

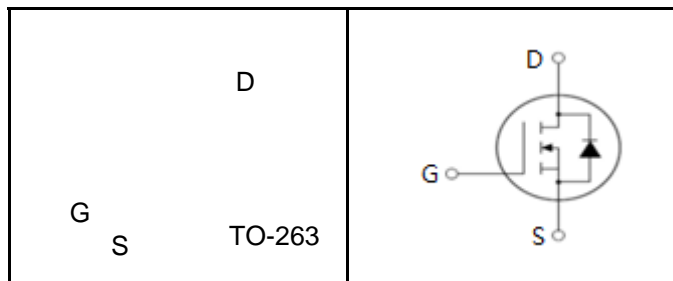
## 600V Super-Junction Power MOSFET

### 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
MPSC60M160CFD	TO-263	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	$V_{GSS}$	$\pm 30$	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, $V_{DS}=0\dots 400\text{V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\dots 400\text{V}$ , $I_{SD} \leq I_D$	dv/dt	50	V/ns
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	150	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150	$^\circ\text{C}$

### Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{thJC}$	0.83	K/W
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62	

# MPSC60M160CFD

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu\text{A}$	600	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 600V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	2	$\mu\text{A}$
		$V_{DS} = 600V, V_{GS} = 0V, T_J = 150^\circ\text{C}$	--	--	500	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	3	--	5	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 10A$	--	0.145	0.160	$\Omega$
Gate Resistance	$R_G$	$f = 1.0\text{MHz}$ , open drain	--	8	--	$\Omega$
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 100V,$ $f = 1.0\text{MHz}$	--	1951	--	$\text{pF}$
Output Capacitance	$C_{oss}$		--	70	--	
Reverse Transfer Capacitance	$C_{rss}$		--	6	--	
Total Gate Charge	$Q_g$	$V_{DD} = 400V, I_D = 20A,$ $V_{GS} = 10V$	--	42	--	nC
Gate-Source Charge	$Q_{gs}$		--	8	--	
Gate-Drain Charge	$Q_{gd}$		--	15	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 20A,$ $V_{GS} = 10V, R_G = 25\Omega$	--	15	--	ns
Turn-on Rise Time	$t_r$		--	59	--	
Turn-off Delay Time	$t_{d(off)}$		--	121	--	
Turn-off Fall Time	$t_f$		--	44	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	20	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	60	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 10A, V_{GS} = 0V$	--	0.9	1.2	V
Reverse Recovery Time	$t_{rr}$	$V_R = 400V, I_F = 20A,$ $di_F/dt = 100A/\mu\text{s}$	--	132	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	0.65	--	$\mu\text{C}$
Peak Reverse Recovery Current	$I_{rrm}$		--	9.2	--	A

## Notes

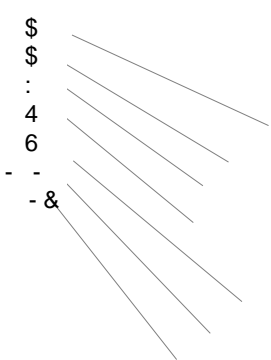
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $I_{AS} = 6A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 1\%$

