MPSA65M170

FEATURES

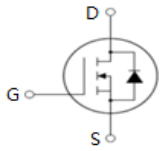
- BV_{DSS}=650V, I_D=20A
- $R_{DS(on)}$:0.17Ω(Max)@V_{GS}=10V
- Very low FOM $R_{DS(on)}$×Q_g
- 100% avalanche tested
- RoHS compliant

APPLICATIONS

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

RoHS

TO-220F



Device Marking and Package Information

Ordering code	Package	Marking
MPSA65M170	TO-220F	MP65M170

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value	Unit
		TO-220F	
Drain-Source Voltage (V_{GS} = 0V)	V_{DSS}	650	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}	480	mJ
AvalancheCurrent (note1)	I_{AR}	3.5	A
Repetitive Avalanche Energy (note1)	E_{AR}	0.7	mJ
MOSFET dv/dt ruggedness, V_{DS}=0…400 V	dv/dt	50	V/ns
Reverse diode dv/dt, V_{DS}=0…400 V, I_{SD}≤I_D	dv/dt	50	V/ns
Power Dissipation (T_C = 25ºC)	P_D	34	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
		TO-220F	
Thermal Resistance, Junction-to-Case	R_{thJC}	4	K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	

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Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 650V, V_{GS} = 0V, T_J = 150ºC	--	--	100	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 0.25mA	2.5	--	3.5	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 10A	--	0.14	0.17	Ω
Gate Resistance	R_G	f = 1.0MHz, open drain	--	8	--	Ω
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 100V, f = 1.0MHz	--	1724	--	pF
Output Capacitance	C_{oss}		--	72	--	
Reverse Transfer Capacitance	C_{rss}		--	6	--	
Total Gate Charge	Q_g	V_{DD} = 400V, I_D = 20A, V_{GS} = 10V	--	38.5	--	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 = 25Ω	--	25	--	ns
Turn-on Rise Time	t_r		--	59	--	
Turn-off Delay Time	$t_{d(off)}$		--	121	--	
Turn-off Fall Time	t_f		--	44	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	20	A
Pulsed Diode Forward Current	I_{SM}		--	--	60	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 20A, V_{GS} = 0V	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	V_R = 400V, I_F = 20A, di_F/dt = 100A/μs	--	453	--	ns
Reverse Recovery Charge	Q_{rr}		--	5.1	--	μC
Peak Reverse Recovery Current	I_{rrm}		--	22	--	A

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} = 3.5A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

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Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

