

650V 2.4Ω Super Junction Power MOSFET

Description

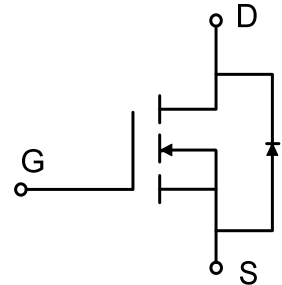
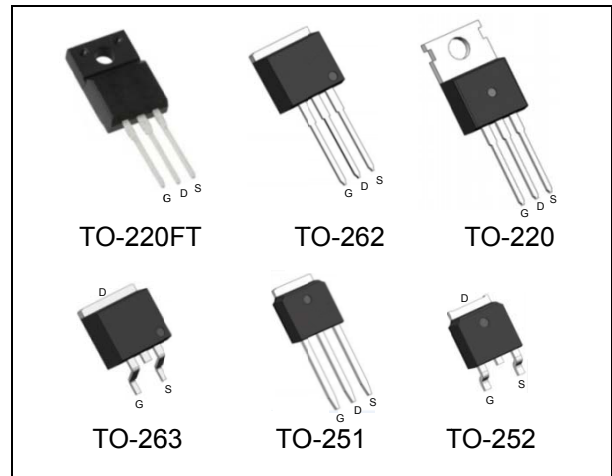
WMOS™ C4 is Wayon's 4th generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ C4 is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 700V @ T_{j,max}$
- Typ. $R_{DS(on)} = 2.4\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

Applications

LED Lighting, Charger, Adapter, PC, LCD TV, Server



Absolute Maximum Ratings

Parameter	Symbol	WMK/WMM/WMN/WMP/WMO	WML	Unit
Drain-source voltage	V_{DSS}	650		V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	2.8		A
		1.6		A
Pulsed drain current ²⁾	I_{DM}	7		A
Gate-source voltage	V_{GS}	± 20		V
Avalanche energy, single pulse ³⁾	E_{AS}	10		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	0.1		mJ
Avalanche current, repetitive ²⁾	I_{AR}	0.3		A
Power dissipation ($T_C = 25^\circ C$) - Derate above $25^\circ C$	P_D	30	18	W
		0.24	0.15	W/ $^\circ C$
Operating and storage temperature range	T_{j}, T_{stg}	-55 to +150		$^\circ C$
Continuous diode forward current	I_S	2.8		A
Diode pulse current	$I_{S,pulse}$	7		A

Thermal Characteristics

Parameter	Symbol	WMK/WMM/WMN/WMP/WMO	WML	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	4	7	$^\circ C/W$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	80	$^\circ C/W$

Electrical Characteristics $T_c = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	2	3	4	V
Drain cut-off current	I_{DSS}	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V},$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	-	-	1	μA
Gate leakage current, forward	I_{GSSF}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Gate leakage current, reverse	I_{GSSR}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=0.8\text{ A}$ $T_j = 25^\circ\text{C}$	-	2.4	2.8	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V},$	-	86	-	pF
Output capacitance	C_{oss}	$f = 1\text{ MHz}$	-	5.4	-	
Reverse transfer capacitance	C_{rss}		-	0.6	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 300\text{ V}, I_D = 1\text{ A}$	-	4	-	ns
Rise time	t_r	$R_G = 25\Omega, V_{GS}=10\text{ V}$	-	6	-	
Turn-off delay time	$t_{d(off)}$		-	17	-	
Fall time	t_f		-	8	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DD}=480\text{ V}, I_D=1\text{ A},$	-	1.0	-	nC
Gate to drain charge	Q_{gd}	$V_{GS}=0\text{ to }10\text{ V}$	-	0.8	-	
Gate charge total	Q_g		-	2.8	-	
Gate plateau voltage	$V_{plateau}$		-	5.4	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=0.8\text{ A}$	-	-	1.2	V
Reverse recovery time	t_{rr}	$V_R=50\text{ V}, I_F=1\text{ A},$	-	73	-	ns
Reverse recovery charge	Q_{rr}	$di_f/dt=100\text{ A}/\mu\text{s}$	-	0.27	-	μC
Peak reverse recovery current	I_{rrm}		-	5.3	-	A

Notes:

- Limited by $T_{j\text{max}}$. Maximum duty cycle $D=0.5$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS} = 0.3\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\Omega$, starting $T_j = 25^\circ\text{C}$.

