

600V 0.6Ω Super Junction Power MOSFET

Description

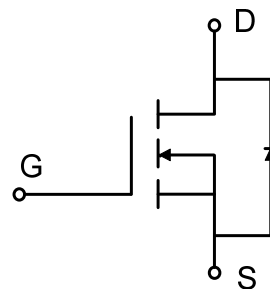
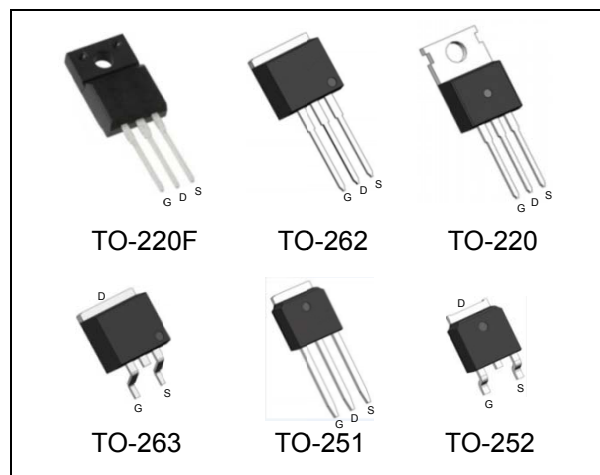
WMOS™ VD is Wayon's new high voltage power MOSFET family that is utilizing advanced technology for extremely low on-resistance and low gate charge performance. WMOS™ VD is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 650V @ T_{j,max}$
- $I_{DM} = 18A$
- Typ. $R_{DS(on)} = 0.6\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

Applications

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



Absolute Maximum Ratings

Parameter	Symbol	WMK/WMM/WMO/WMP/WMN	WML	Unit
Drain-source voltage	V_{DSS}	600		V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	10		A
		5		A
($T_C = 100^\circ C$)				
Pulsed drain current ²⁾	I_{DM}	18		A
Gate-source voltage	V_{GS}	± 30		V
Avalanche energy, single pulse ³⁾	E_{AS}	55		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	0.15		mJ
Avalanche current, repetitive ²⁾	I_{AR}	1.2		A
Power dissipation ($T_C = 25^\circ C$)	P_D	57	27	W
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		$^\circ C$
Continuous diode forward current	I_S	10		A
Diode pulse current	$I_{S,pulse}$	18		A

Thermal Characteristics

Parameter	Symbol	WMK/WMM/WMO/WMP/WMN	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	2.5	3.3	4.5	V
Drain cut-off current	I _{DSS}	V _{DS} =600 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 =1.5 A T _J = 25°C	- -	 0.6	 0.69	 Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V,	-	438	-	pF
Output capacitance	C _{Oss}	f = 1 MHz	-	430	-	
Reverse transfer capacitance	C _{rss}		-	4.3	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 300V, I _D = 2A	-	18	-	ns
Rise time	t _r	R _G = 25Ω, V _{GS} =10V	-	14	-	
Turn-off delay time	t _{d(off)}		-	47	-	
Fall time	t _f		-	10	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =480 V, I _D =2A,	-	2.3	-	nC
Gate to drain charge	Q _{gd}	V _{GS} =0 to 10 V	-	8.0	-	
Gate charge total	Q _g		-	13.6	-	
Gate plateau voltage	V _{plateau}		-	5.3	-	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 =50 V, I _F =2A,	-	144	-	ns
Reverse recovery charge	Q _{rr}	di _F /dt=100 A/μs	-	0.83	-	μC
Peak reverse recovery current	I _{rrm}		-	12	-	A

Notes:

- Limited by $T_{j\max}$. Maximum duty cycle $D=0.5$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS} = 1.2\text{ A}$, $V_{DD} = 50\text{ V}$, $R_G = 25\Omega$, starting $T_j = 25^\circ\text{C}$.