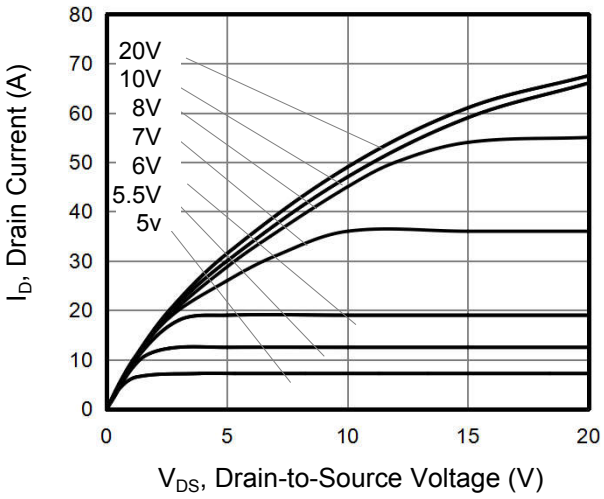


Figure 2. Transfer Characteristics

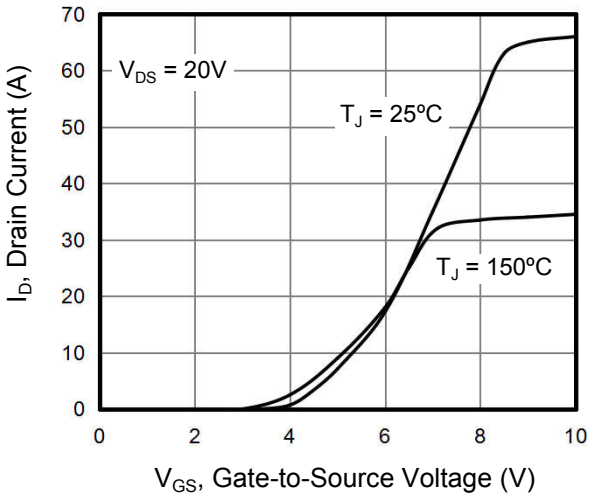


Figure 3. On-Resistance vs. Drain Current

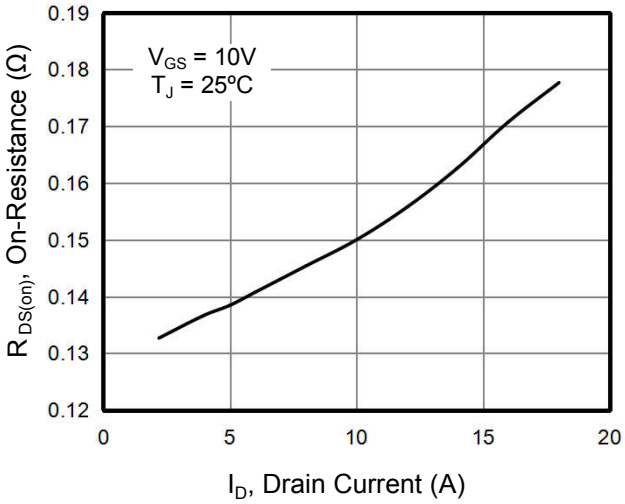


Figure 4. Capacitance

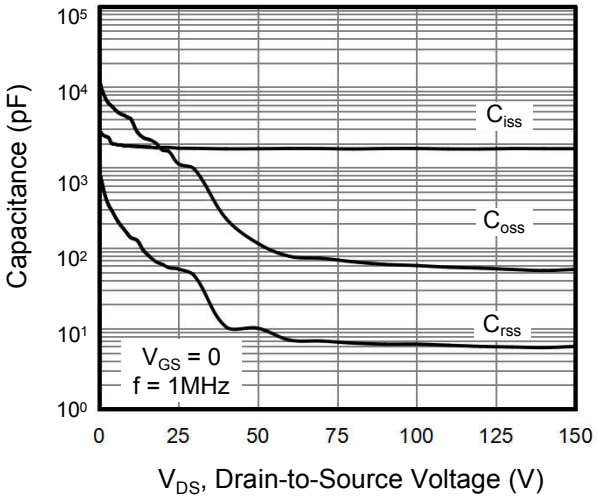


Figure 5. Gate Charge

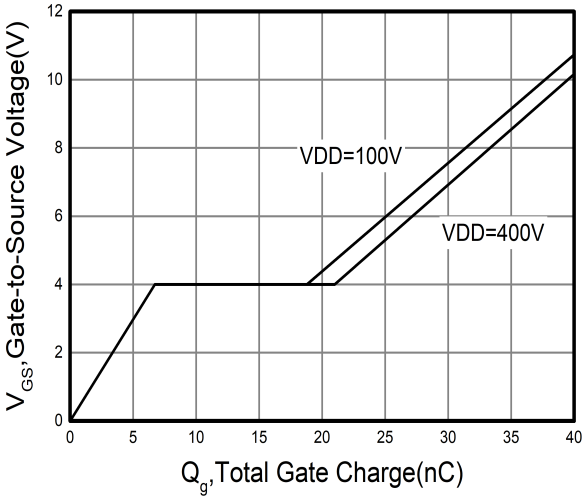
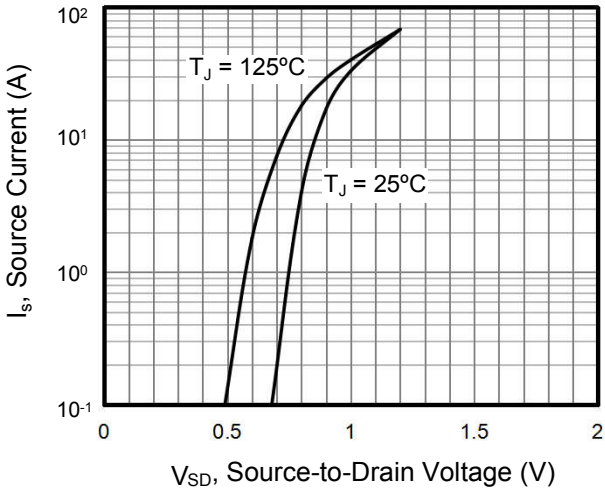