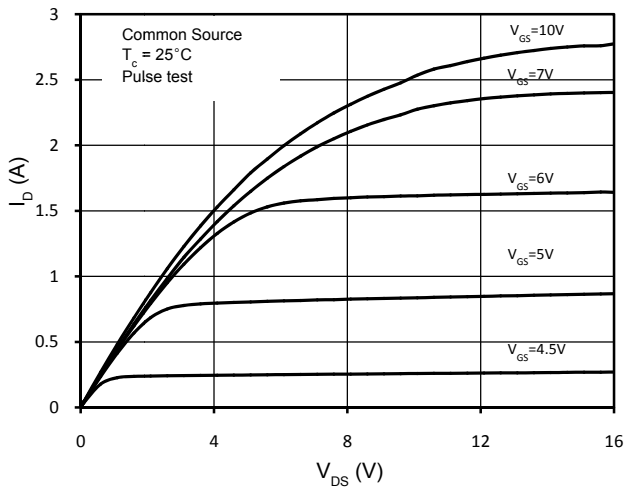


Figure 1. On-Region Characteristics

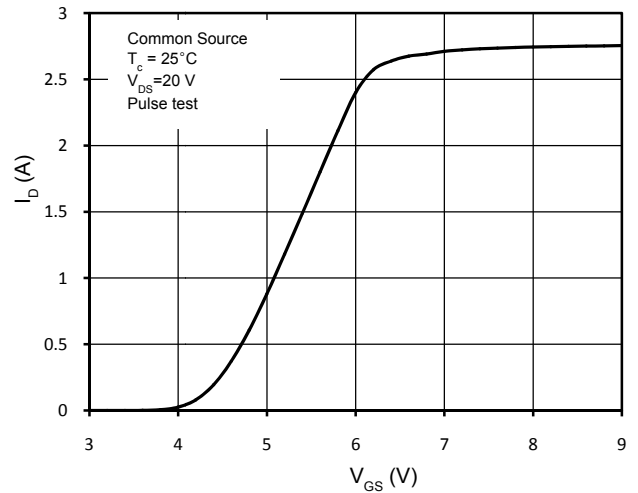


Figure 2. Transfer Characteristics

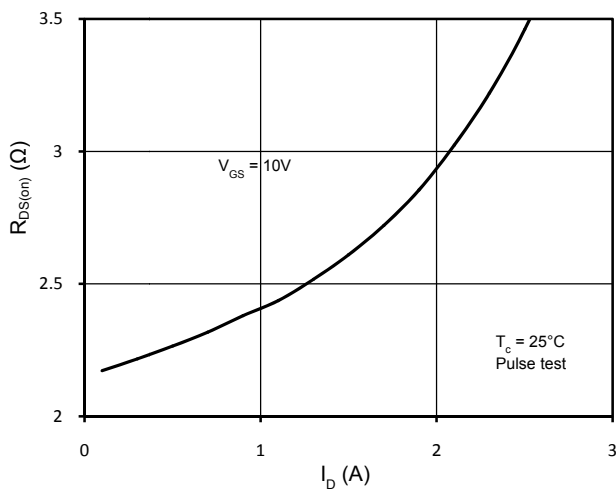


Figure 3. Static Drain-Source On Resistance

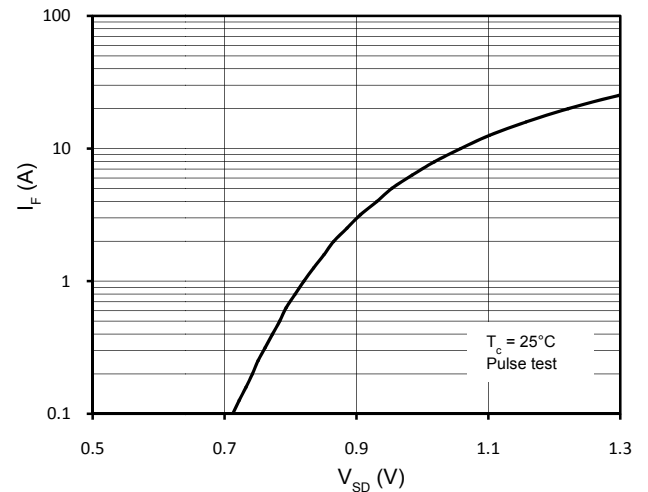


