

800V 0.3Ω Super Junction Power MOSFET

Description

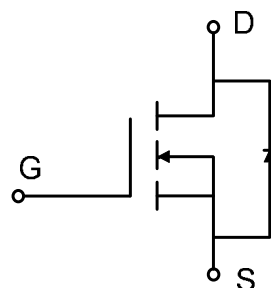
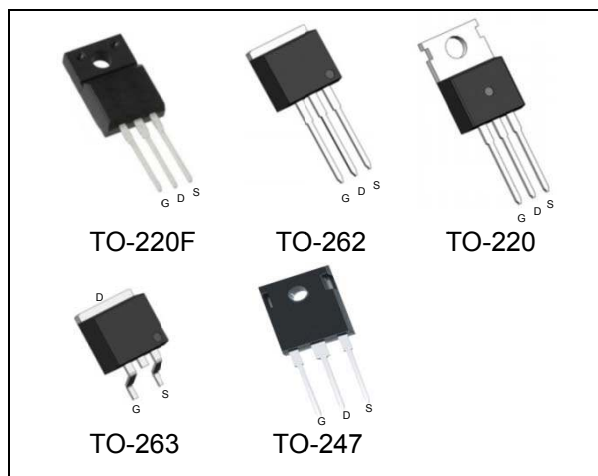
WMOS™ M3 is Wayon's 3rd generation 800V super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ M3 is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 850V @ T_{j,max}$
- Typ. $R_{DS(on)} = 0.3\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

Applications

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



Absolute Maximum Ratings

Parameter	Symbol	WMN/WMM/WMJ/WMK	WML	Unit
Drain-source voltage	V_{DSS}	800		V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	15		A
($T_C = 100^\circ C$)		8		A
Pulsed drain current ²⁾	I_{DM}	56		A
Gate-source voltage	V_{GS}	± 30		V
Avalanche energy, single pulse ³⁾	E_{AS}	350		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	0.25		mJ
Avalanche current, repetitive ²⁾	I_{AR}	3		A
Power dissipation ($T_C = 25^\circ C$)	P_D	150	35	W
- Derate above $25^\circ C$		1.2	0.28	W/ $^\circ C$
Operating and storage temperature range	$T_{j, T_{stg}}$	-55 to +150		$^\circ C$
Continuous diode forward current ¹⁾	I_S	15		A
Diode pulse current ²⁾	$I_{S,pulse}$	56		A

Thermal Characteristics

Parameter	Symbol	WMN/WMM/WMJ/WMK	WML	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.85	3.7	$^\circ C/W$
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 V, I _D =0.25 mA	800	-	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =0.25mA	2.5	3.5	4.5	V
Drain cut-off current	I _{DSS}	V _{DS} =800 V, V _{GS} =0 V, T _J = 25°C T _J = 125°C	- -	- 10	1 -	μA
Gate leakage current, forward	I _{GSSF}	V _{GS} =30 V, V _{DS} =0 V	-	-	100	nA
Gate leakage current, reverse	I _{GSSR}	V _{GS} =-30 V, V _{DS} =0 V	-	-	-100	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10 V, I _D =4A T _J = 25°C	- -	 0.3	 0.36	 Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 50 V, V _{GS} = 0 V, f = 1 MHz	-	1700	-	pF
Output capacitance	C _{OSS}		-	63	-	
Reverse transfer capacitance	C _{rss}		-	2.6	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 300V, I _D = 10A R _G = 25Ω, V _{GS} =10V	-	35	-	ns
Rise time	t _r		-	38	-	
Turn-off delay time	t _{d(off)}		-	125	-	
Fall time	t _f		-	24	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =480 V, I _D =10A, V _{GS} =0 to 10 V	-	7.8	-	nC
Gate to drain charge	Q _{gd}		-	15	-	
Gate charge total	Q _g		-	34	-	
Gate plateau voltage	V _{plateau}		-	5.7	-	V
Reverse diode characteristics						
Diode forward voltage	V _{SD}	V _{GS} =0 V, I _F =4A	-	-	1.2	V
Reverse recovery time	t _{rr}	V _R =50 V, I _F =10A, dI _F /dt=100 A/μs	-	260	-	ns
Reverse recovery charge	Q _{rr}		-	3.1	-	μC
Peak reverse recovery current	I _{rrm}		-	26	-	A