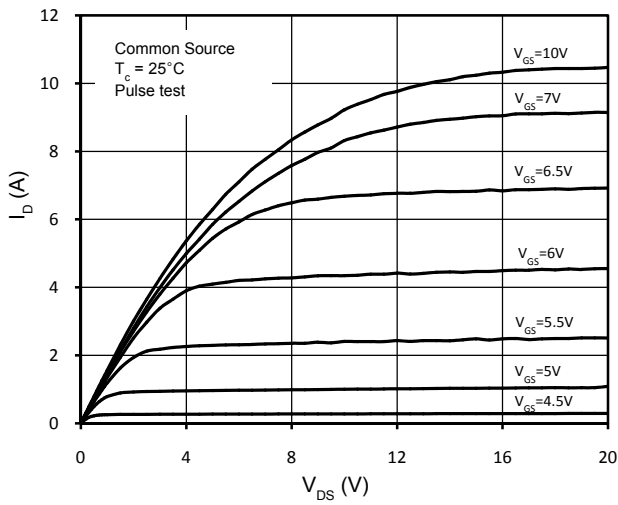


Figure 1. On-Region Characteristics

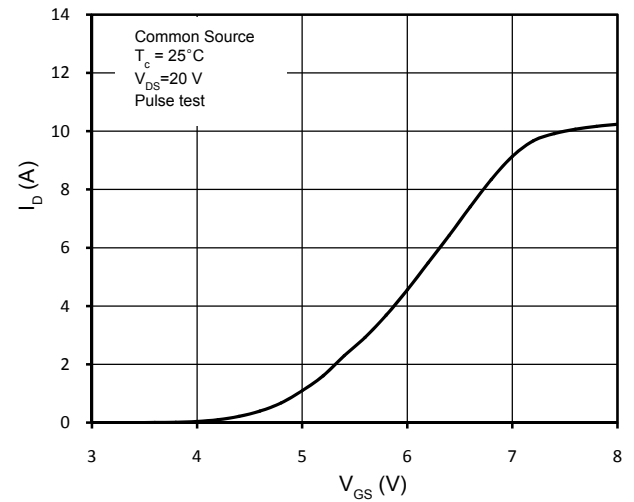


Figure 2. Transfer Characteristics

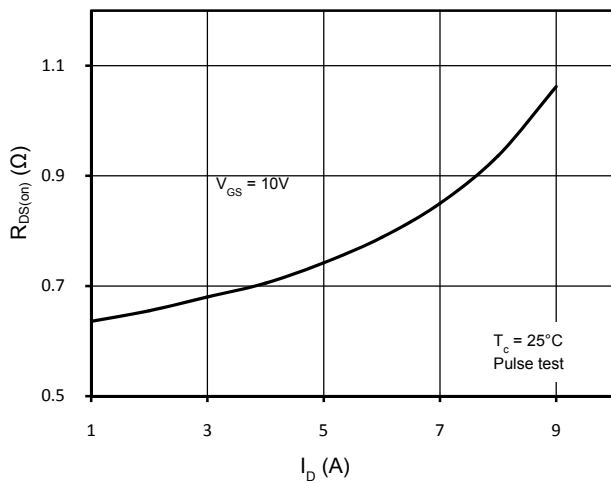