Figure 4. Body-Diode Forward Characteristics

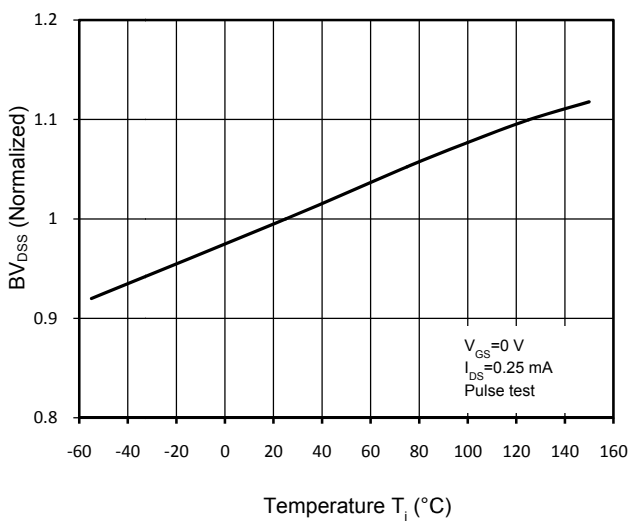


Figure 5. Normalized $BV_{DS(s)}$ vs. Temperature

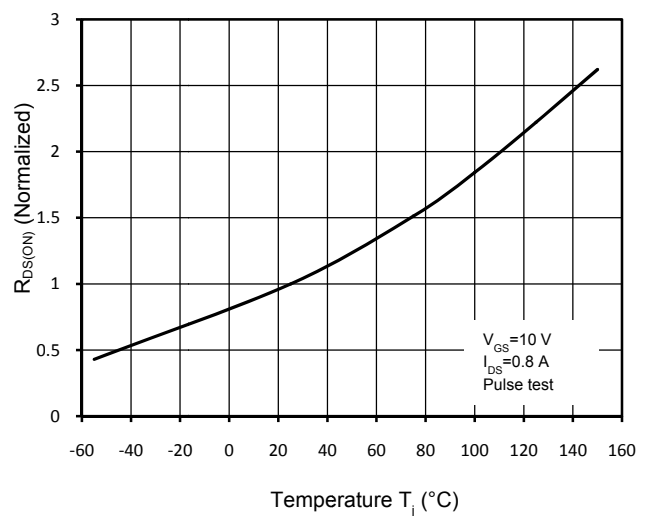


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

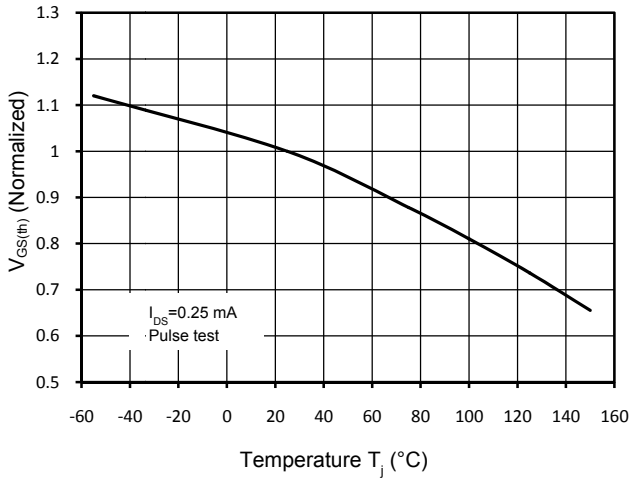