Notes:

- Limited by $T_{j\max}$. Maximum duty cycle $D=0.5$.
- Repetitive rating: pulse width limited by maximum junction temperature
- $I_{AS}=3\text{ A}, V_{DD}=50\text{ V}, R_G=25\Omega$, starting $T_j=25^\circ\text{C}$

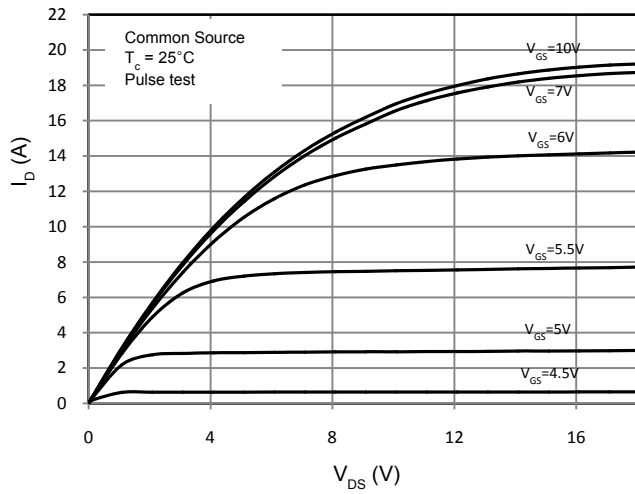


Figure 1. On-Region Characteristics