Figure 3. Static Drain-Source On Resistance

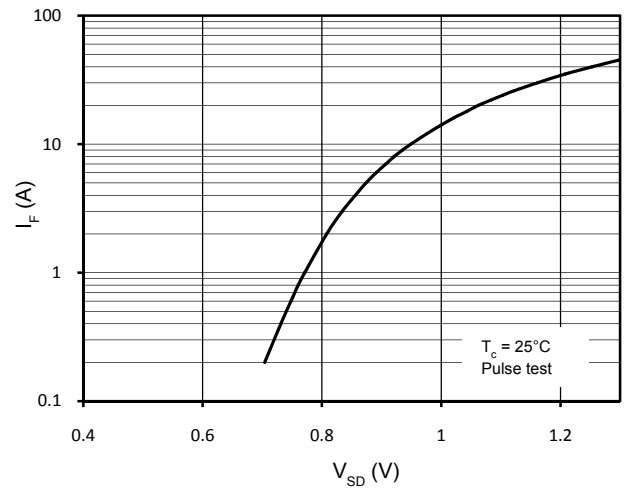
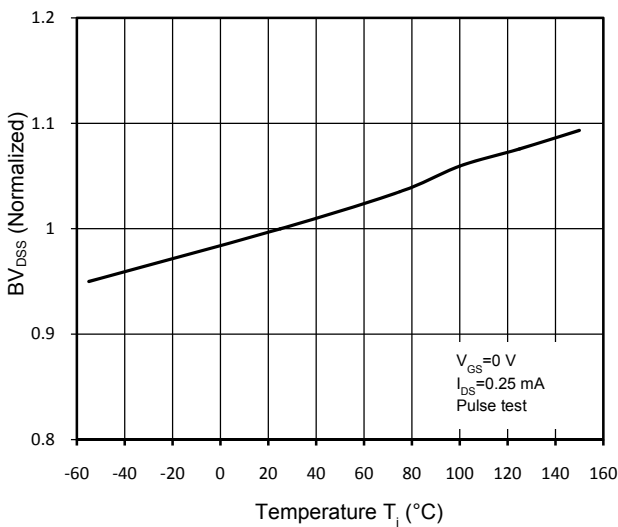
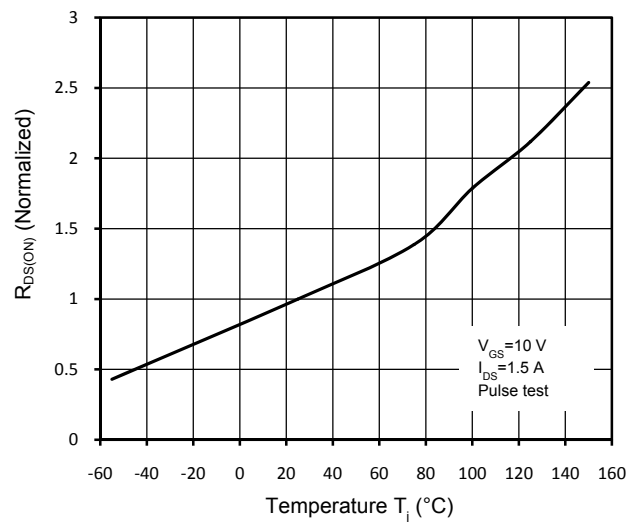