Figure 7. Threshold Voltage vs. Temperature

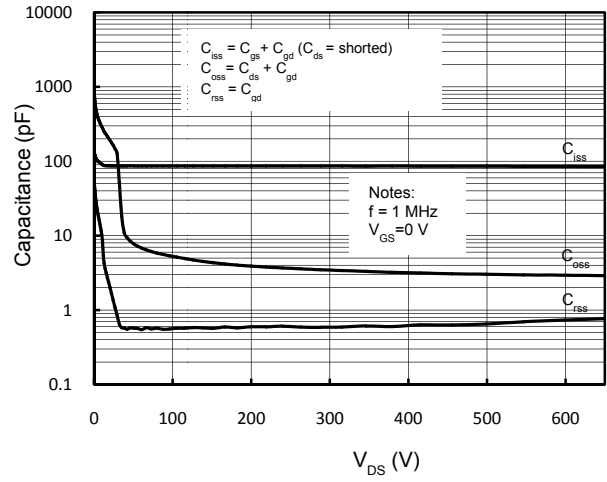


Figure 8. Capacitance Characteristics

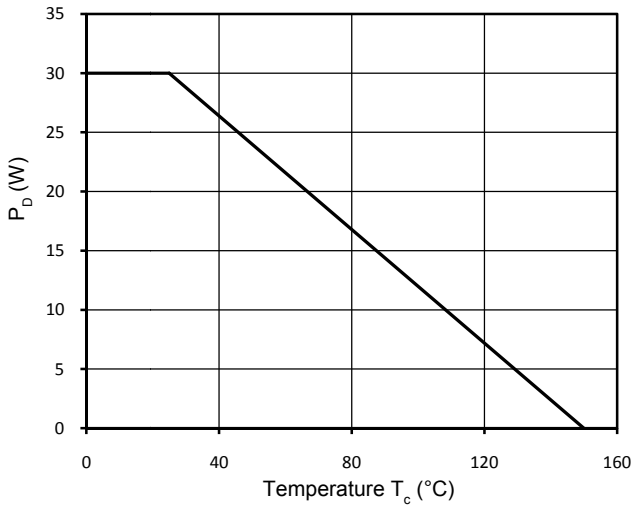


Figure 9. Power Dissipation

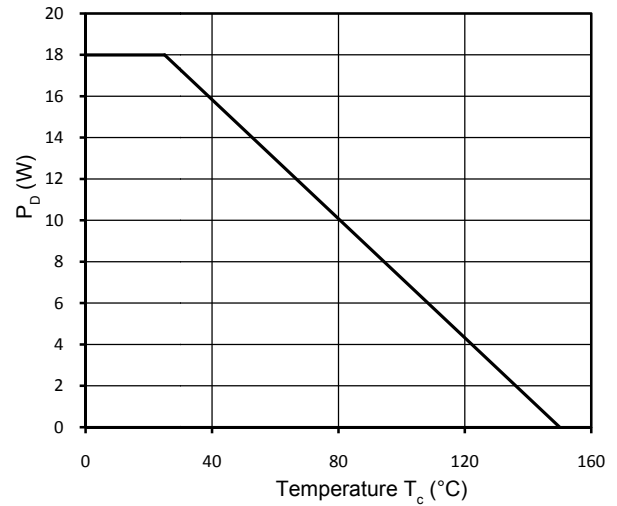


Figure 10. Power Dissipation (TO-220FT)