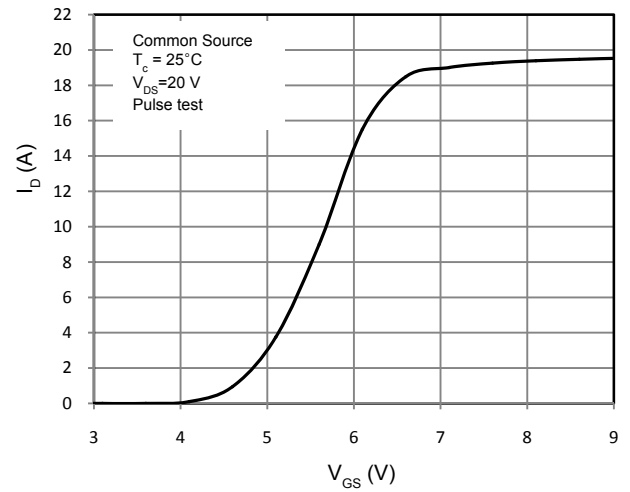


Figure 2. Transfer Characteristics

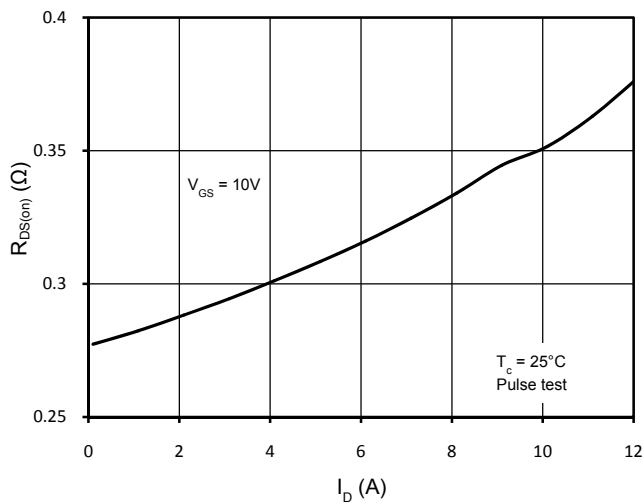


Figure 3. Static Drain-Source On Resistance

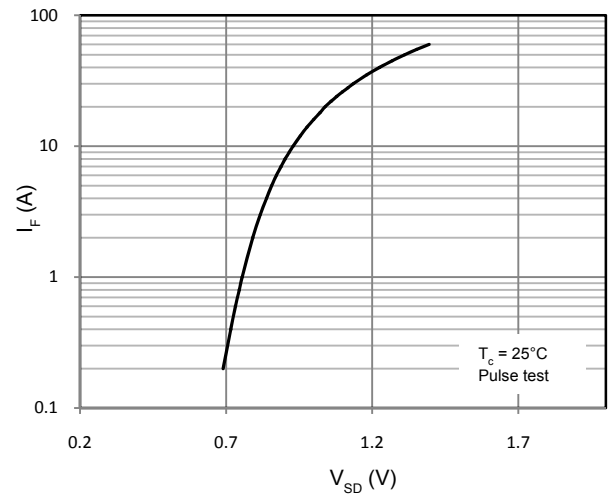
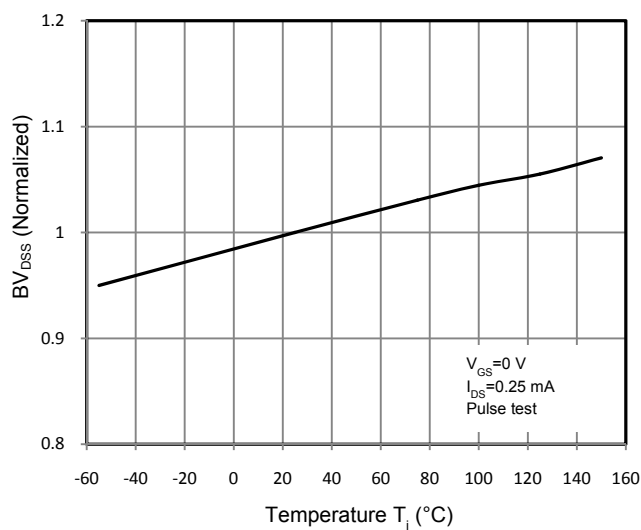
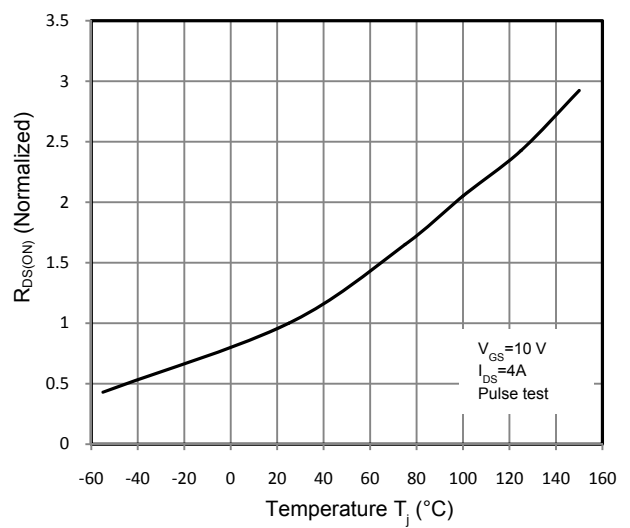