Figure 6. Body Diode Forward Voltage



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Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

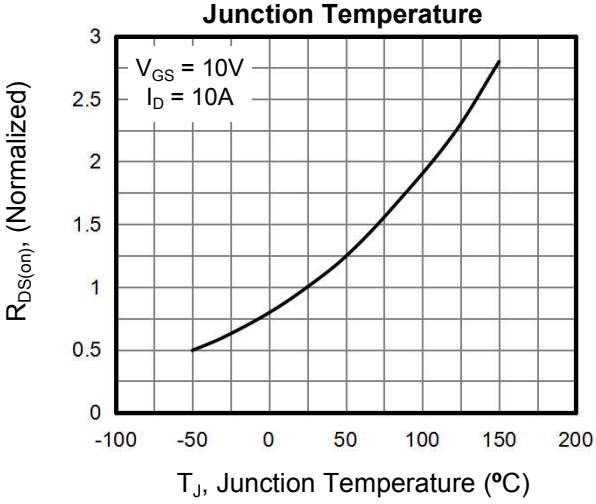

Figure 8. Threshold Voltage vs. Junction Temperature

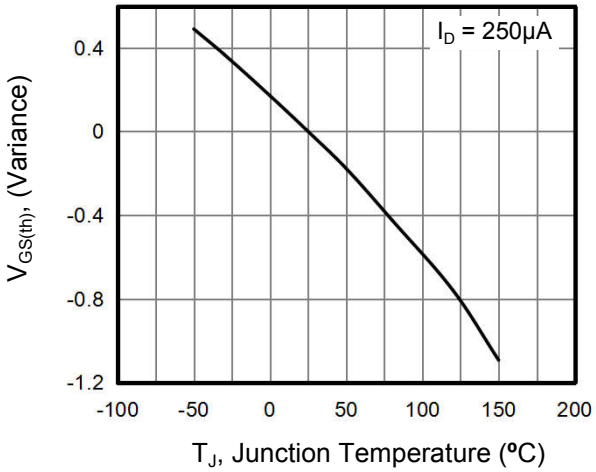

Figure 9. Transient Thermal Impedance

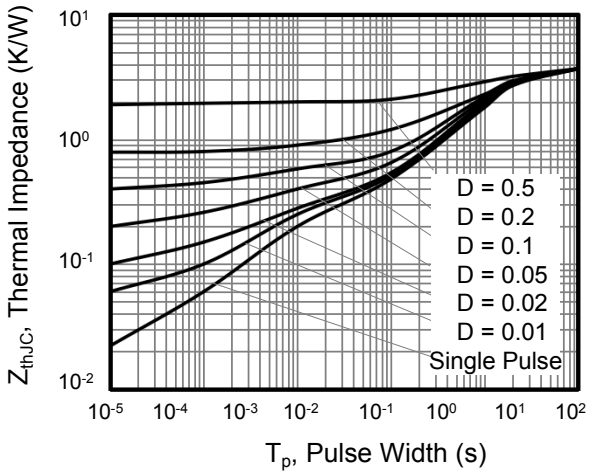

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Figure A：Gate Charge Test Circuit and Waveform