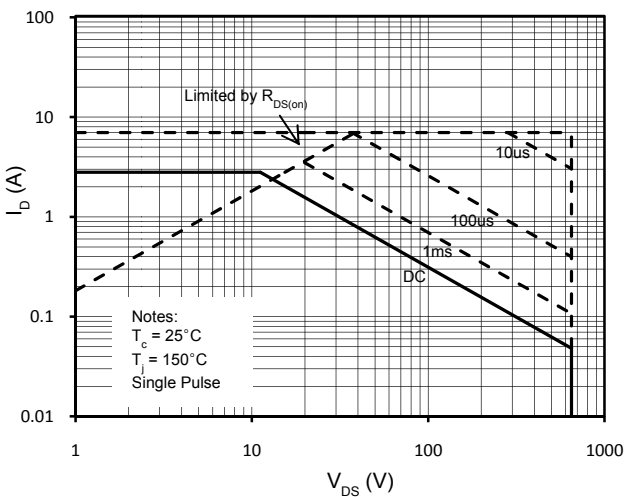


Figure 11. Maximum Safe Operating Area

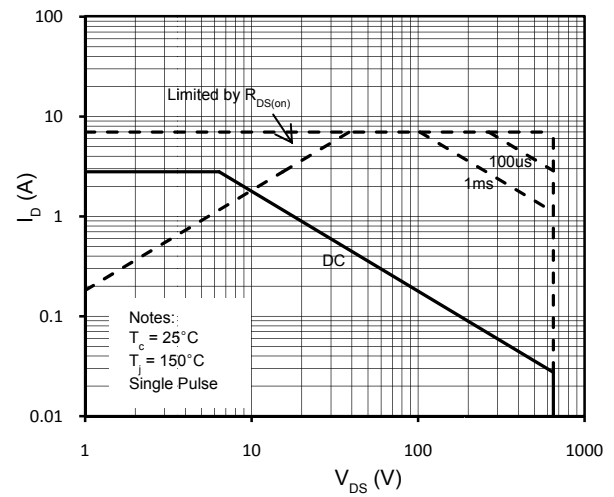


Figure 12. Maximum Safe Operating Area (TO-220FT)

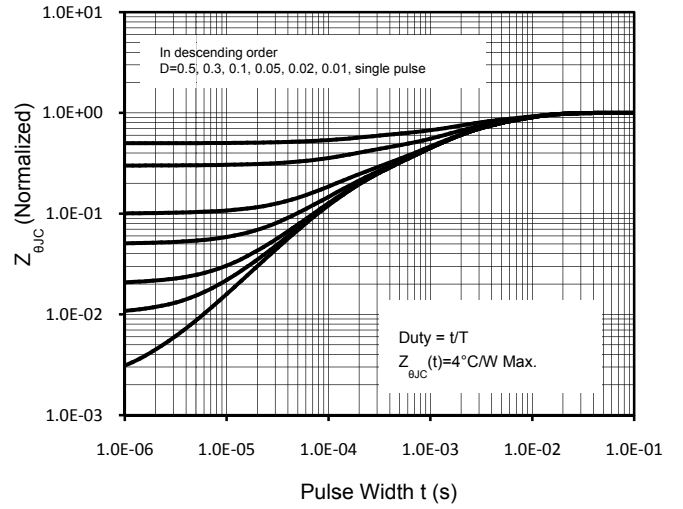
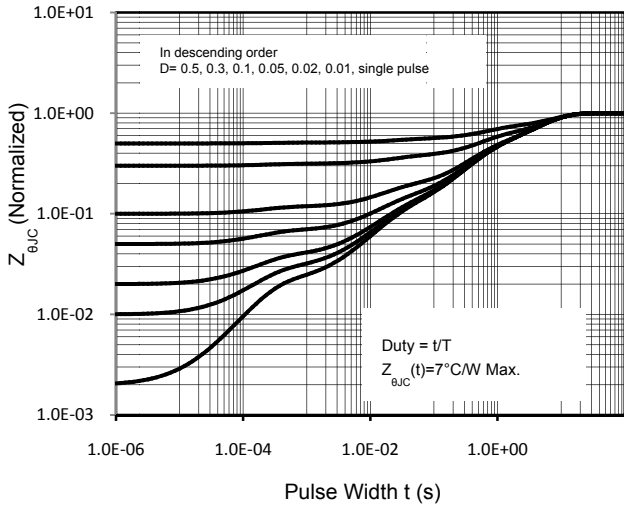


Figure 13. Transient Thermal Response Curve (TO-220FT) Figure 14. Transient Thermal Response Curve