Figure 4. Body-Diode Forward Characteristics

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

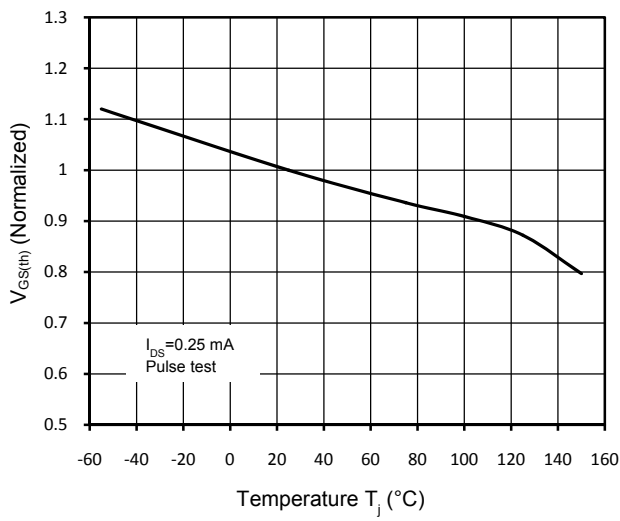


Figure 7. Threshold Voltage vs. Temperature

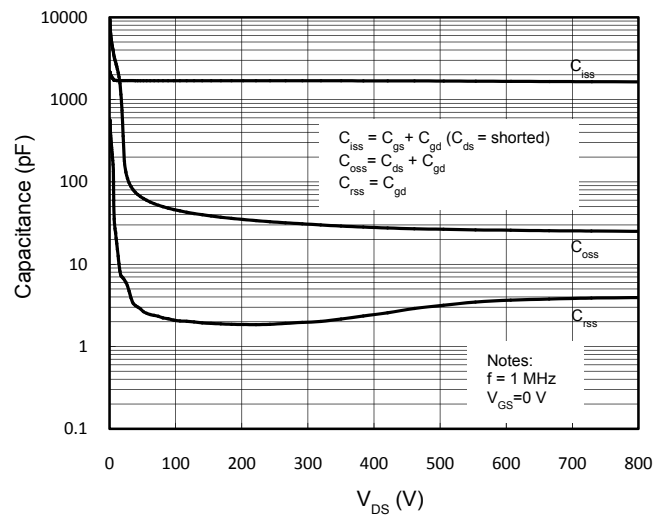


Figure 8. Capacitance Characteristics

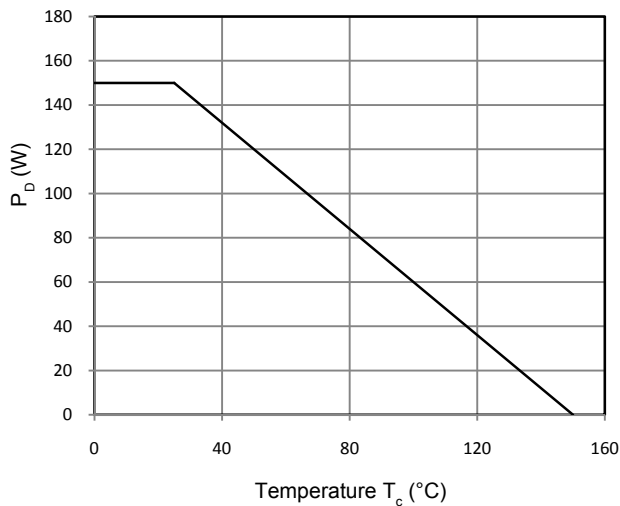


Figure 9. Power Dissipation

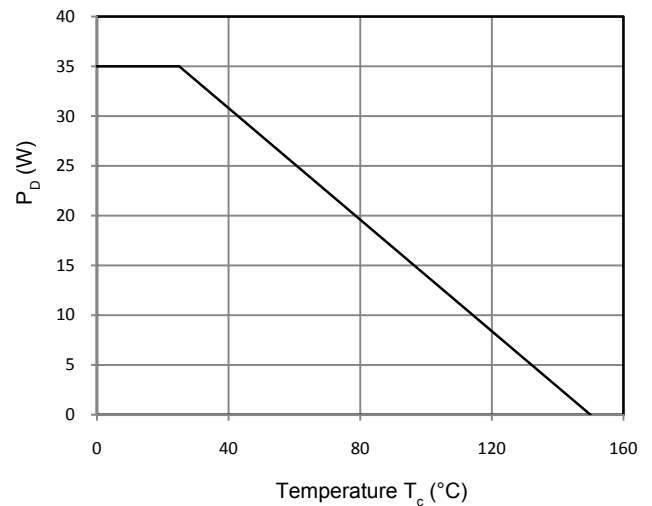


Figure 10. Power Dissipation (TO-220F)