Figure 4. Body-Diode Forward Characteristics

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

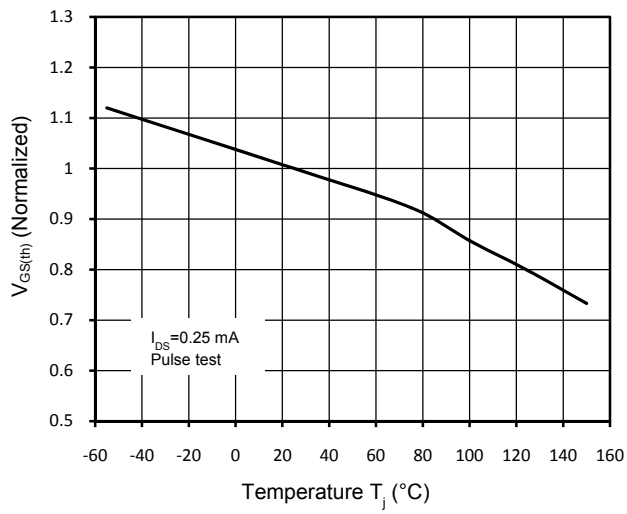


Figure 7. Threshold Voltage vs. Temperature

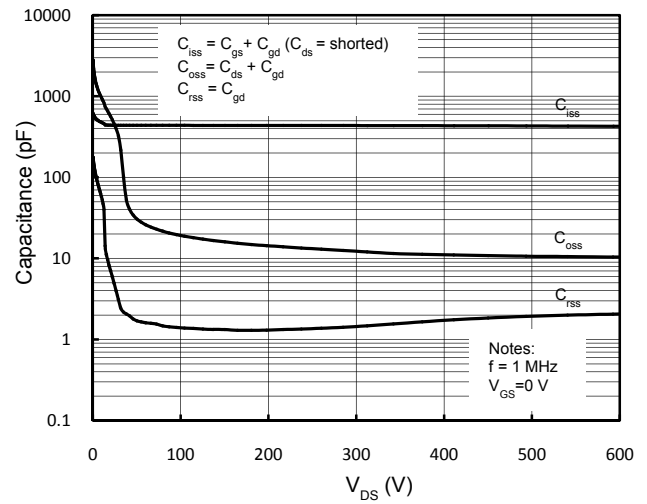


Figure 8. Capacitance Characteristics

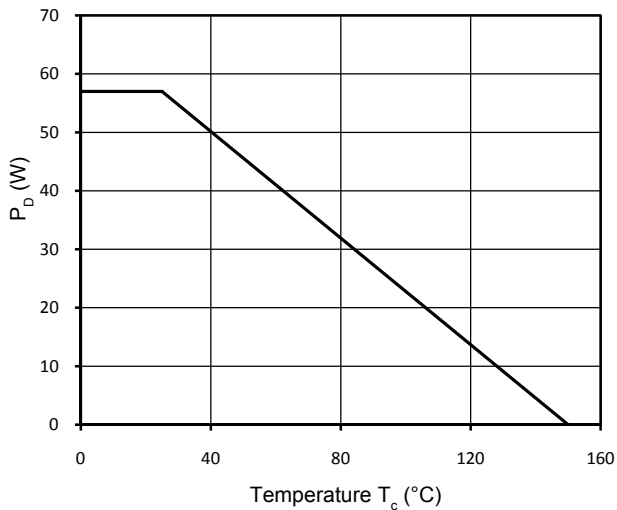


Figure 9. Power Dissipation

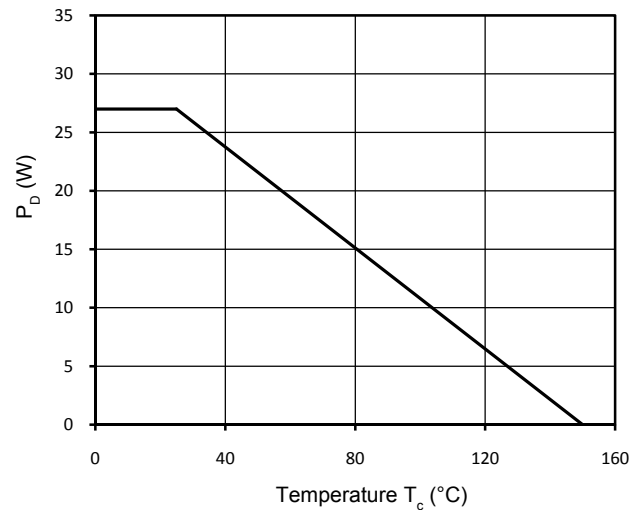


Figure 10. Power Dissipation (TO-220F)