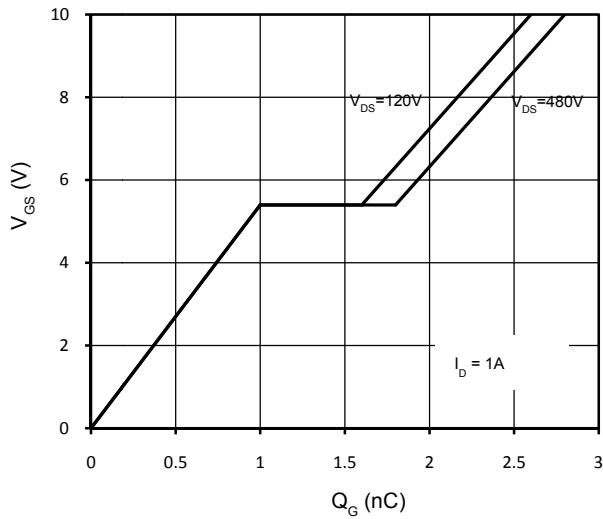
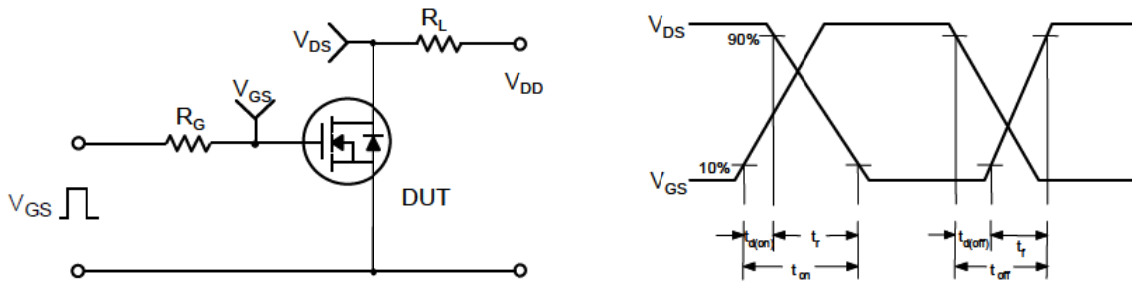


Figure 15. Gate Charge Characteristics

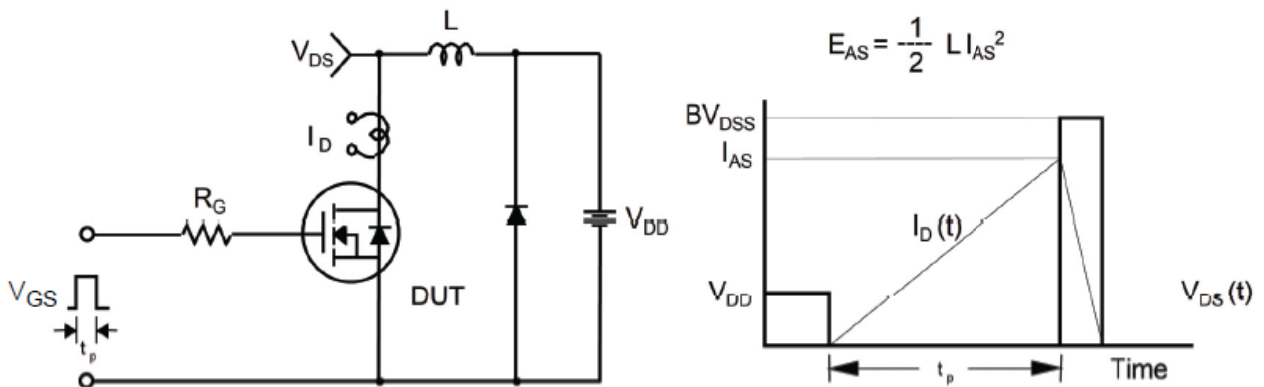
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