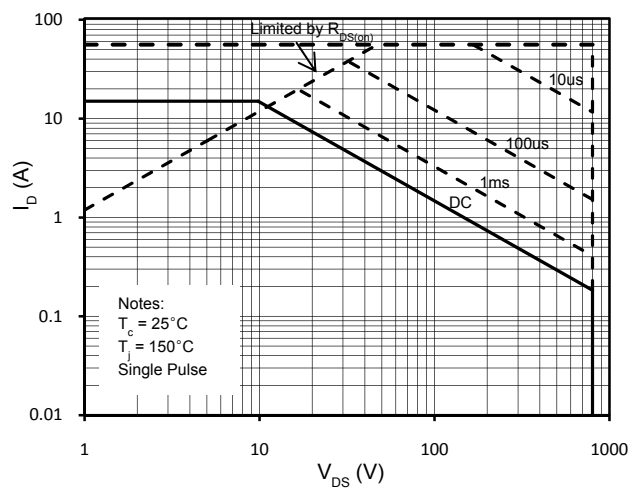


Figure 11. Maximum Safe Operating Area

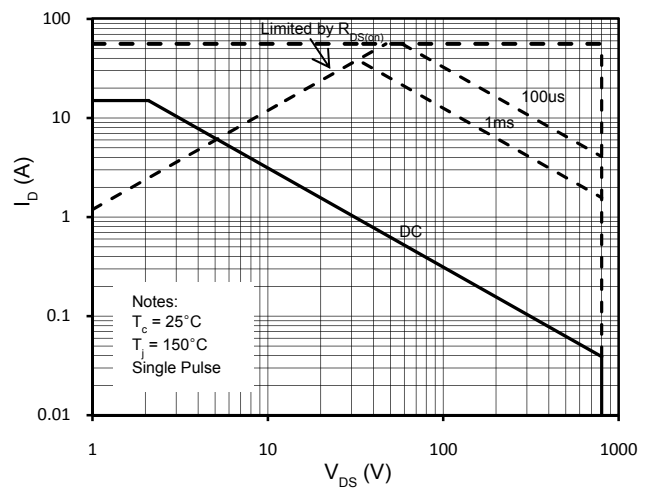


Figure 12. Maximum Safe Operating Area (TO-220F)

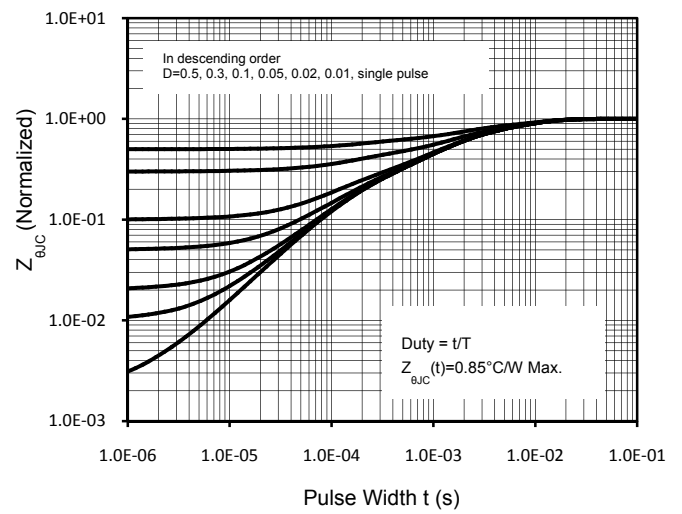
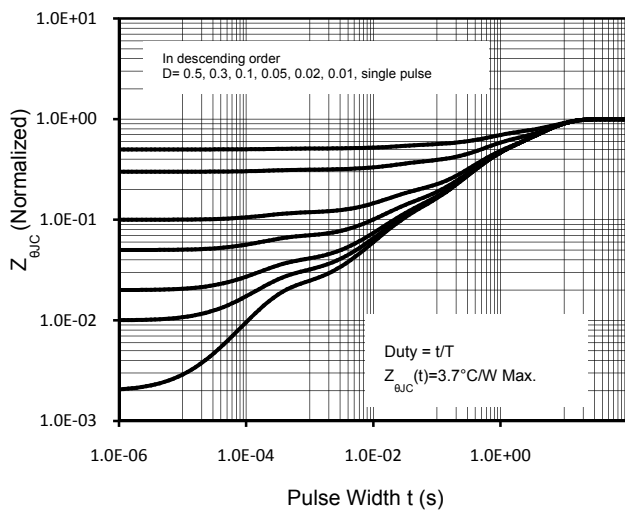


Figure 13. Transient Thermal Response Curve (TO-220F) Figure 14. Transient Thermal Response Curve

