

600V 0.52Ω Super Junction Power MOSFET

Description

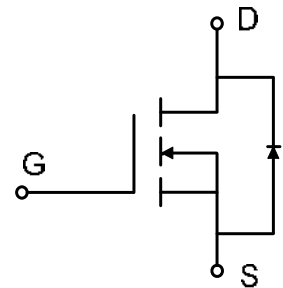
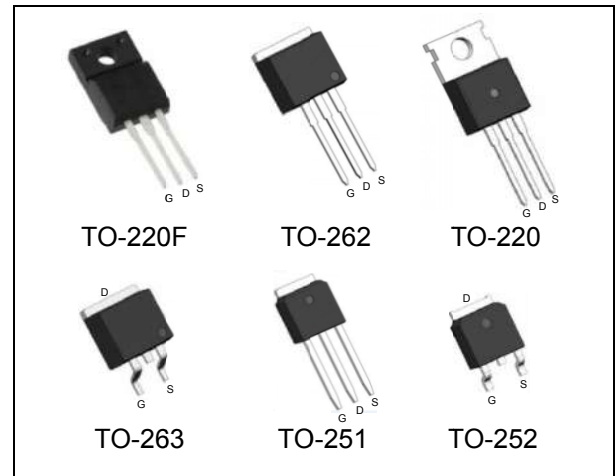
WMOS™ C4 is Wayon's 4th generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ C4 is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 650V @ T_{j,max}$
- Typ. $R_{DS(on)} = 0.52\Omega$
- 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}	600		V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	8		A
($T_C = 100^\circ C$)		4.8		A
Pulsed drain current ²⁾	I_{DM}	19		A
Gate-source voltage	V_{GS}	± 30		V
Avalanche energy, single pulse ³⁾	E_{AS}	45		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	0.15		mJ
Avalanche current, repetitive ²⁾	I_{AR}	1.0		A
Power dissipation ($T_C = 25^\circ C$)	P_D	57	27	W
- Derate above $25^\circ C$		0.46	0.22	W/ $^\circ C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		$^\circ C$
Continuous diode forward current	I_S	8		A
Diode pulse current	$I_{S,pulse}$	19		A

Thermal Characteristics

Parameter	Symbol	WMK/WMM/WMN/WMP/WMO	WML	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	2.2	4.6	$^\circ C/W$
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 V, I _D =0.25 mA	600	-	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =0.25mA	2	3	4	V
Drain cut-off current	I _{DSS}	V _{DS} =600 V, V _{GS} =0V, T _J = 25°C T _J = 125°C	- -	- 30	1 -	μA
Gate leakage current, forward	I _{GSSF}	V _{GS} =20V, V _{DS} =0V	-	-	100	nA
Gate leakage current, reverse	I _{GSSR}	V _{GS} =-20V, V _{DS} =0V	-	-	-100	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10 V, I _D =1.5A T _J = 25°C	- -	 0.52	 0.6	 Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 100V, V _{GS} = 0V, f = 1 MHz	-	415	-	pF
Output capacitance	C _{Oss}		-	19	-	
Reverse transfer capacitance	C _{rss}		-	0.95	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 300V, I _D = 2A R _G = 25Ω, V _{GS} =10V	-	12	-	ns
Rise time	t _r		-	10	-	
Turn-off delay time	t _{d(off)}		-	62	-	
Fall time	t _f		-	13	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =480V, I _D =2A, V _{GS} =0 to 10V	-	1.7	-	nC
Gate to drain charge	Q _{gd}		-	3.5	-	
Gate charge total	Q _g		-	9.6	-	
Gate plateau voltage	V _{plateau}		-	5.2	-	V
Reverse diode characteristics						
Diode forward voltage	V _{SD}	V _{GS} =0 V, I _F =1.5A	-	-	1.2	V
Reverse recovery time	t _{rr}	V _R =50V, I _F =2A, dI _F /dt=100A/μs	-	105	-	ns
Reverse recovery charge	Q _{rr}		-	0.6	-	μC
Peak reverse recovery current	I _{rrm}		-	11.3	-	A

Notes:

- Limited by $T_{j\max}$. Maximum duty cycle $D=0.5$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS}=1.0\text{ A}$, $V_{DD}=50\text{ V}$, $R_G=25\Omega$, starting $T_j=25^\circ\text{C}$.