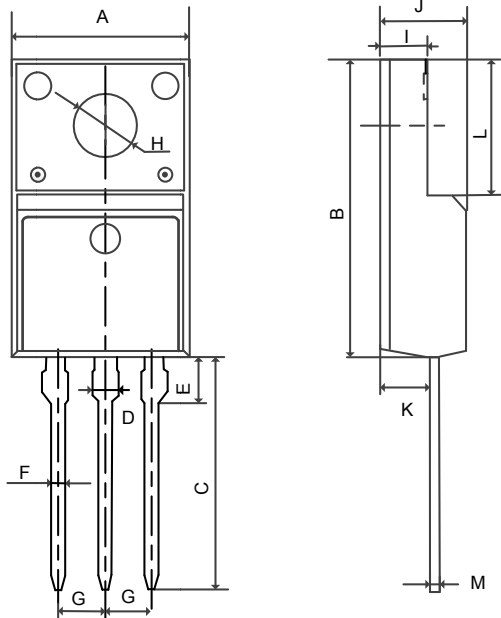


Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO-220FT

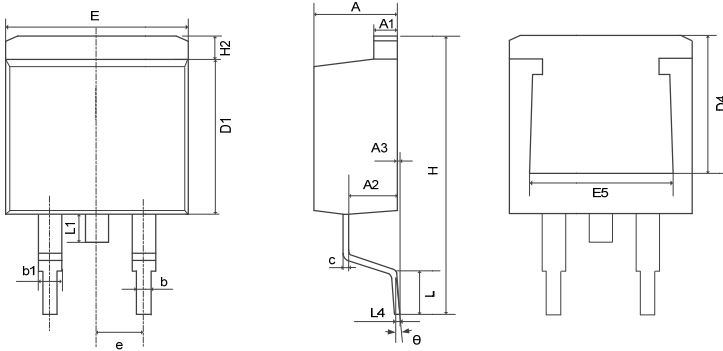
COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.67	16.07
C	12.70	13.30
D	1.12	1.32
E	1.85	2.15
F	0.59	0.79
G	2.39	2.69
H	3.08	3.29
I	2.34	2.74
J	4.50	4.90
K	2.61	2.91
L	6.50	6.90
M	0.40	0.60

Mechanical Dimensions for TO-263

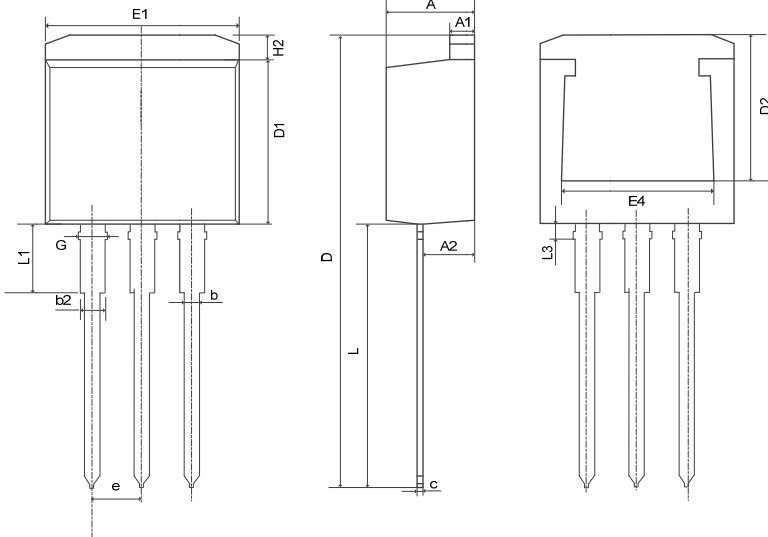
COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	4.37	4.89
A1	1.17	1.42
A2	2.49	2.89
b	0.70	0.96
b1	1.17	1.47
c	0.30	0.53
D1	8.45	8.90
D4	6.60	—
E	9.86	10.40
E5	7.06	—
e	2.54BSC	
H	14.70	15.50
H2	1.07	1.47
L	2.00	2.70
L1	1.40	1.70
L4	0.25BSC	
θ	0°	9°