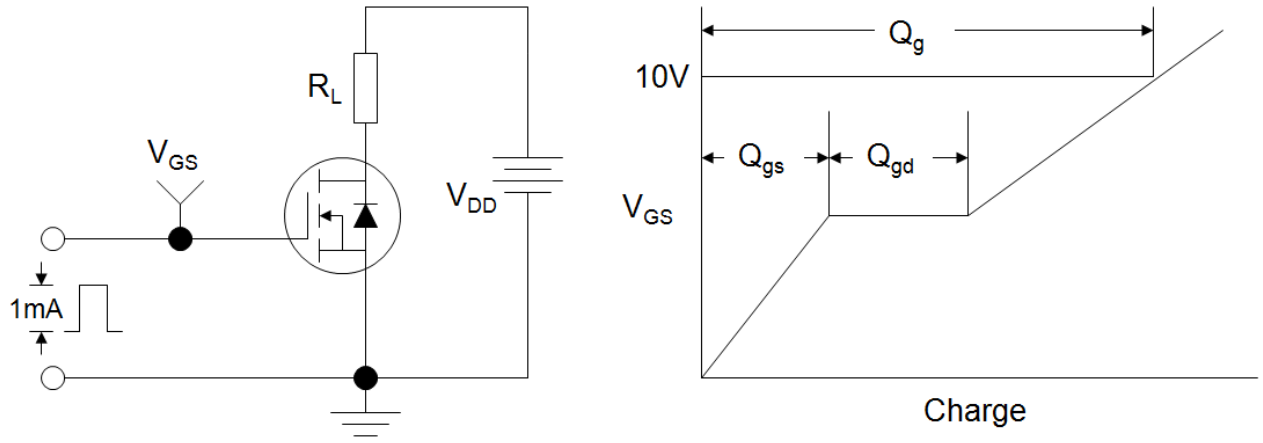


Figure B：Resistive Switching Test Circuit and Waveform

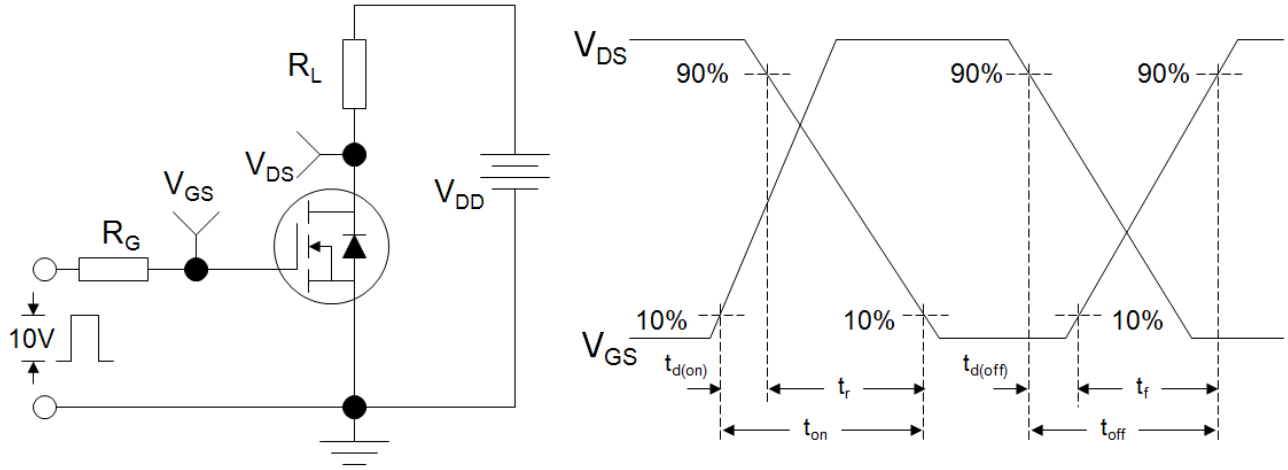
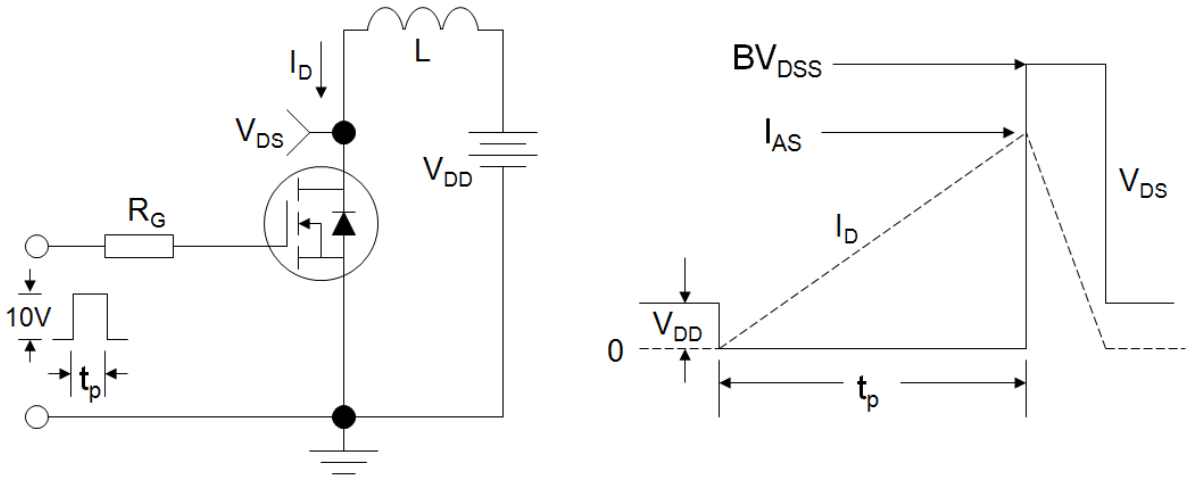


