600V 0.058Ω Super Junction Power MOSFET

Description

WMOS™ C2 is Wayon's 2nd generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ C2 is suitable for applications which require superior power density and outstanding efficiency.

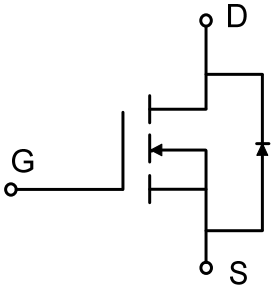
TO-220F

TO-247

Features

- V_{DS} =650V @ $T_{j,max}$
- Typ. $R_{DS(on)}$ =0.058Ω
- 100% UIS tested
- Pb-free plating, Halogen free

RoHS compliant



Applications

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

Absolute Maximum Ratings

Parameter	Symbol	WMJ	WML	Unit
Drain-source voltage	V_{DSS}	600		V
Continuous drain current[1] (T_C = 25°C)	I_D	53		A
(T_C = 100°C)		30		A
Pulsed drain current[2]	I_{DM}	142		A
Gate-source voltage	V_{GS}	±30		V
Avalanche energy, single pulse[3]	E_{AS}	1100		mJ
Avalanche energy, repetitive[2]	E_{AR}	1.7		mJ
Avalanche current, repetitive[2]	I_{AR}	5.3		A
Power dissipation (T_C = 25°C)	P_D	378	34	W
- Derate above 25°C		3.03	0.27	W/°C
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		°C
Continuous diode forward current	I_S	46		A
Diode pulse current	$I_{S,pulse}$	142		A

Thermal Characteristics

Parameter	Symbol	WMJ	WML	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.33	3.6	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	80	°C/W

Electrical Characteristics T_c = 25°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	2.2	3	4.2	V
Drain cut-off current	I_{DSS}	V_{DS}=600 V, V_{GS}=0V,				μA
		T_j = 25°C	-	-	1	
		T_j = 125°C	-	10	-	
Gate leakage current, forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0V	-	-	100	nA
Gate leakage current, reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=15A	-			
		T_j = 25°C	-	0.058	0.07	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS}= 100V, V_{GS}= 0V,	-	4300	-	
Output capacitance	C_{oss}	f = 1 MHz	-	150	-	pF
Reverse transfer capacitance	C_{rss}		-	3.7	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 300V, I_D = 15A	-	77	-	
Rise time	t_r	R_G = 25Ω, V_{GS}=10V	-	87	-	ns
Turn-off delay time	$t_{d(off)}$		-	300	-	
Fall time	t_f		-	60	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480V, I_D=15A,	-	20.5	-	
Gate to drain charge	Q_{gd}	V_{GS}=0 to 10V	-	33	-	nC
Gate charge total	Q_g		-	88.5	-	
Gate plateau voltage	$V_{plateau}$		-	5.3	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=15A	-	-	1.2	V
Reverse recovery time	t_{rr}	V_R=50V, I_F=15A,	-	316	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=100A/μs	-	5.2	-	μC
Peak reverse recovery current	I_{rrm}		-	38	-	A

Notes:

1. Limited by $T_{j\,max}$. Maximum duty cycle D=0.5.

2. Repetitive rating: pulse width limited by maximum junction temperature.

3. I_{AS} = 5.3 A, V_{DD} = 50V, R_G = 25Ω, starting T_j = 25°C.

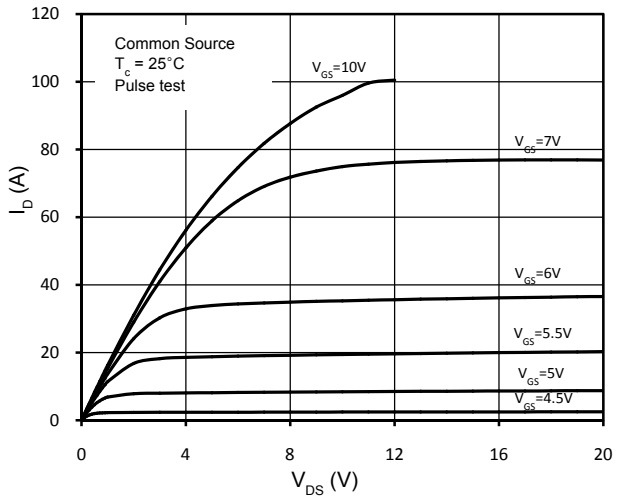


Figure 1.On-Region Characteristics

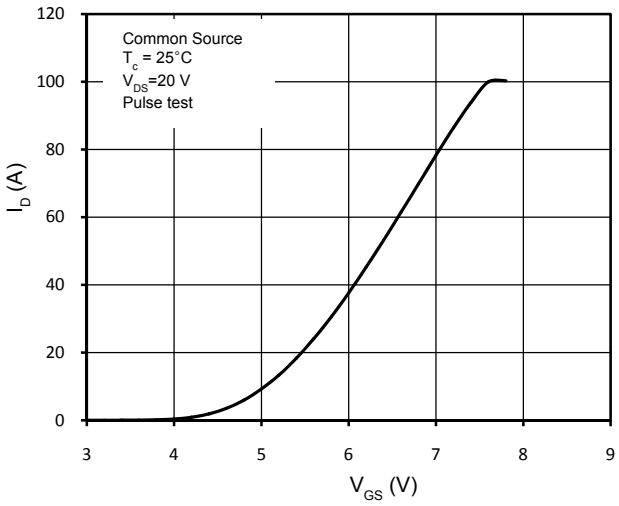


Figure 2. Transfer Characteristics

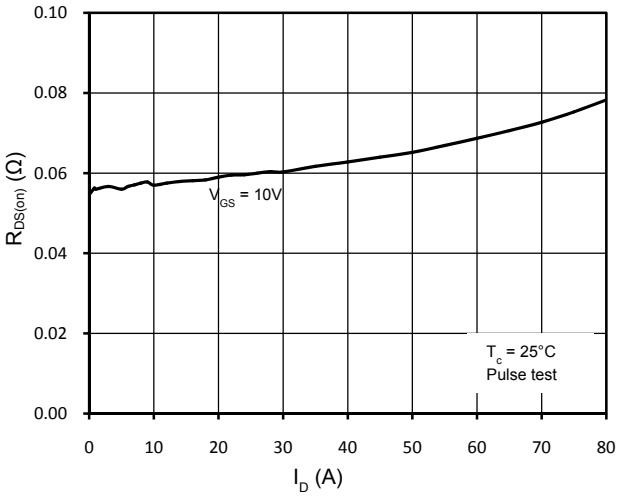