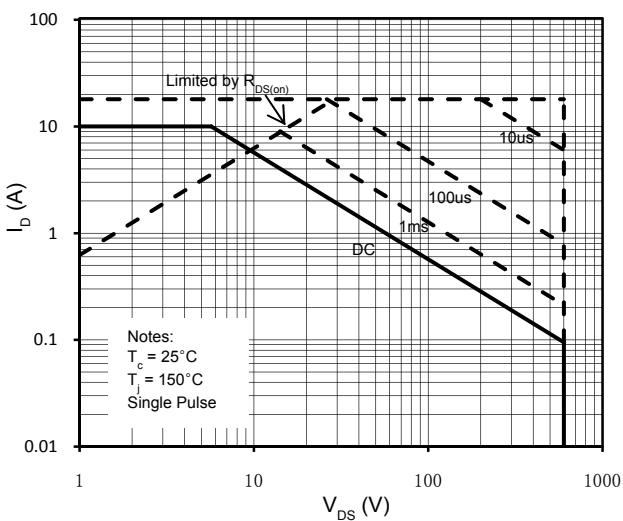


Figure 11. Maximum Safe Operating Area

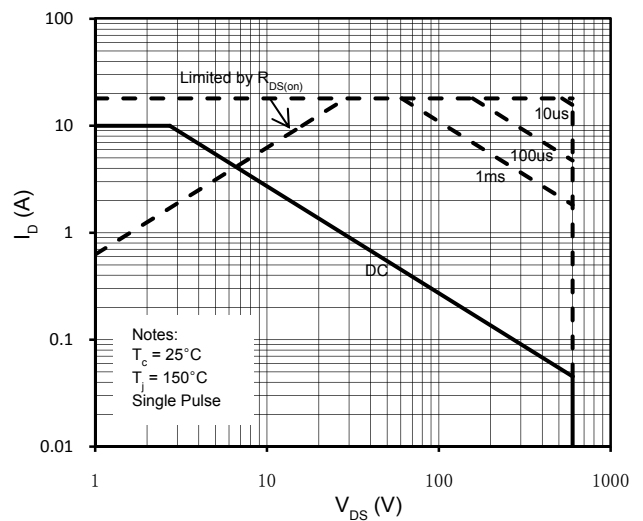


Figure 12. Maximum Safe Operating Area (TO-220F)

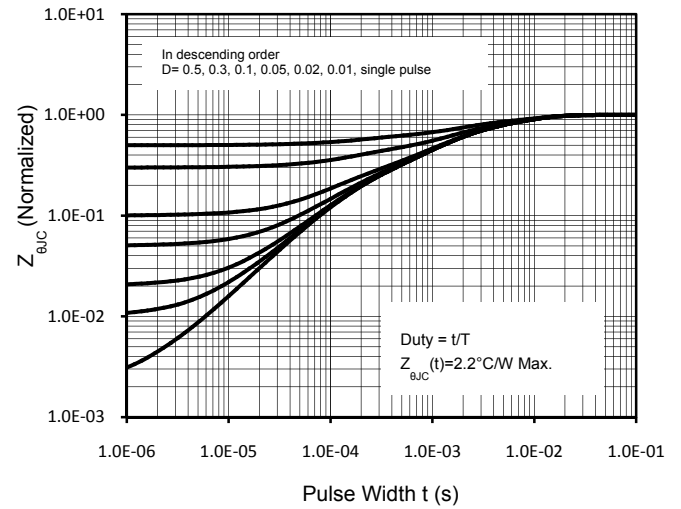
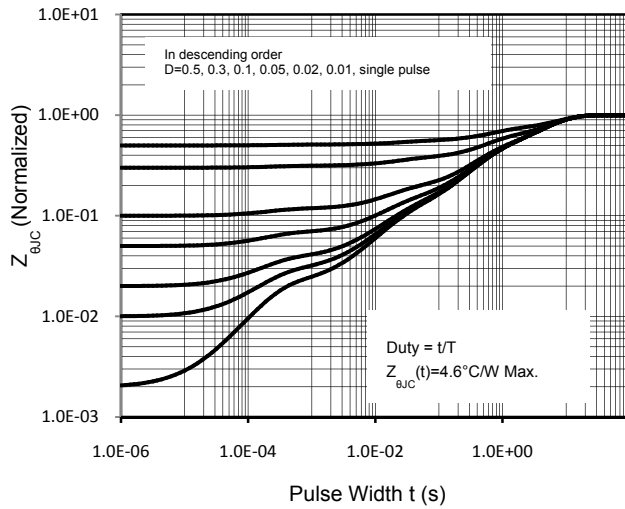