Mechanical Dimensions for TO-262

COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	4.37	4.90
A1	1.17	1.42
A2	2.49	2.89
b	0.71	0.96
b2	1.07	1.47
c	0.28	0.53
D	23.20	24.02
D1	8.45	8.90
D2	6.00	—
E1	9.86	10.40
E4	7.06	—
e	2.54BSC	
G	1.25	1.50
H2	—	1.50
L	13.33	14.16
L1	3.50	4.00
L3	1.28	1.58

Mechanical Dimensions for TO-220

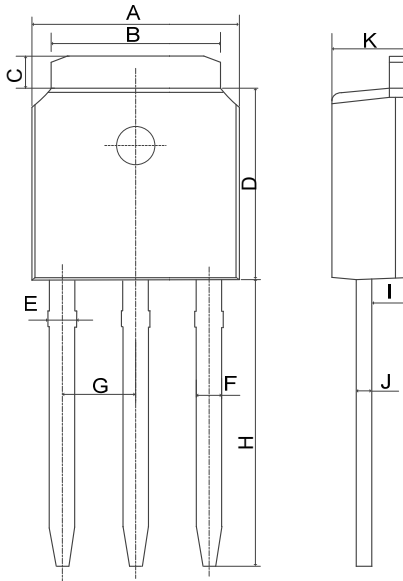
COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	9.70	10.20
B	3.40	3.80
C	8.90	9.40
D	1.17	1.47
E	2.60	3.40
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60

Mechanical Dimensions for TO-251

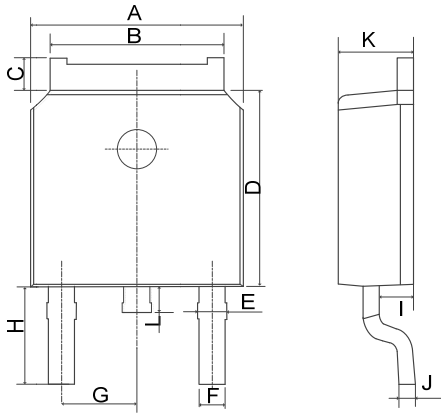
COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.50
C	0.88	1.28
D	5.90	6.22
E	0.68	1.10
F	0.68	0.91
G	2.29REF	
H	9.00	9.65
I	0.85	1.17
J	0.40	0.61
K	2.10	2.50

Mechanical Dimensions for TO-252

COMMON DIMENSIONS

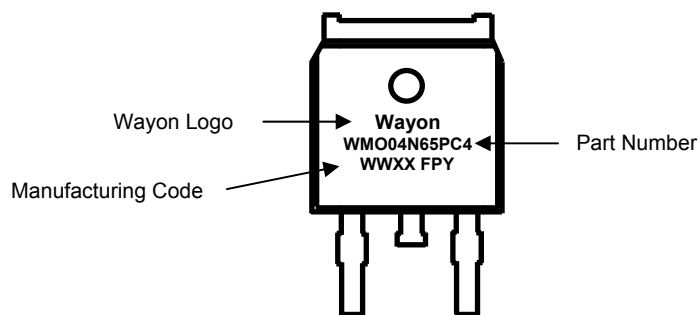


SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.50
C	0.88	1.28
D	5.90	6.22
E	0.68	1.10
F	0.68	0.91
G	2.29REF	
H	2.90REF	
I	0.85	1.17
J	0.51REF	
K	2.10	2.50
L	0.40	1.00

Ordering Information

Part	Package	Marking	Packing method
WML04N65PC4	TO-220FT	WML04N65PC4	Tube
WMK04N65PC4	TO-220	WMK04N65PC4	Tube
WMN04N65PC4	TO-262	WMN04N65PC4	Tube
WMM04N65PC4	TO-263	WMM04N65PC4	Tape and Reel
WMO04N65PC4	TO-252	WMO04N65PC4	Tape and Reel
WMP04N65PC4	TO-251	WMP04N65PC4	Tube

Marking Information



Contact Information

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WAYON website: <http://www.way-on.com>

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