Figure 3. Static Drain-Source On Resistance

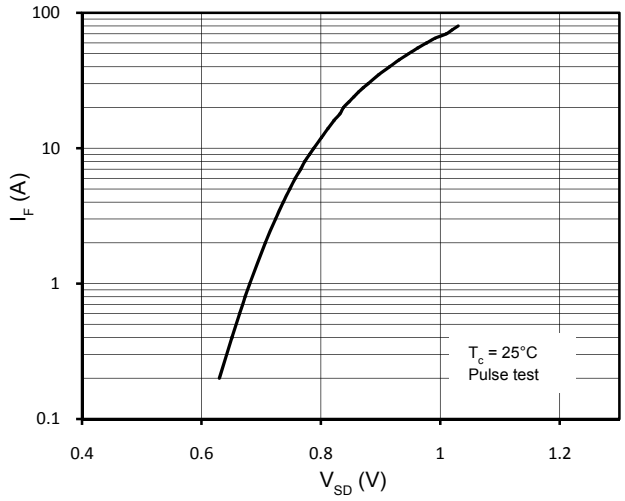


Figure 4. Body- Diode Forward Characteristics

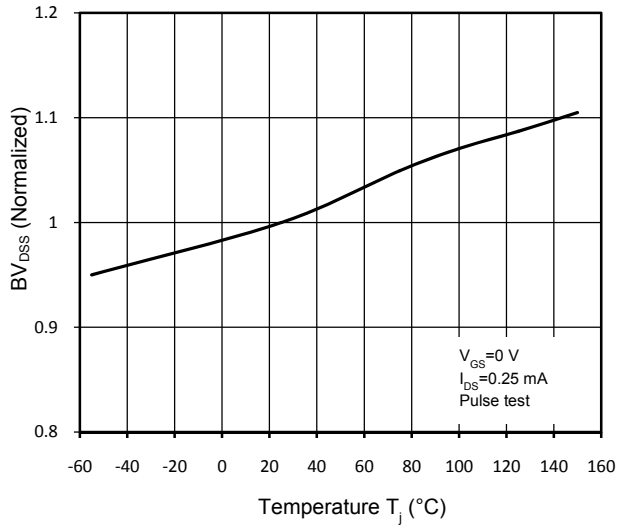


Figure 5. Normalized BV_{DSS} vs. Temperature

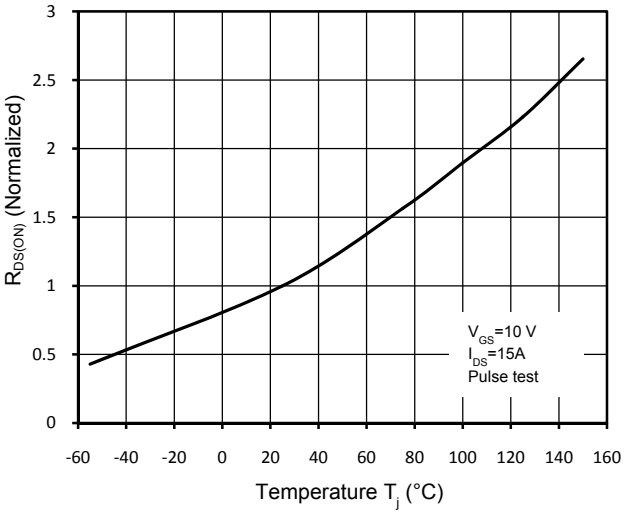


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

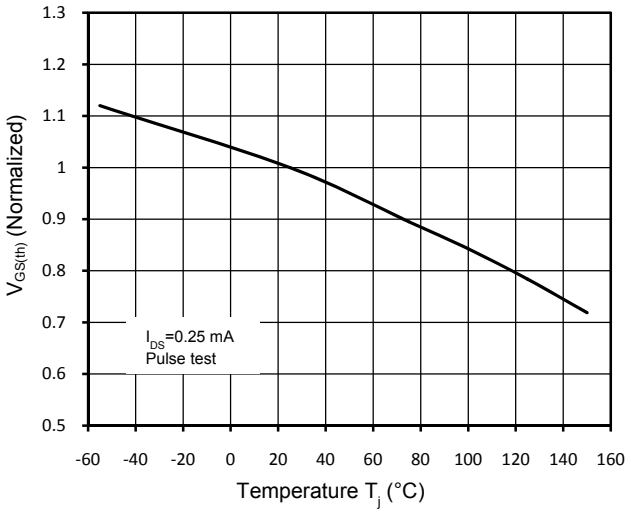


Figure 7. Threshold Voltage vs. Temperature