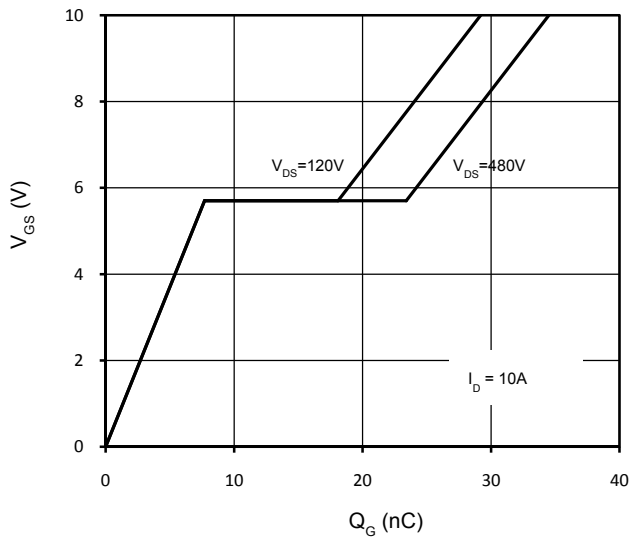
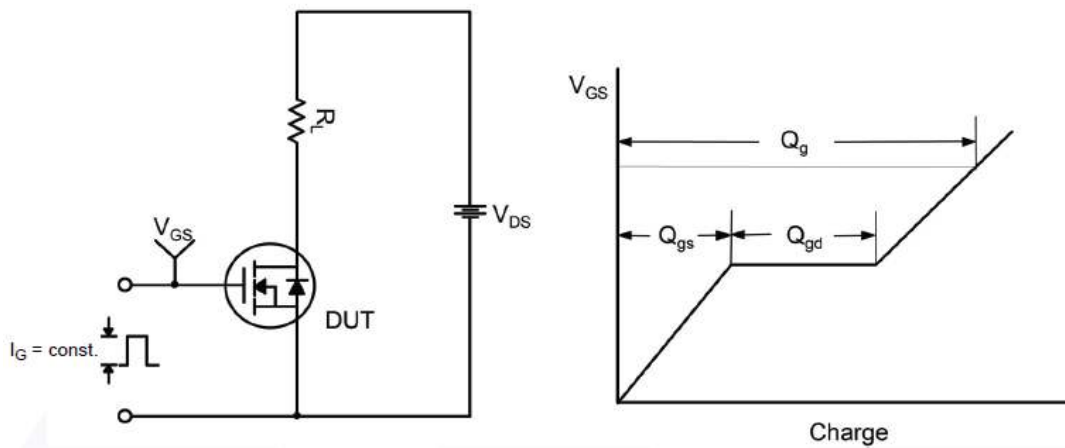
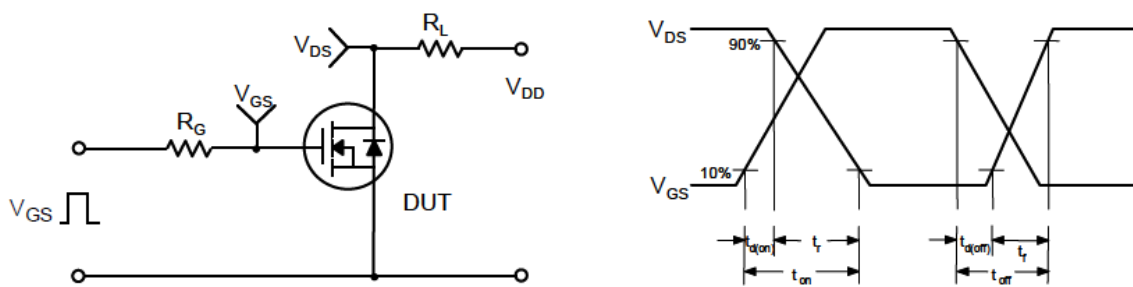