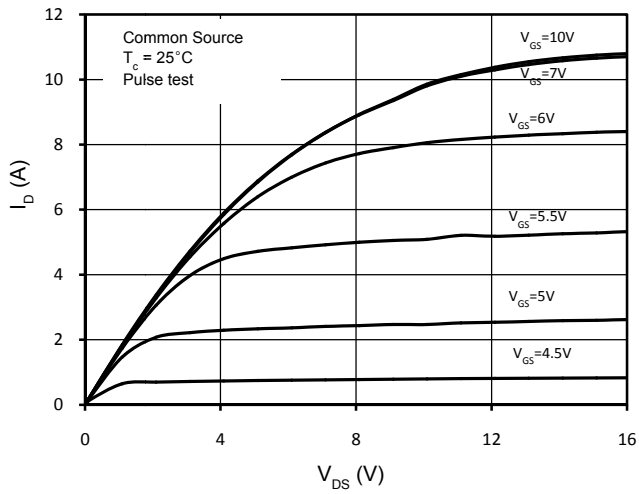


Figure 1. On-Region Characteristics

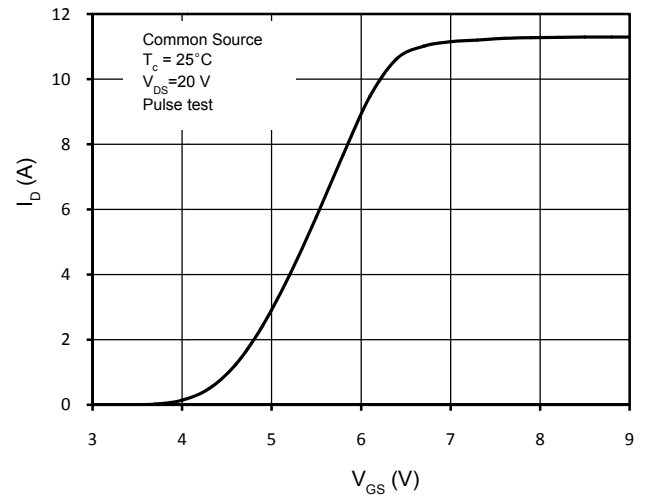


Figure 2. Transfer Characteristics

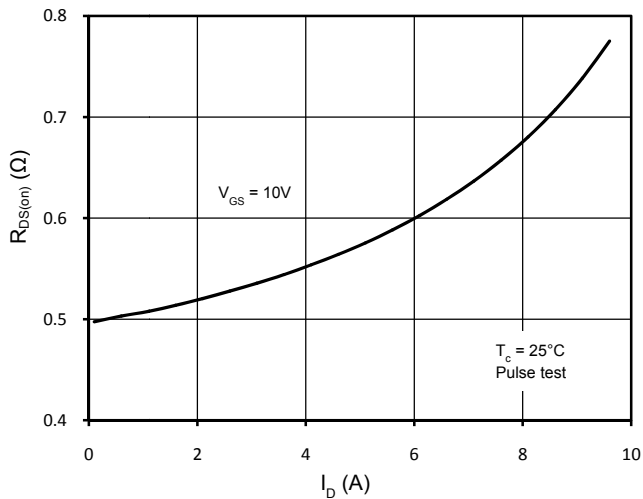


Figure 3. Static Drain-Source On Resistance

