



MPSA65M990, MPSP65M990, MPSU65M990, MPSD65M990

迈普电源

FEATURES

- $BV_{DSS}=650V$, $I_D=4A$
- $R_{DS(on)}:0.99\Omega(\text{Max}) @ V_{GS}=10V$
- Very low FOM $R_{DS(on)} \times Q_g$
- 100% avalanche tested
- RoHS compliant

APPLICATIONS

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

RoHS



Device Marking and Package Information

Ordering code	Package	Marking
MPSA65M990	TO-220F	MP65M990
MPSP65M990	TO-220	MP65M990
MPSU65M990	TO-251	MP65M990
MPSD65M990	TO-252	MP65M990

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

Parameter	Symbol	Value		Unit
		TO-220F	TO-220, TO-251, TO-252	
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	650		V
Continuous Drain Current	I_D	4		A
Pulsed Drain Current (note1)	I_{DM}	8		A
Gate-Source Voltage	V_{GSS}	± 30		V
Single Pulse Avalanche Energy (note2)	E_{AS}	120		mJ
Repetitive Avalanche Current (note1)	I_{AR}	2		A
Repetitive Avalanche Energy (note1)	E_{AR}	0.1		mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\dots 400V$	dv/dt	50		V/ns
Reverse diode dv/dt, $V_{DS}=0\dots 400V$, $I_{SD} \leq I_D$	dv/dt	50		V/ns
Power Dissipation ($T_C = 25^\circ C$)	P_D	23	28	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150		°C

Thermal Resistance

Parameter	Symbol	Value		Unit
		TO-220F	TO-220, TO-251, TO-252	
Thermal Resistance, Junction-to-Case	R_{thJC}	5.5	4.4	K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	62	



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

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_D = 250\mu\text{A}$	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 650\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 25^\circ\text{C}$	--	--	1	μA
		$V_{\text{DS}} = 650\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 150^\circ\text{C}$	--	--	100	
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = \pm 30\text{V}$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = 0.25\text{mA}$	2.5	--	4.5	V
Drain-Source On-Resistance (Note3)	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, I_D = 2\text{A}$	--	0.88	0.99	Ω
Gate Resistance	R_G	$f = 1.0\text{MHz}$, open drain	--	14	--	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V}, V_{\text{DS}} = 100\text{V}, f = 1.0\text{MHz}$	--	306	--	pF
Output Capacitance	C_{oss}		--	12	--	
Reverse Transfer Capacitance	C_{rss}		--	2	--	
Total Gate Charge	Q_g	$V_{\text{DD}} = 400\text{V}, I_D = 4\text{A}, V_{\text{GS}} = 10\text{V}$	--	8.8	--	nC
Gate-Source Charge	Q_{gs}		--	1.5	--	
Gate-Drain Charge	Q_{gd}		--	4.2	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 400\text{V}, I_D = 4\text{A}, V_{\text{GS}} = 10\text{V}, R_G = 25\Omega$	--	36	--	ns
Turn-on Rise Time	t_r		--	27	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	80	--	
Turn-off Fall Time	t_f		--	25	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	4	A
Pulsed Diode Forward Current	I_{SM}		--	--	8	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{\text{SD}} = 4\text{A}, V_{\text{GS}} = 0\text{V}$	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$V_R = 400\text{V}, I_F = 4\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	--	240	--	ns
Reverse Recovery Charge	Q_{rr}		--	1.1	--	μC
Peak Reverse Recovery Current	I_{rrm}		--	9	--	A