Figure 15. Gate Charge Characteristics

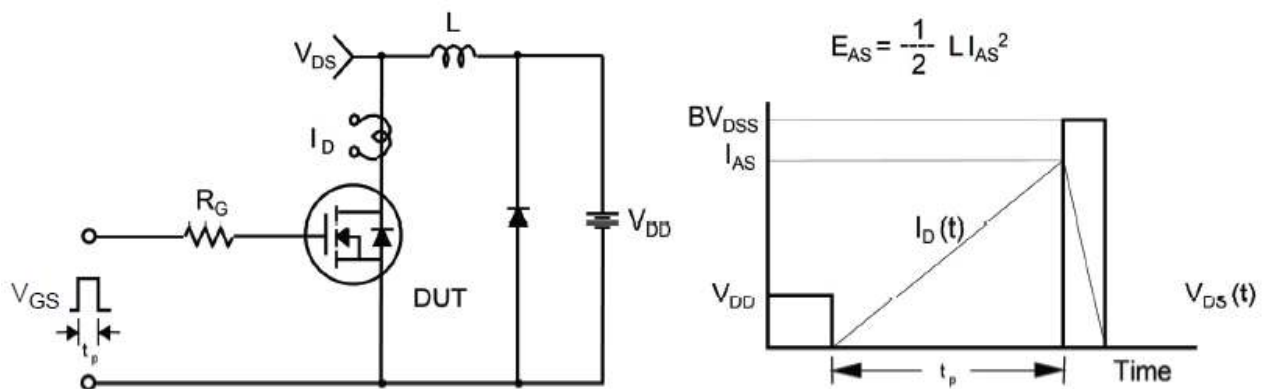
Gate Charge Test Circuit & Waveform

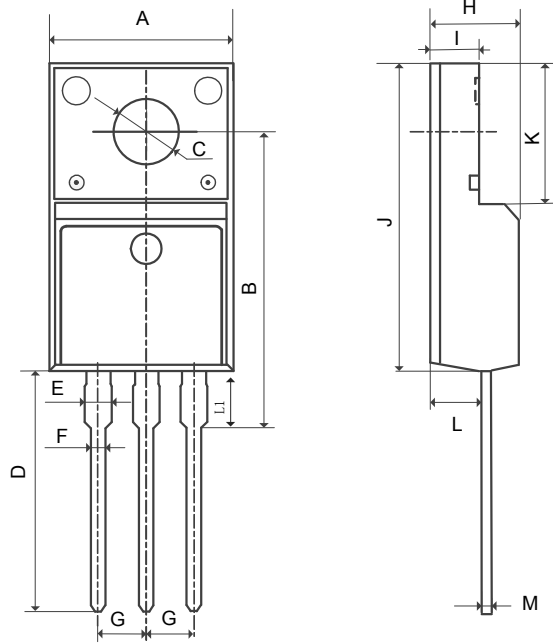


Switching Test Circuit & Waveforms

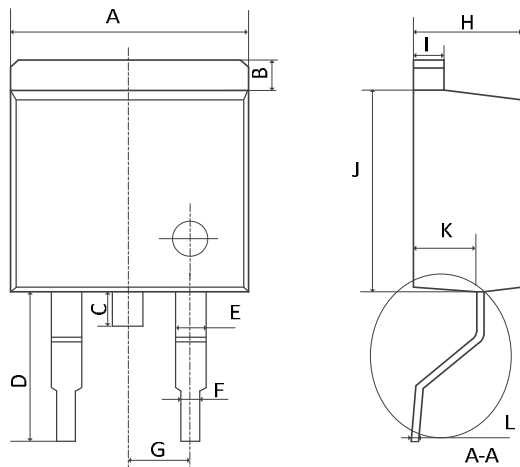


Unclamped Inductive Switching Test Circuit & Waveforms

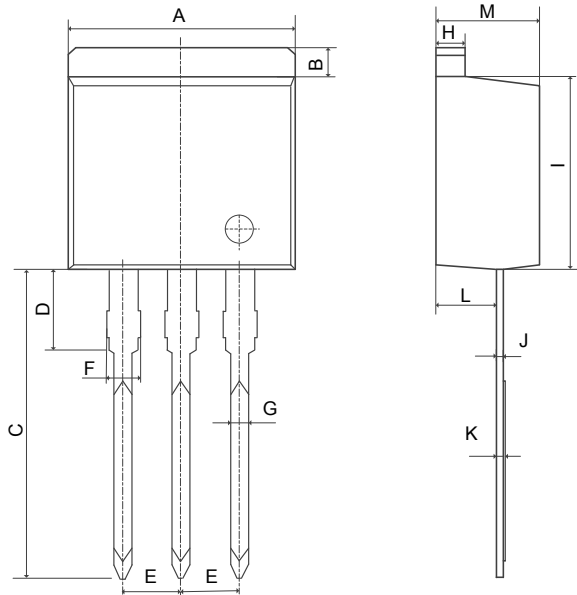


Mechanical Dimensions for TO-220F

COMMON DIMENSIONS

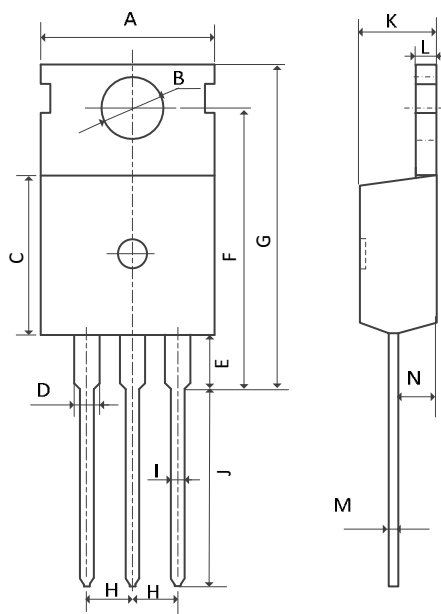
SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.10	16.10
C	3.03	3.38
D	12.64	13.28
E	1.18	1.58
F	0.70	0.95
G	2.54REF	
H	4.50	4.90
I	2.34	2.74
J	15.57	16.17
K	6.70REF	
L	2.56	2.96
M	0.40	0.65
L1	2.85	3.45