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



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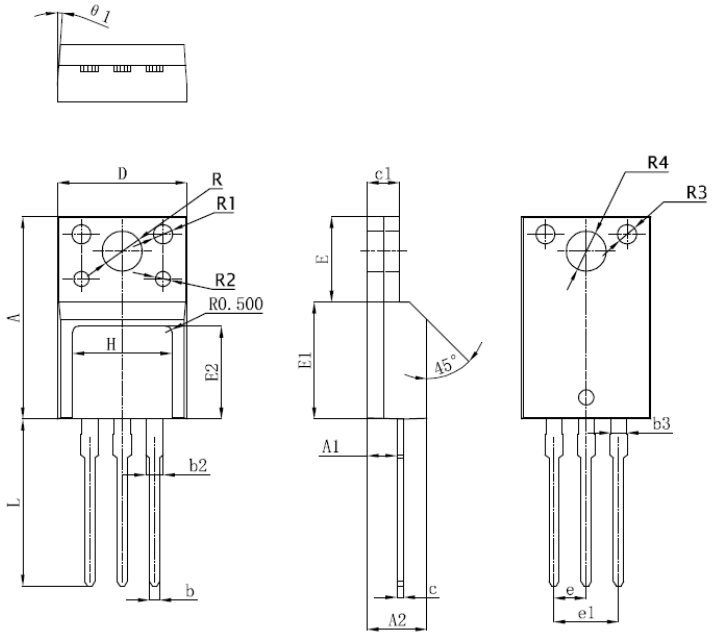
TO-220F



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	15.670	15.870	16.070
A1	2.150	2.350	2.550
A2	4.500	4.700	4.900
b	0.770	0.800	0.830
b2	1.200	1.300	1.400
b3		1.200BSC	
c	0.490	0.500	0.520
c1	2.340	2.540	2.740
D	9.960	10.160	10.360
E	6.480	6.680	6.880
E1	8.990	9.190	9.390
E2	7.100	7.300	7.500
e		2.540BSC	
e1		5.080	
L	13.140	13.340	13.540
R		3.150	
R1		1.500	
R2		1.200	
R3		1.500	
R4		3.180	
H	7.600	7.800	8.000
θ1	4°	4.5°	5°

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