Notes

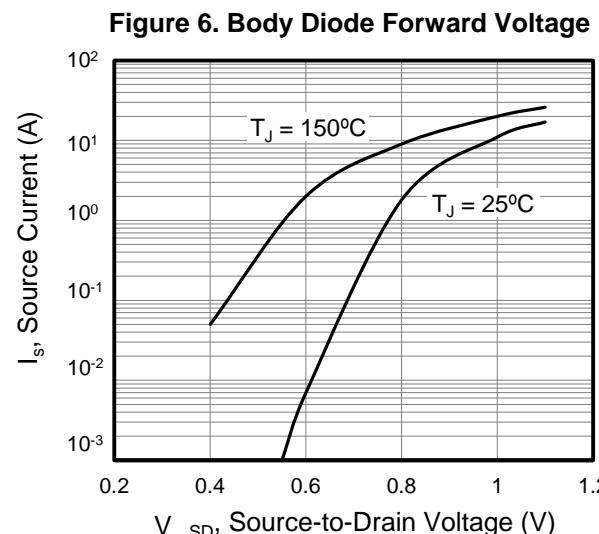
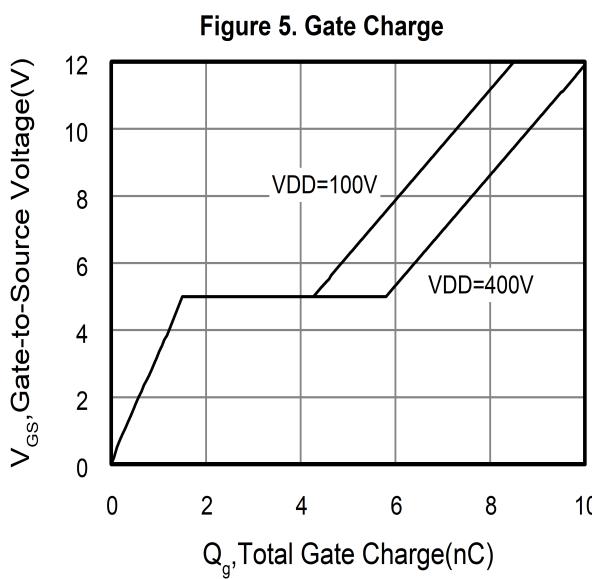
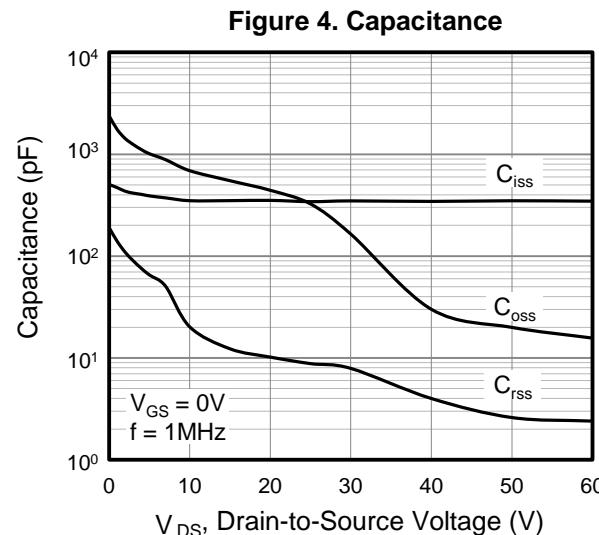
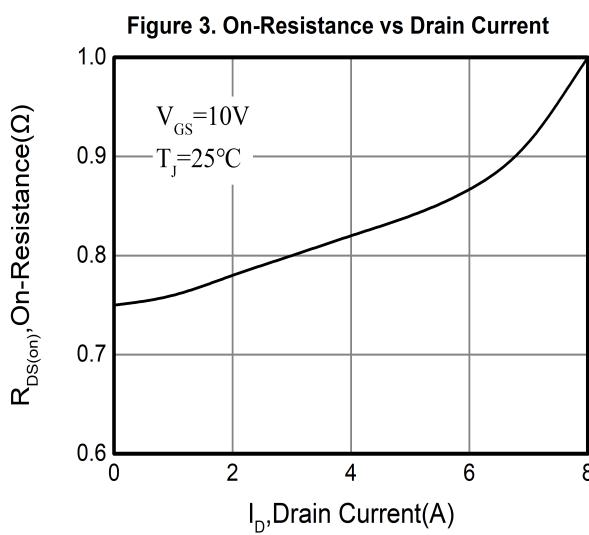
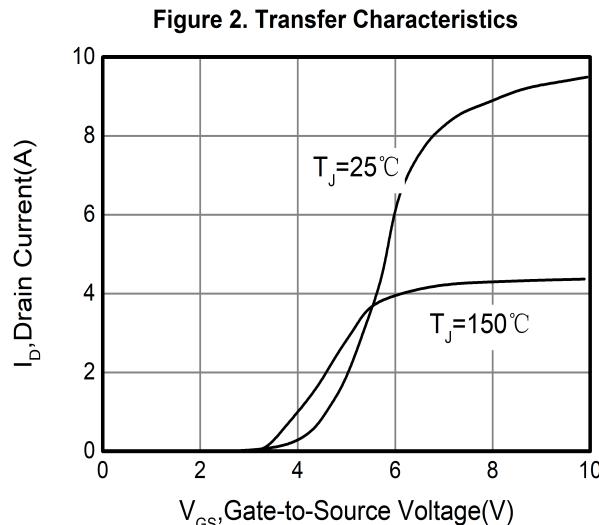
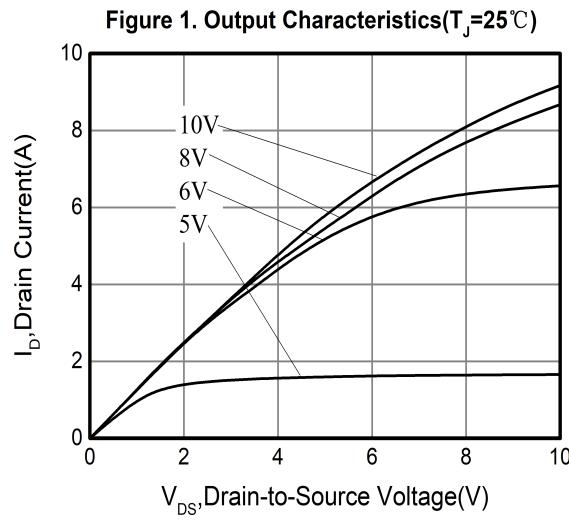
- Repetitive Rating: Pulse width limited by maximum junction temperature
- $I_{\text{AS}} = 2\text{A}, V_{\text{DD}} = 50\text{V}, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 1\%$