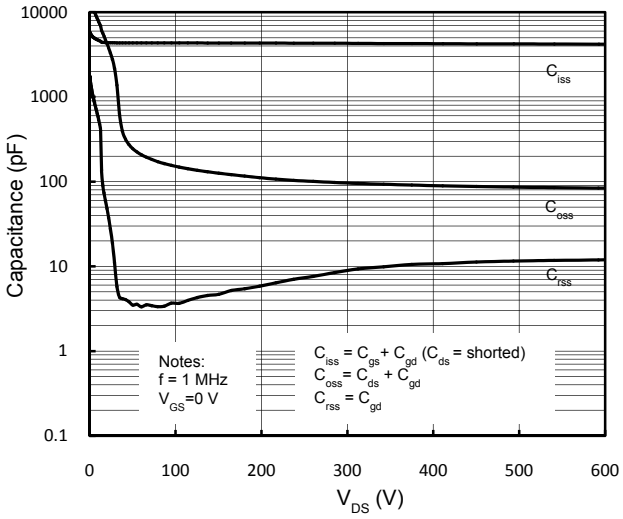


Figure 8. Capacitance Characteristics

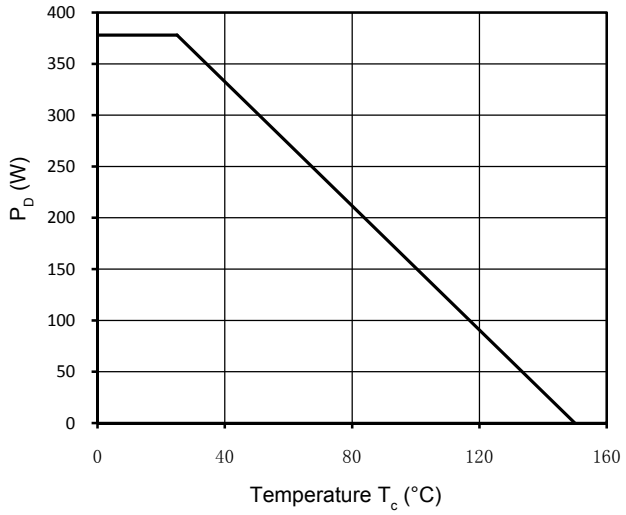


Figure 9. Power Dissipation

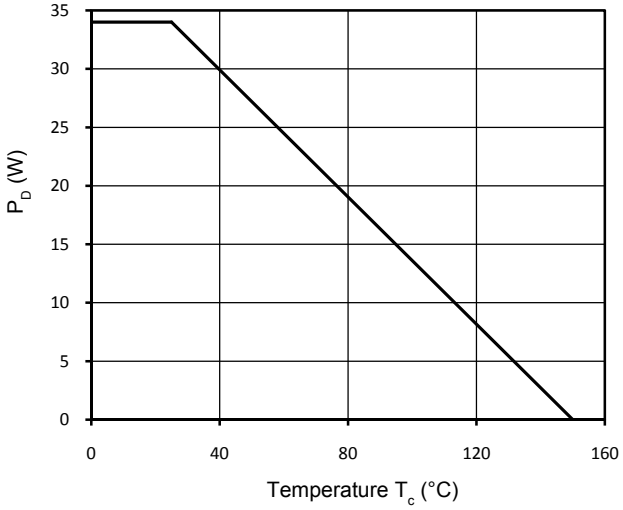


Figure 10. Power Dissipation (TO-220F)

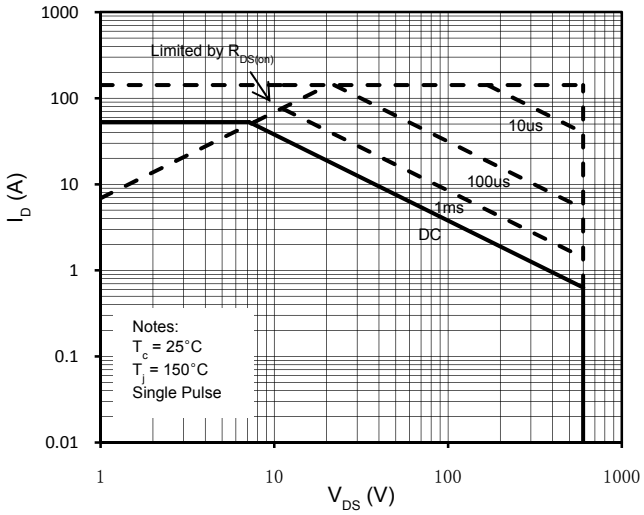


Figure 11. Maximum Safe Operating Area

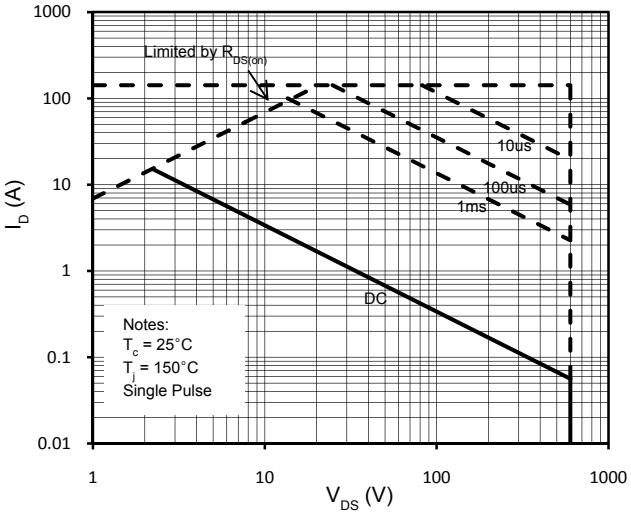


Figure 12. Maximum Safe Operating Area(TO-220F)

