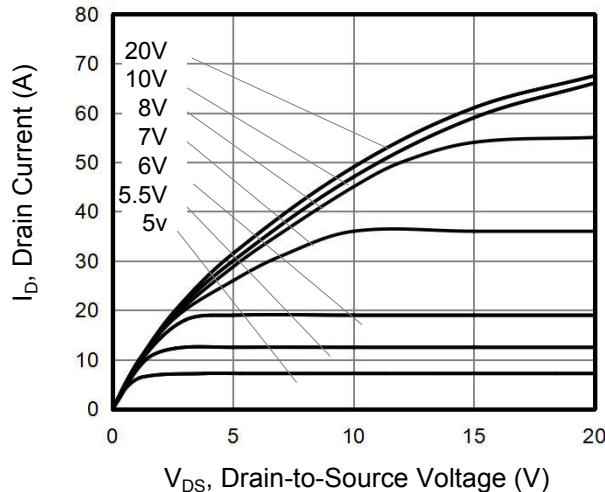


Figure 2. Transfer Characteristics

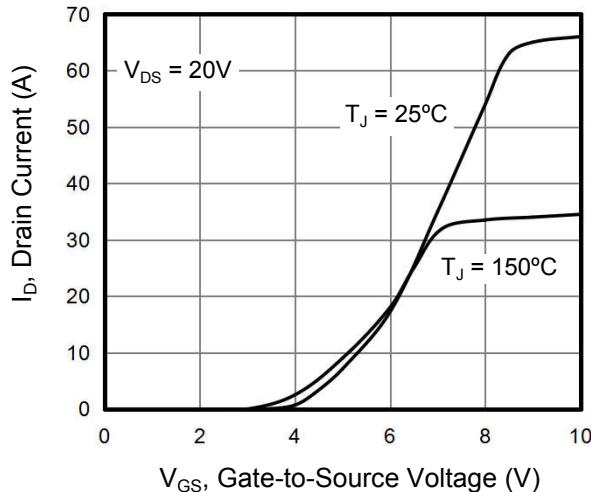


Figure 3. On-Resistance vs. Drain Current

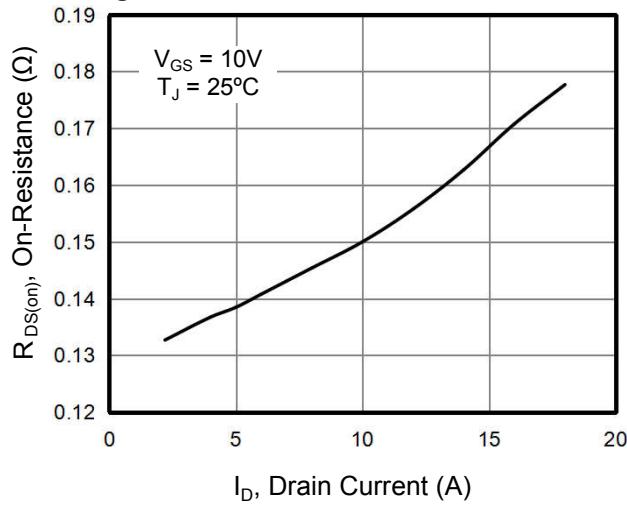


Figure 4. Capacitance

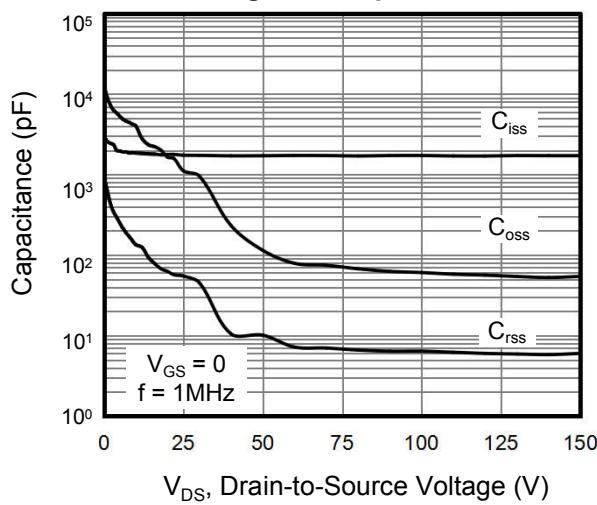


Figure 5. Gate Charge

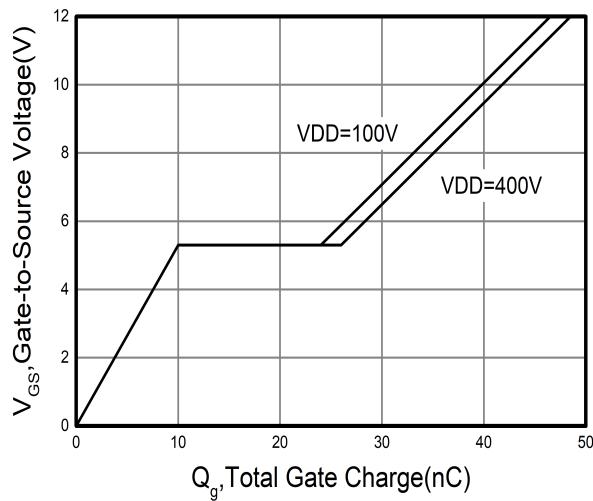
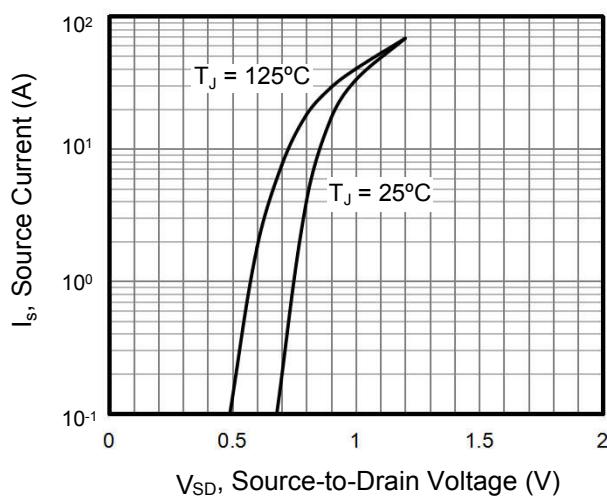
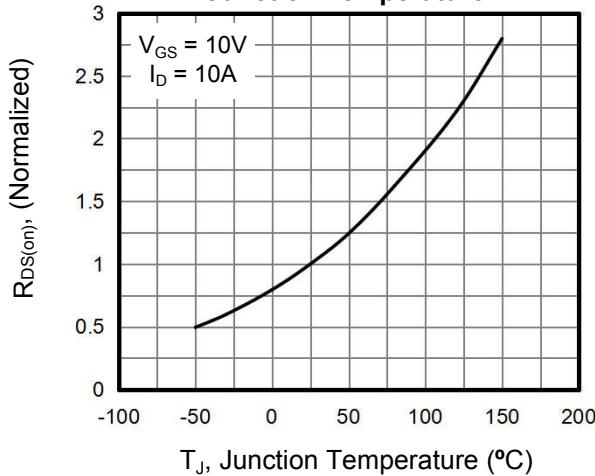