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





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

Figure 7. On-Resistance vs.
Junction Temperature

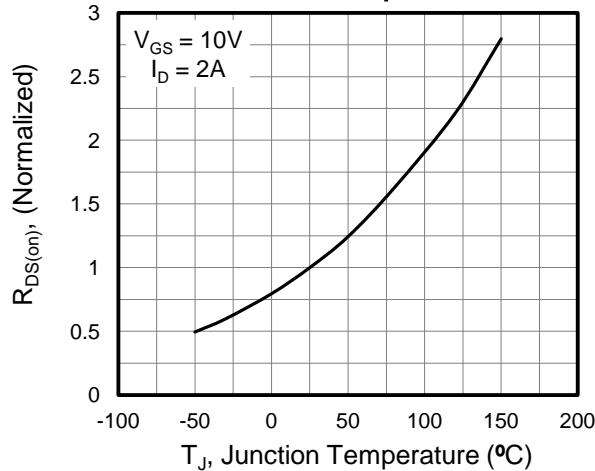


Figure 8. Threshold Voltage vs.
Junction Temperature

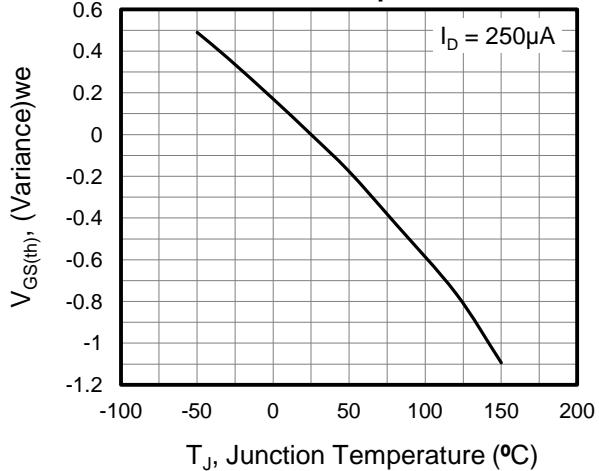