Figure 13. Transient Thermal Response Curve (TO-220F) Figure 14. Transient Thermal Response Curve

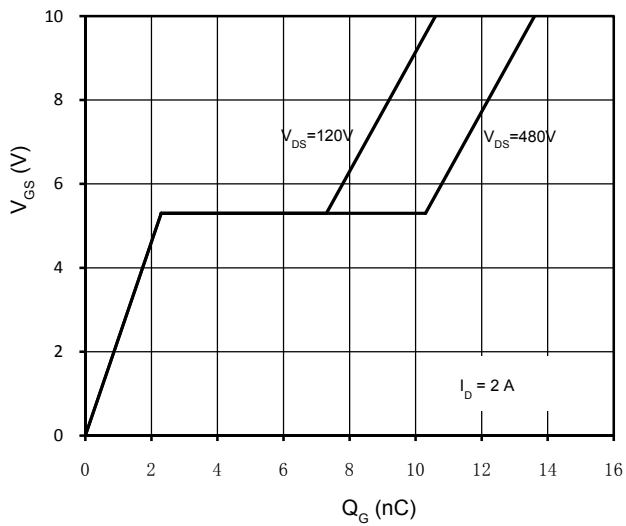
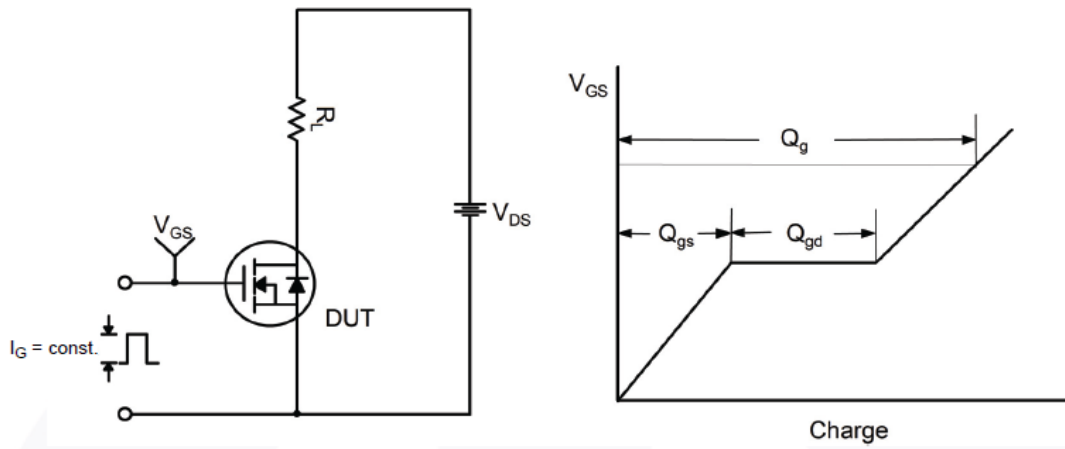
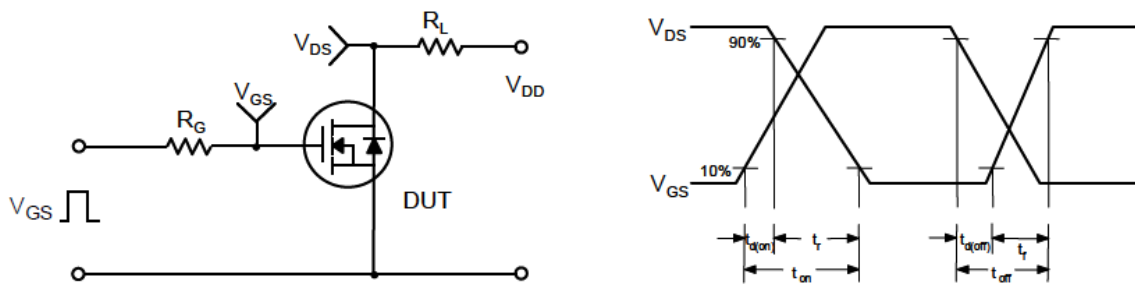