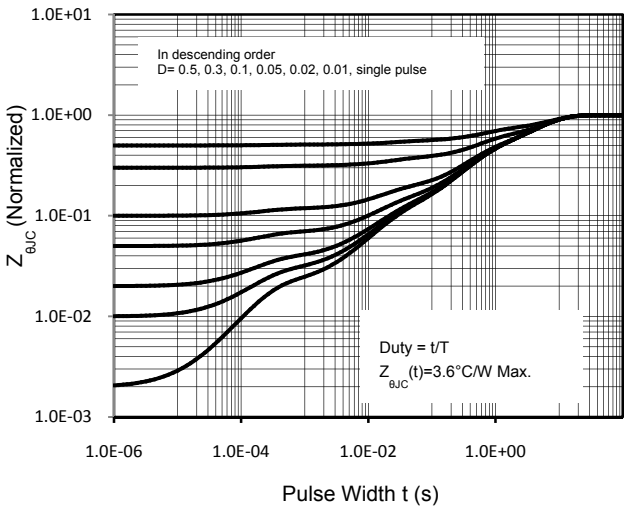


Figure 13. Transient Thermal Response Curve (TO-220F)

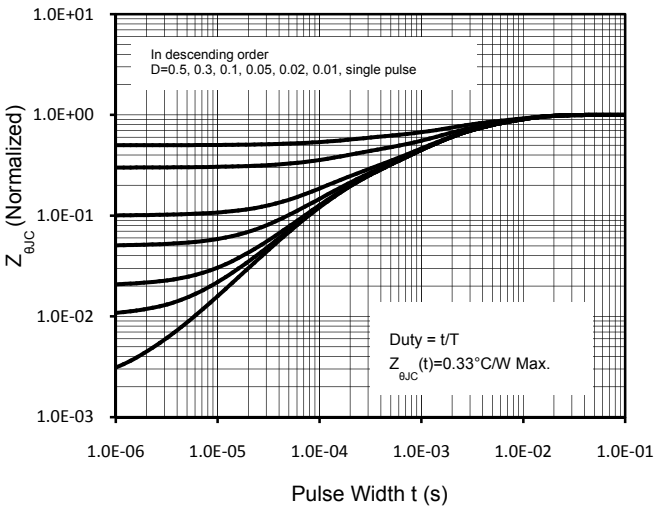