Figure 9. Transient Thermal Impedance
TO-251, TO-252, TO-220

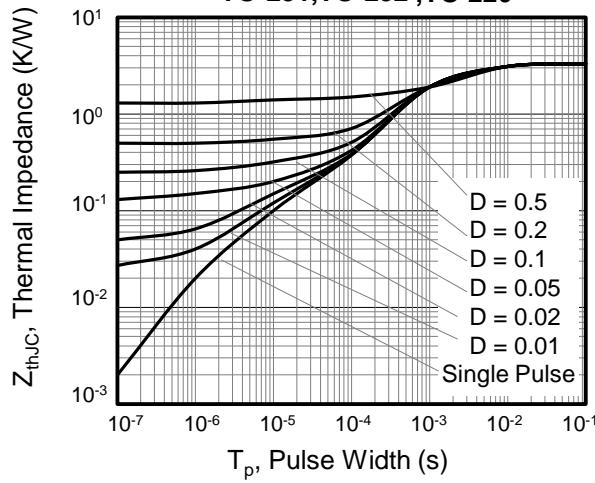


Figure 10. Transient Thermal Impedance
TO-220F

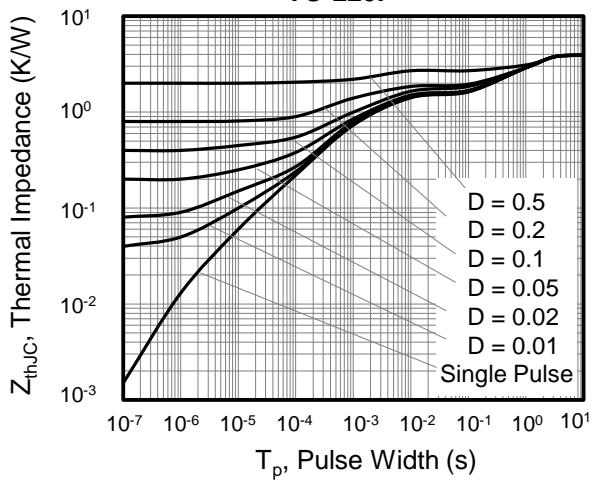
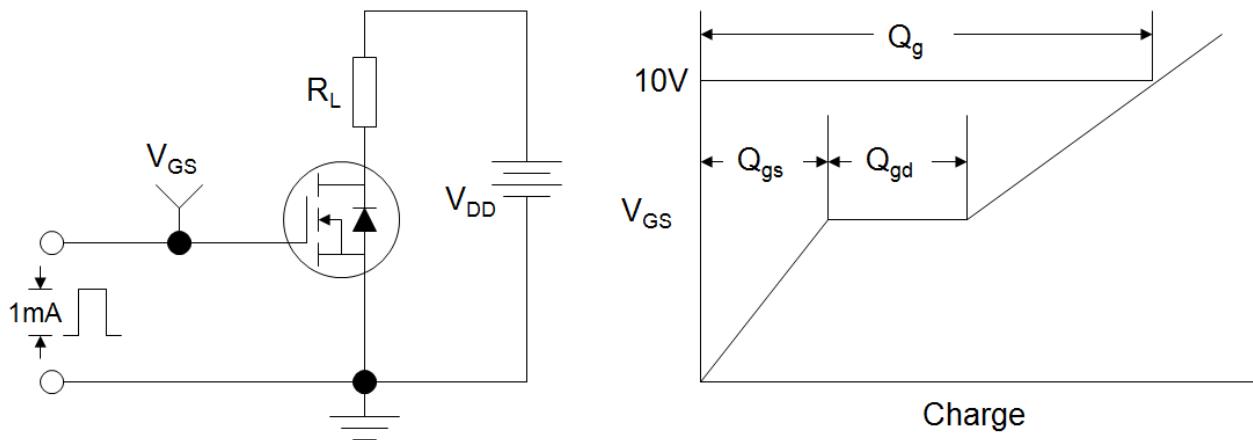
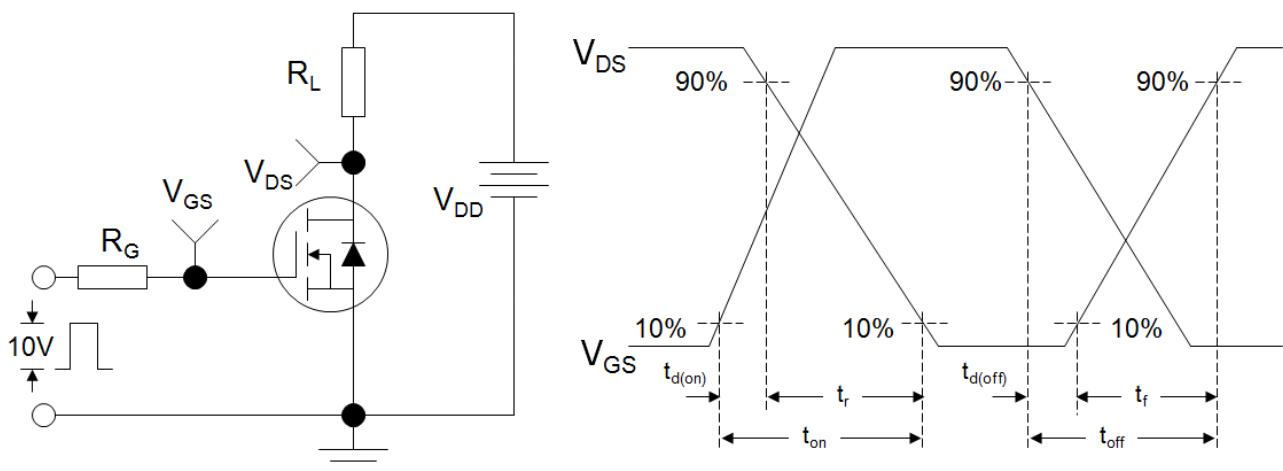
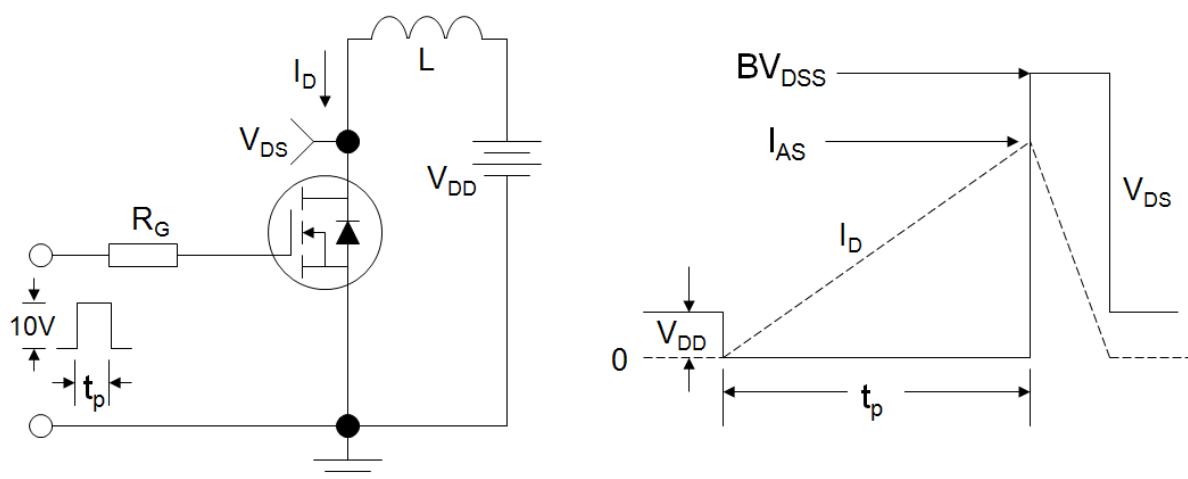