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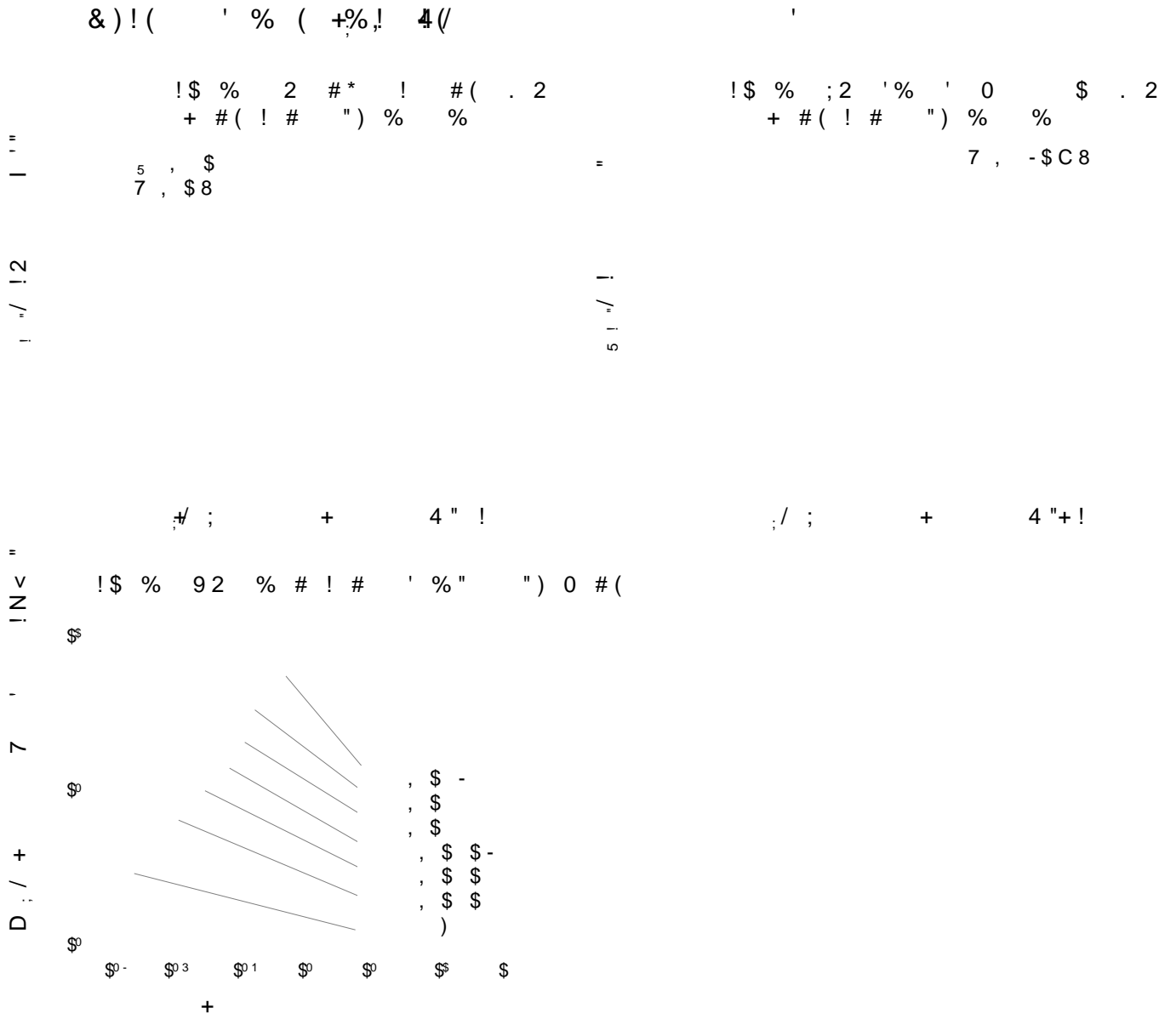
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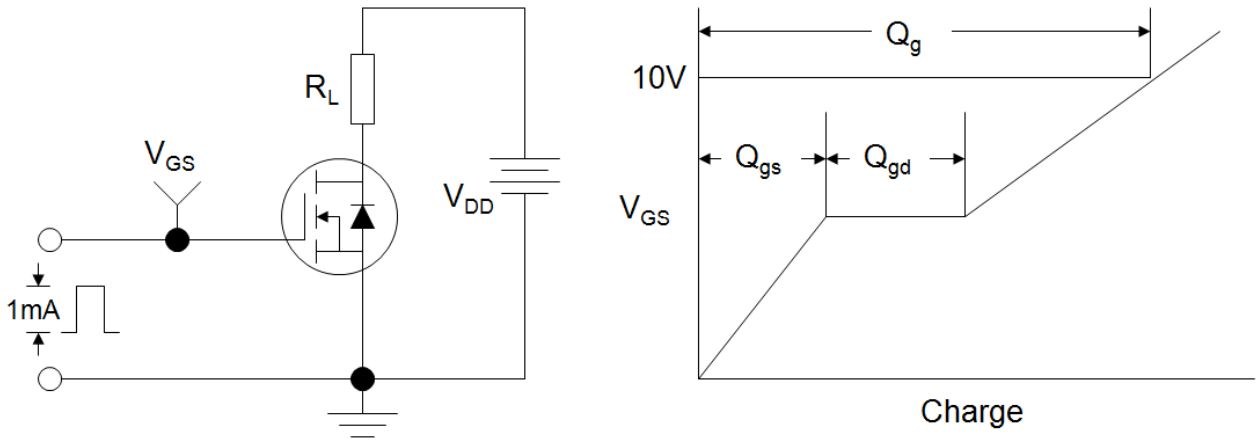
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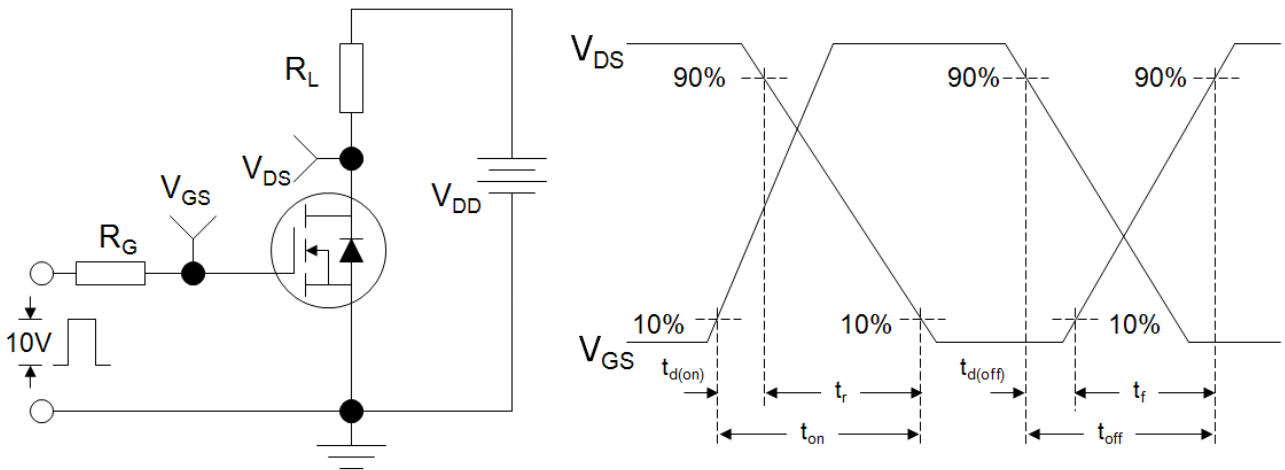