Figure 14. Transient Thermal Response Curve

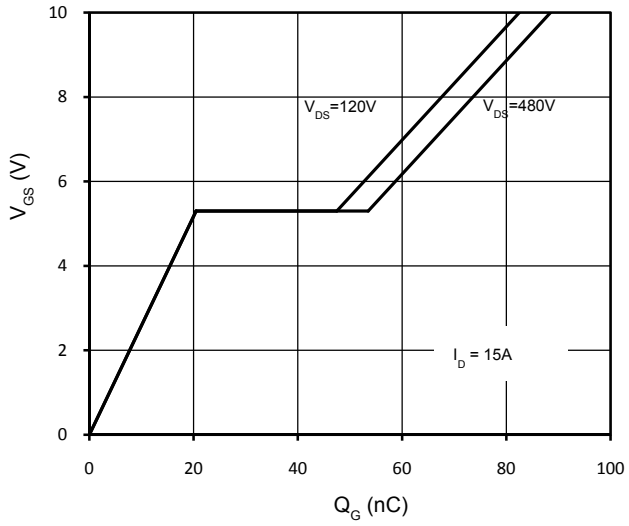
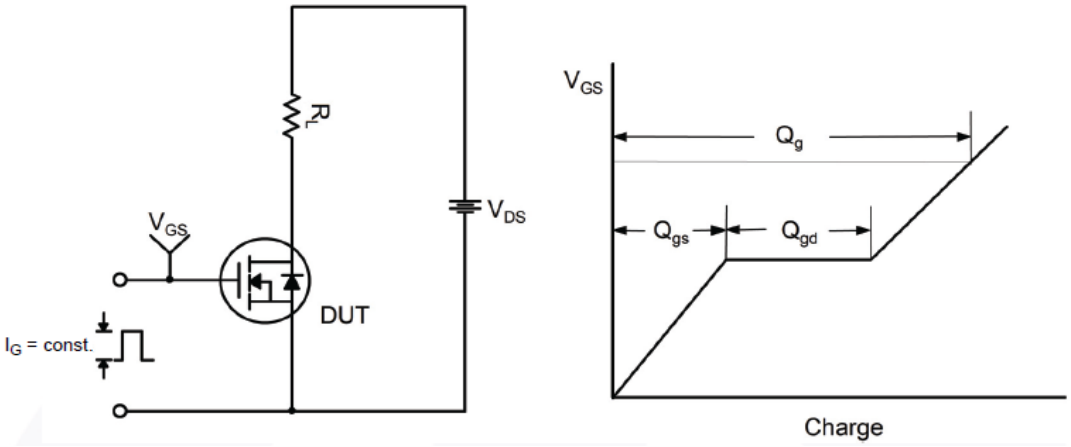
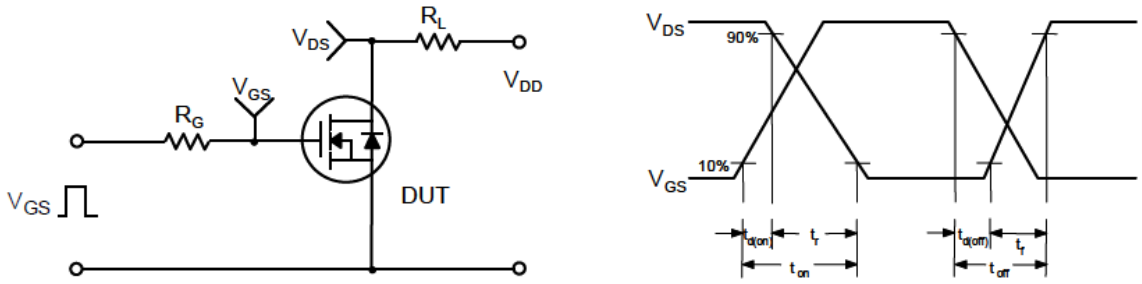