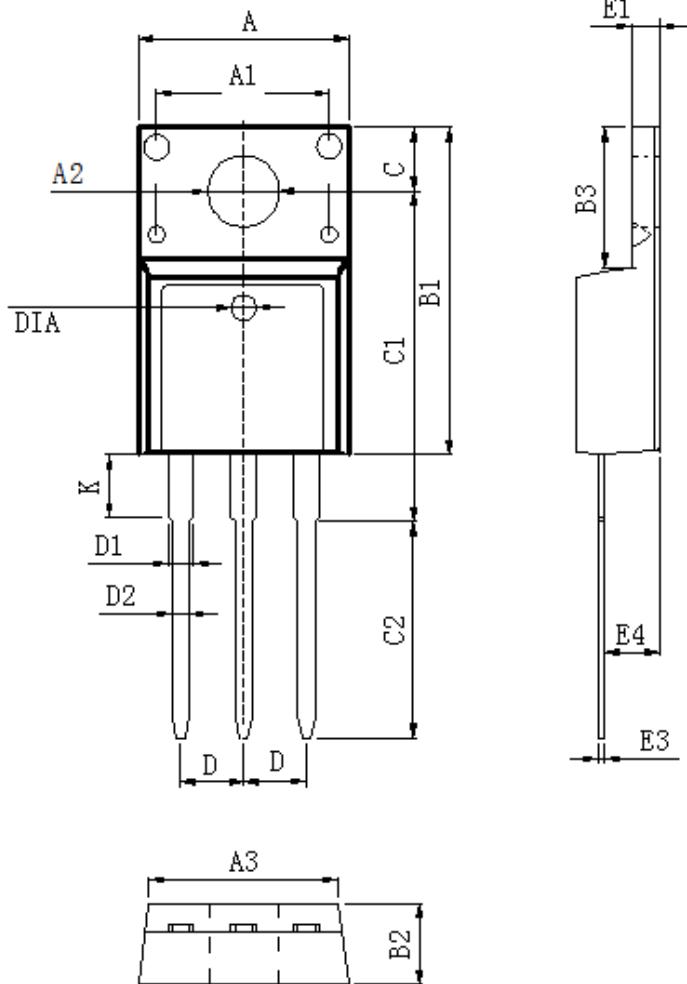
Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform