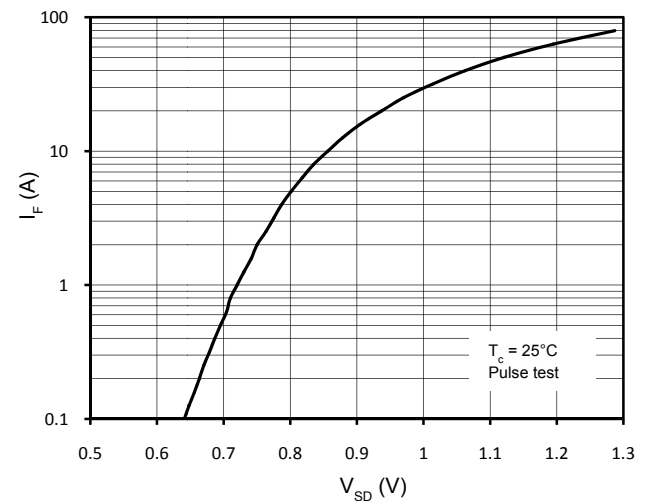
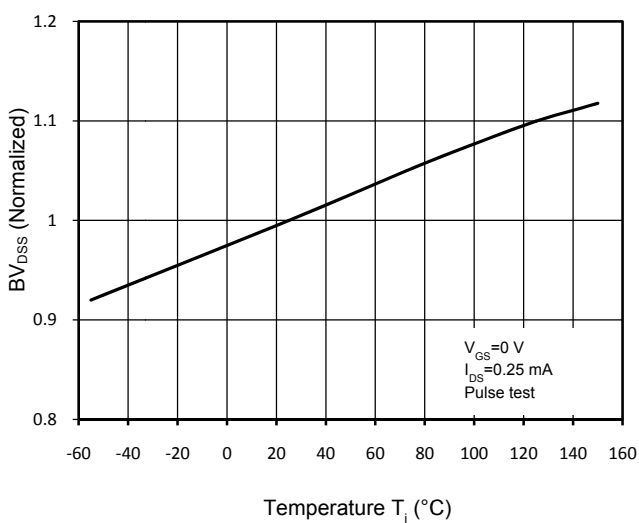
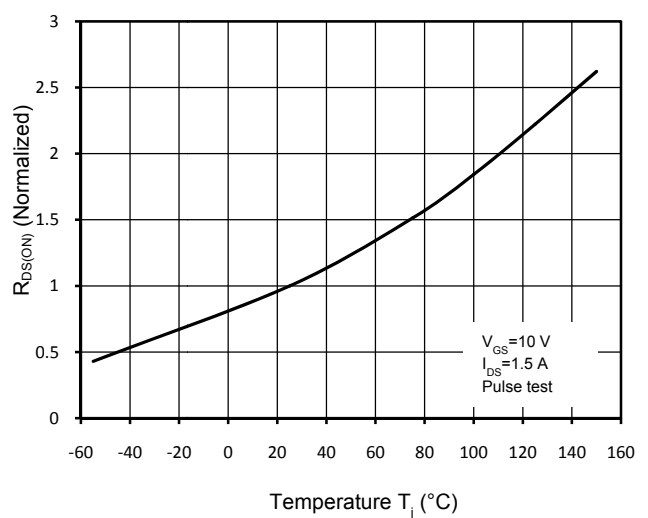


Figure 4. Body-Diode Forward Characteristics

Figure 5. Normalized BV_{DS} vs. TemperatureFigure 6. Normalized $R_{DS(on)}$ vs. Temperature