Mechanical Dimensions for TO-263

COMMON DIMENSIONS

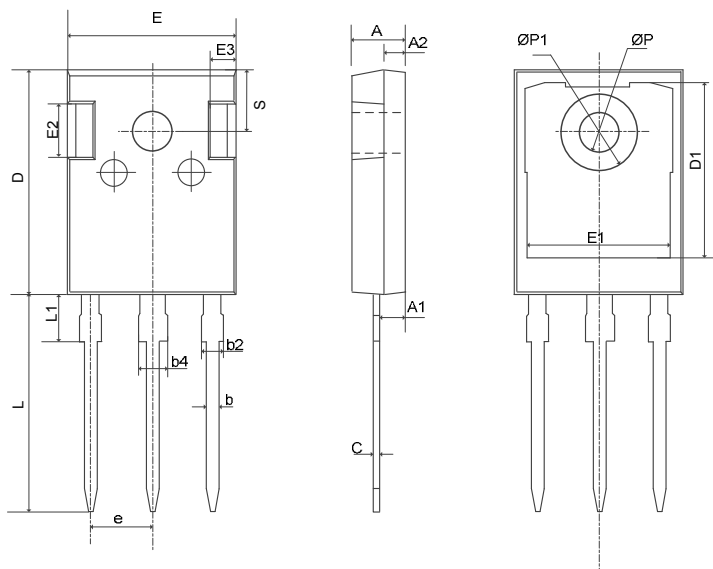
SYMBOL	MM	
	MIN	MAX
A	10.00	10.40
B	1.11	1.41
C	1.25	1.55
D	5.10	5.50
E	1.12	1.42
F	0.71	0.92
G	2.39	2.69
H	4.49	4.89
I	1.17	1.37
J	8.45	8.85
K	2.54	2.84
L	0.28	0.49

Mechanical Dimensions for TO-262

COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	10.00	10.40
B	1.11	1.41
C	13.56	14.16
D	3.58	3.98
E	2.39	2.69
F	1.07	1.47
G	0.71	0.92
H	1.17	1.37
I	8.45	8.85
J	0.28	0.49
K	0.32	0.52
L	2.54	2.85
M	4.50	4.90

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

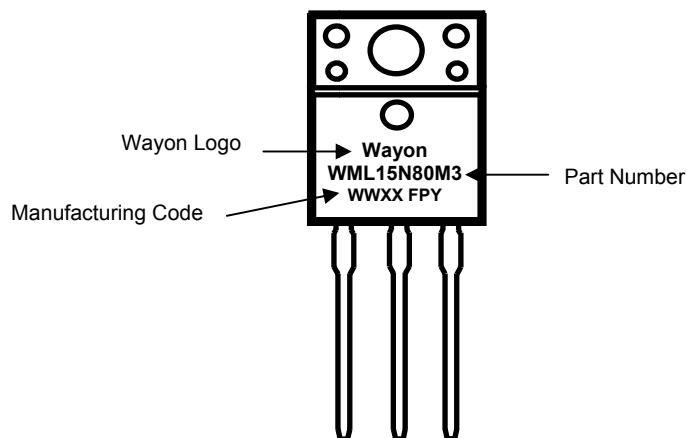
Mechanical Dimensions for TO-247
COMMON DIMENSIONS


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	5.60
E3	2.10	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
WML15N80M3	TO-220F	WML15N80M3	Tube
WMK15N80M3	TO-220	WMK15N80M3	Tube
WMN15N80M3	TO-262	WMN15N80M3	Tube
WMM15N80M3	TO-263	WMM15N80M3	Tape and Reel
WMJ15N80M3	TO-247	WMJ15N80M3	Tube

Marking Information



Contact Information

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

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