Figure 15. Gate Charge Characteristics

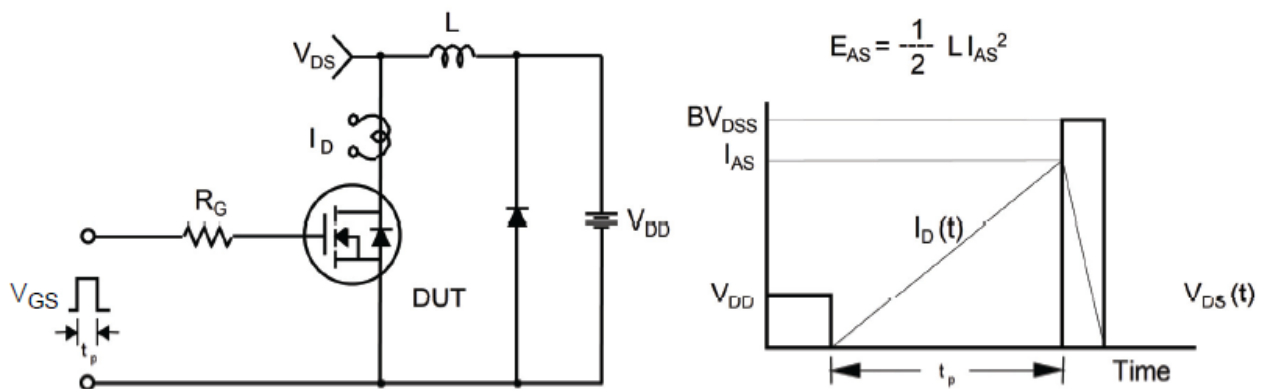
Gate Charge Test Circuit & Waveform

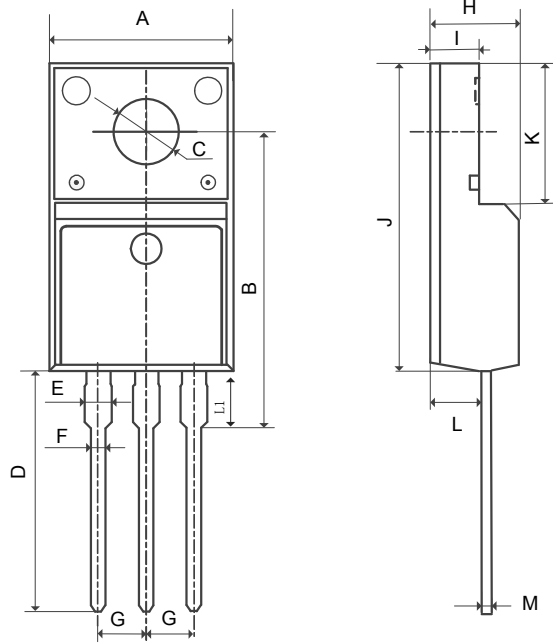


Switching Test Circuit & Waveforms

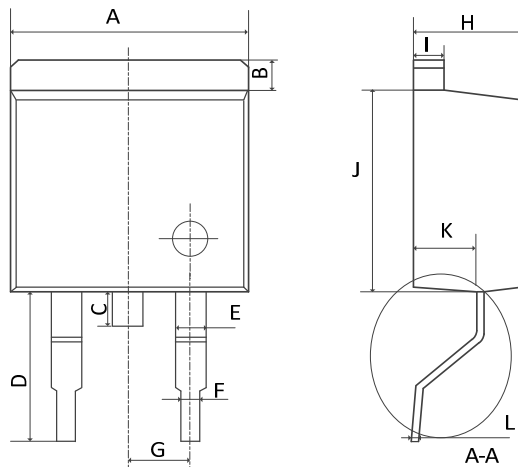


Unclamped Inductive Switching Test Circuit & Waveforms

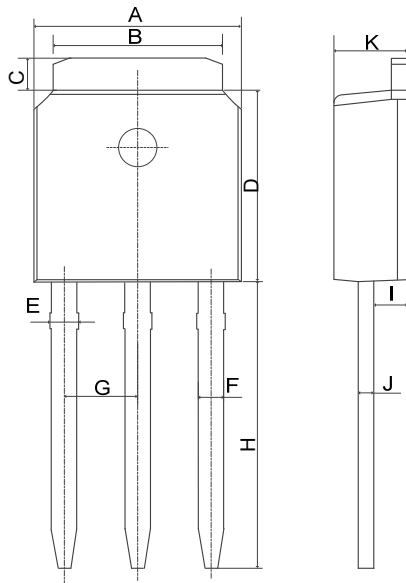


Mechanical Dimensions for TO-220F

COMMON DIMENSIONS

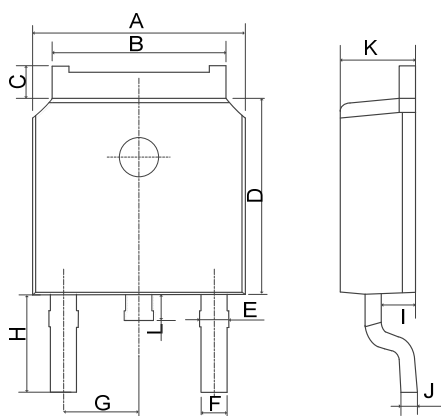
SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.10	16.10