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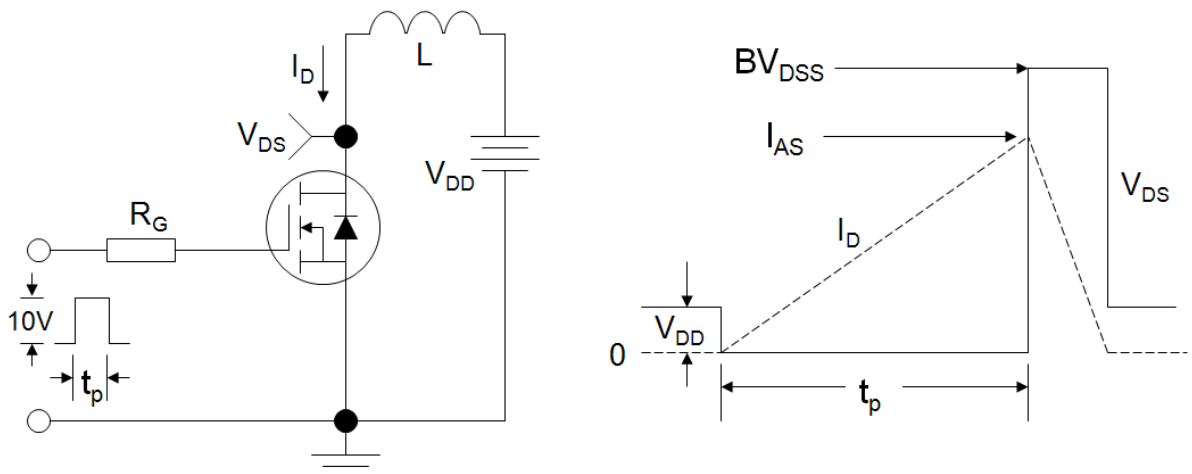
**Figure A: Gate Charge Test Circuit and Waveform**



**Figure B: Resistive Switching Test Circuit and Waveform**



**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**



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