Figure 6. Body Diode Forward Voltage



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

**Figure 7. On-Resistance vs.
Junction Temperature**



**Figure 8. Threshold Voltage vs.
Junction Temperature**

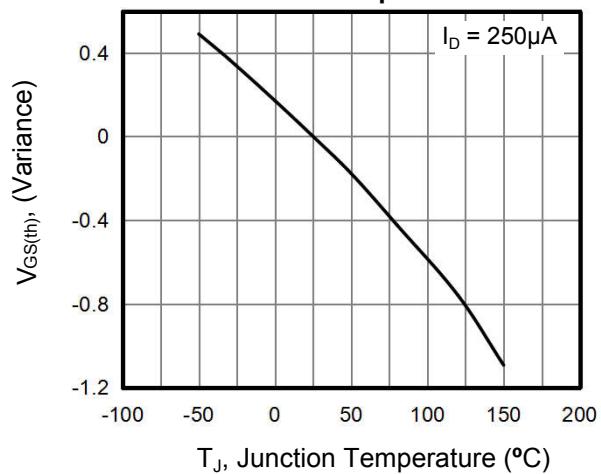


Figure 9. Transient Thermal Impedance

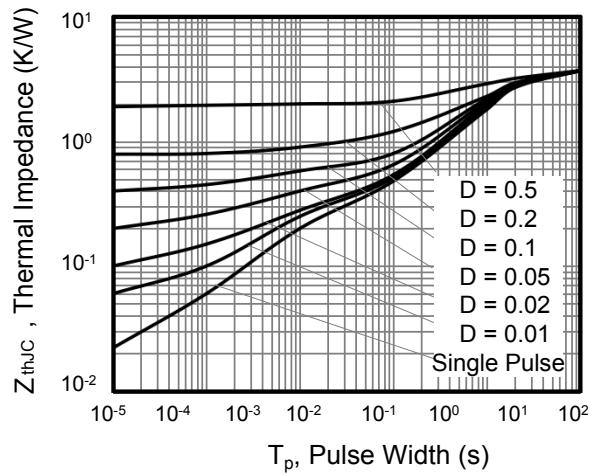
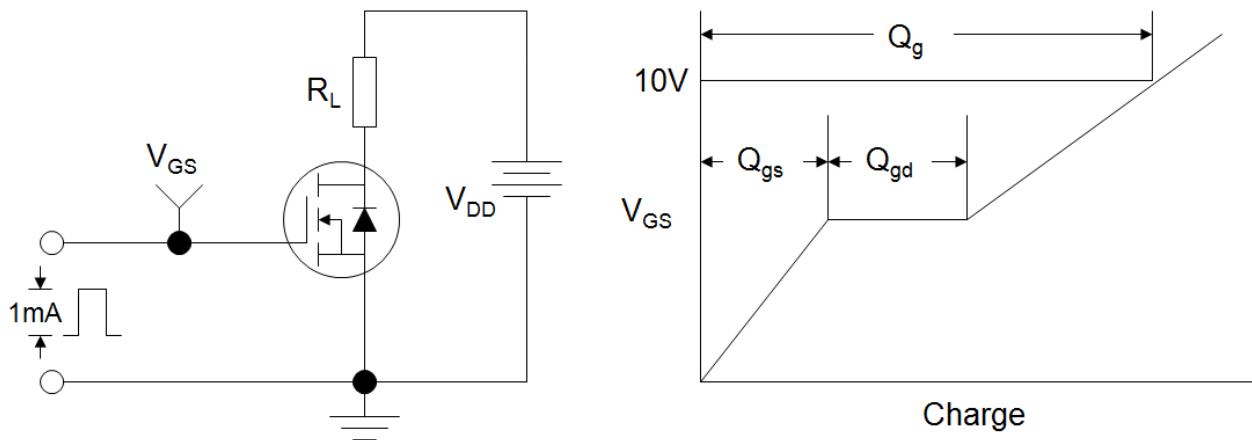
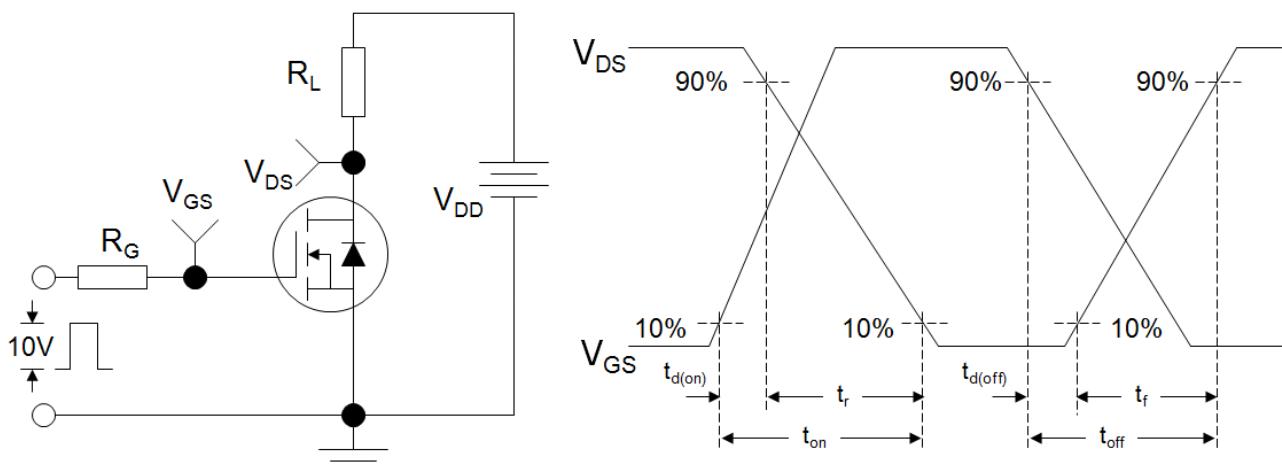
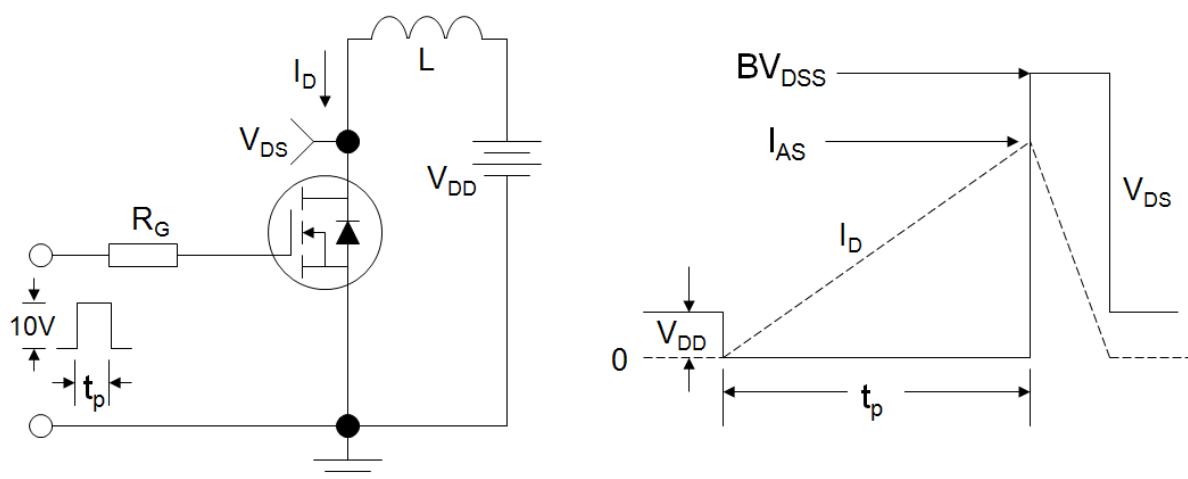


Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform


Package Dimension

unit: mm