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TO-220F



DIM	MILLIMETERS
A	10.16 ± 0.3
A1	7.00 ± 0.1
A2	3.3 ± 0.2
A3	9.5 ± 0.2
B1	15.87 ± 0.3
B2	4.7 ± 0.2
B3	6.68 ± 0.4
C	3.3 ± 0.2
C1	12.57 ± 0.3
C2	10.02 ± 0.5
D	2.54 ± 0.05
D1	1.28 ± 0.2
D2	0.8 ± 0.1
K	3.1 ± 0.3
E1	2.54 ± 0.1
E3	0.5 ± 0.1
E4	2.76 ± 0.2
DIA	$\odot 1.5$ (deep 0.2)

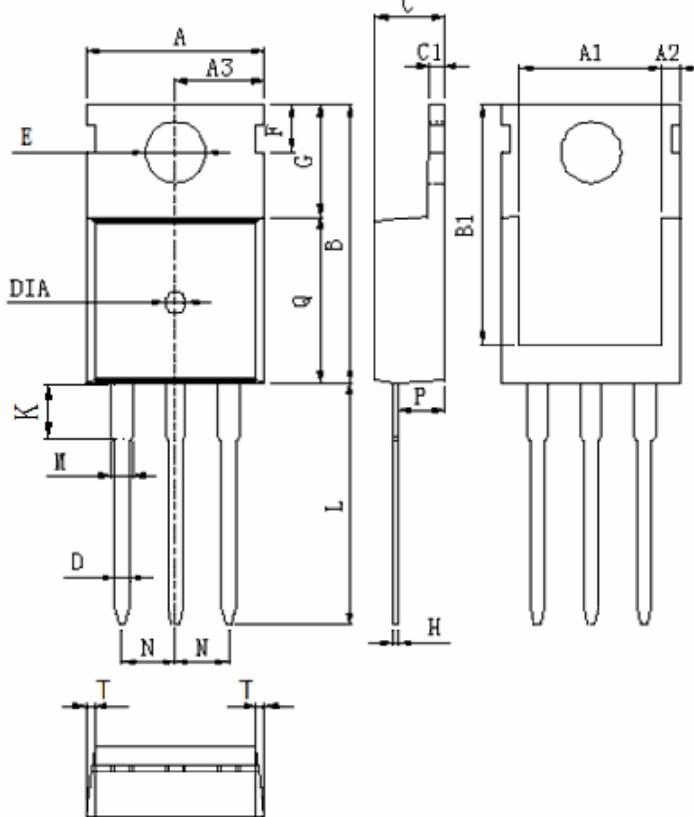
Unit :mm



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TO-220



DIM	MILLIMETERS
A	10.0 ± 0.3
A1	8.64 ± 0.2
A2	1.15 ± 0.1
A3	5.0 ± 0.2
B	15.8 ± 0.4
B1	13.2 ± 0.3
C	4.56 ± 0.1
C1	1.3 ± 0.2
D	0.8 ± 0.2
E	3.6 ± 0.2
F	2.95 ± 0.3
G	6.5 ± 0.3
H	0.5 ± 0.1
K	3.1 ± 0.2
L	13.2 ± 0.4
M	1.25 ± 0.1
N	2.54 ± 0.1
P	2.4 ± 0.3
Q	9.0 ± 0.3
T	W: 0.35
DIA	◎ 1.5 (deep 0.2)