Figure 15. Gate Charge Characteristics

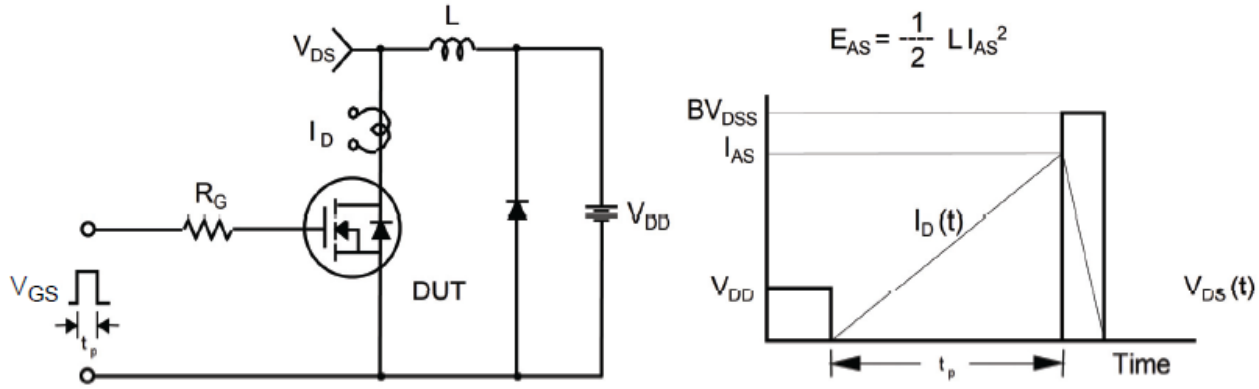
Gate Charge Test Circuit & Waveform



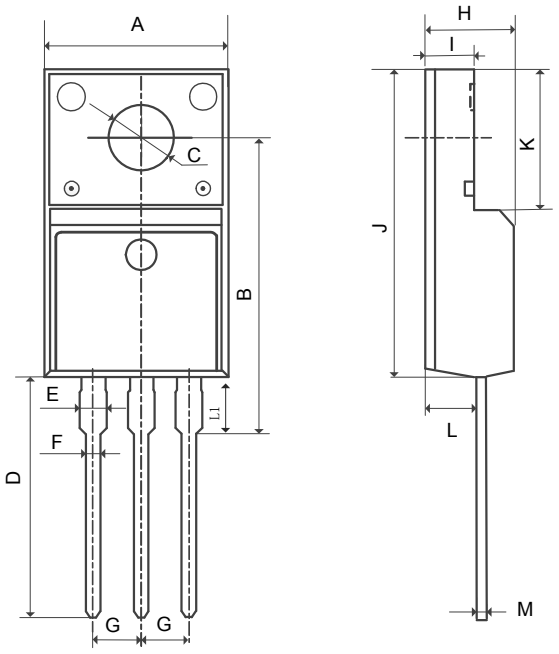
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



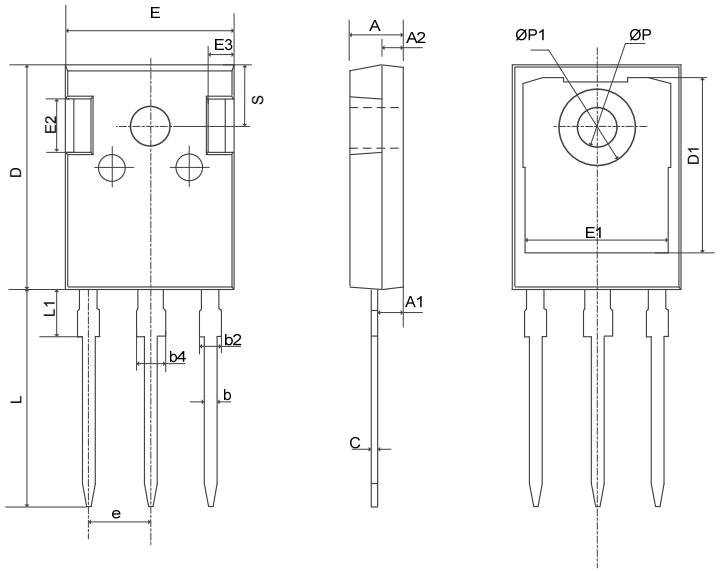
Mechanical Dimensions for TO-220F



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.20	16.10
C	3.03	3.38
D	12.64	13.28
E	1.18	1.58
F	0.70	0.95
G	2.54REF	
H	4.50	4.90
I	2.34	2.74
J	15.57	16.17
K	6.70REF	
L	2.56	2.96
M	0.40	0.65
L1	2.85	3.45

Mechanical Dimensions for TO-247



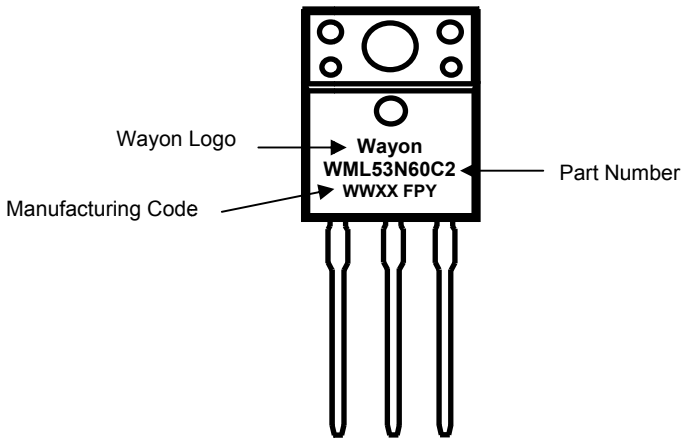
COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.11	1.36
b2	1.91	2.21
b4	2.91	3.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.44BSC	
L	19.62	20.22
L1	—	4.30
ØP	3.40	3.80
ØP1	—	7.30
S	6.15BSC	

Ordering Information

Part	Package	Marking	Packing method
WML53N60C2	TO-220F	WML53N60C2	Tube
WMJ53N60C2	TO-247	WMJ53N60C2	Tube

Marking Information



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