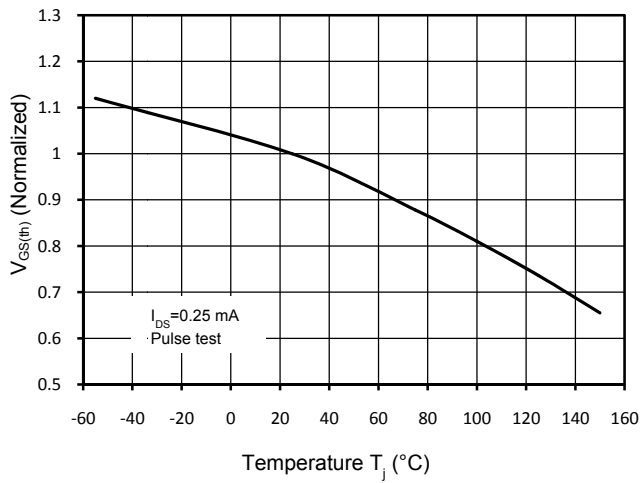


Figure 7. Threshold Voltage vs. Temperature

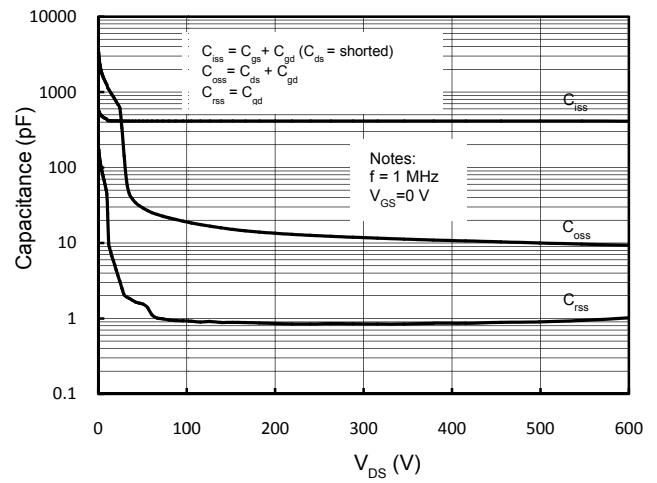


Figure 8. Capacitance Characteristics

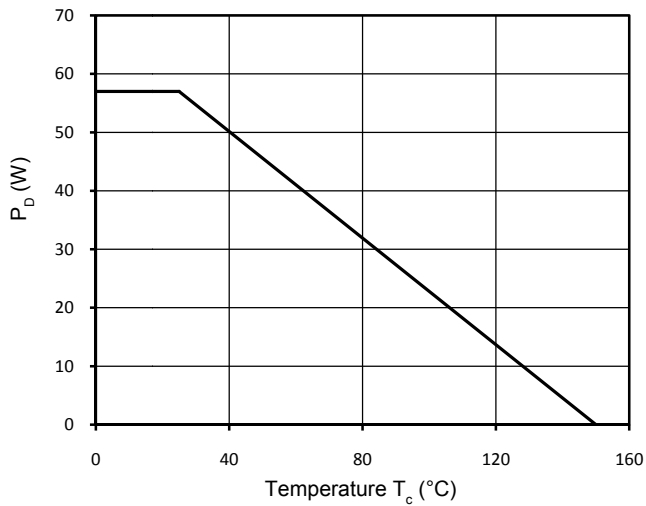


Figure 9. Power Dissipation

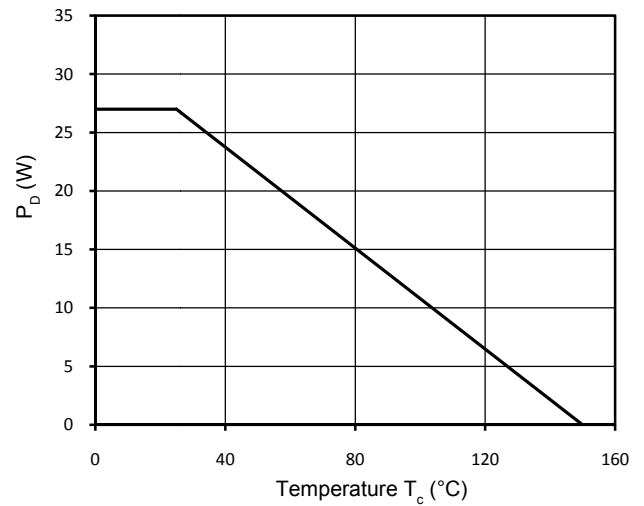


Figure 10. Power Dissipation (TO-220F)

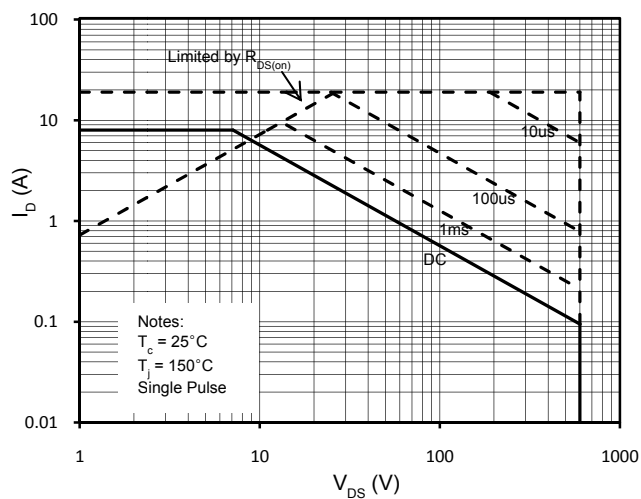


Figure 11. Maximum Safe Operating Area

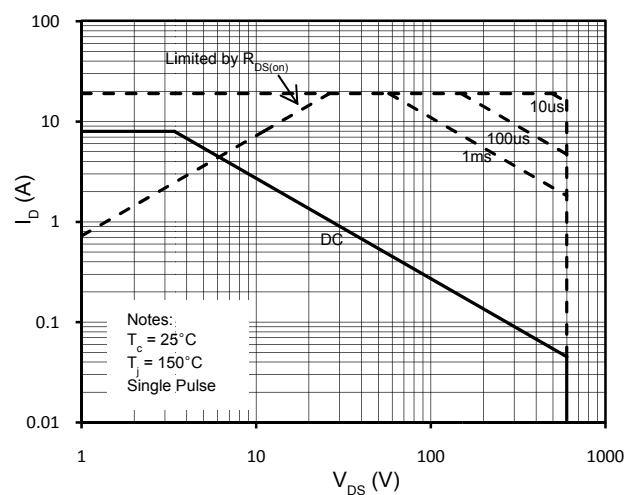


Figure 12. Maximum Safe Operating Area (TO-220F)