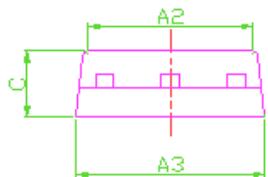
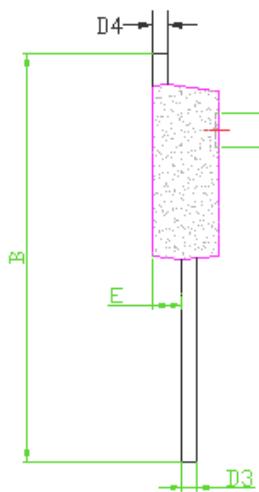
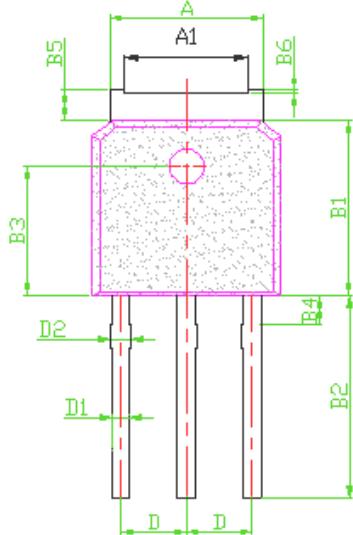
Unit :mm



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TO-251



DIM	MILLIMETERS
A	5.33±0.2
A1	4.33±0.2
A2	5.80±0.1
A3	6.6±0.2
B	14.15±0.5
B1	6.1±0.3
B2	7.0±0.5
B3	4.5±0.15
B4	1.0±0.1
B5	1.05±0.1
B6	0.1±0.05
C	2.3±0.2
D	2.286±0.05
D1	0.60±0.1
D2	0.72±0.12
D3	0.5±0.08
D4	0.5±0.08
E	1.01±0.2
DIA	◎1.2 (deep 0.1)

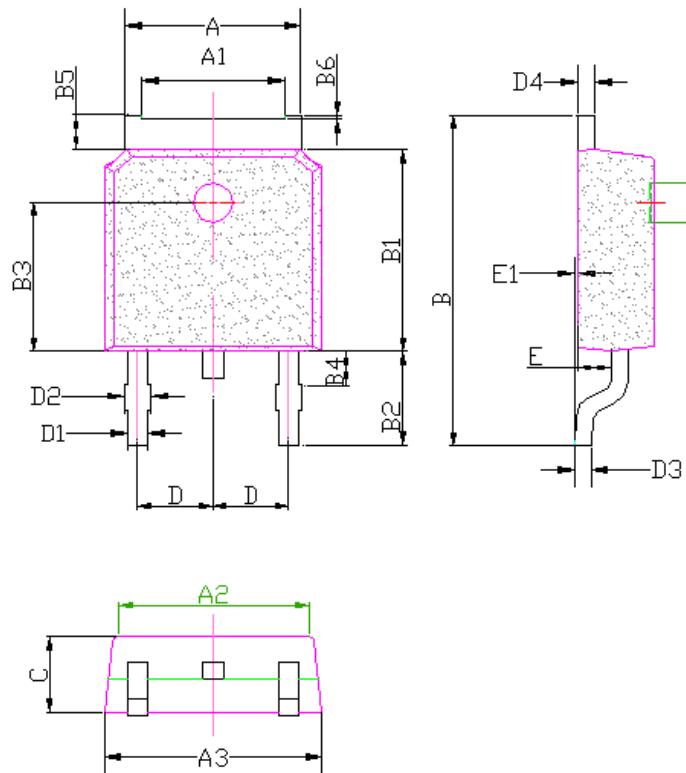
Unit :mm



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TO-252



DIM	MILLIMETERS
A	5.33±0.2
A1	4.33±0.2
A2	5.80±0.1
A3	6.6±0.2
B	10±0.5
B1	6.1±0.3
B2	2.85±0.5
B3	4.5±0.15
B4	1.0±0.1
B5	1.05±0.1
B6	0.1±0.05
C	2.3±0.15
D	2.286±0.05
D1	0.60±0.1
D2	0.72±0.12
D3	0.5±0.08
D4	0.5±0.08
E	1.01±0.15
E1	0.1±0.05
DIA	◎1.2 (deep 0.1)

Unit :mm