C	3.03	3.38
D	12.64	13.28
E	1.18	1.58
F	0.70	0.95
G	2.54REF	
H	4.50	4.90
I	2.34	2.74
J	15.57	16.17
K	6.70REF	
L	2.56	2.96
M	0.40	0.65
L1	2.85	3.45

Mechanical Dimensions for TO-263

COMMON DIMENSIONS

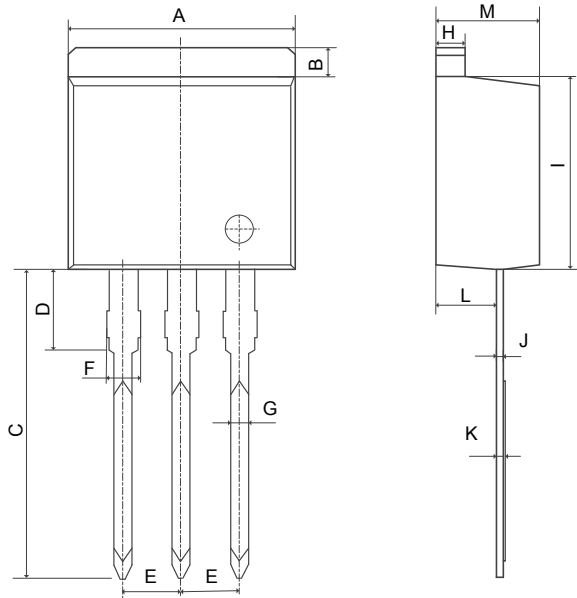
SYMBOL	MM	
	MIN	MAX
A	10.00	10.40
B	1.11	1.41
C	1.25	1.55
D	5.10	5.50
E	1.12	1.42
F	0.71	0.92
G	2.39	2.69
H	4.49	4.89
I	1.17	1.37
J	8.45	8.85
K	2.54	2.84
L	0.28	0.49

Mechanical Dimensions for TO-251

COMMON DIMENSIONS

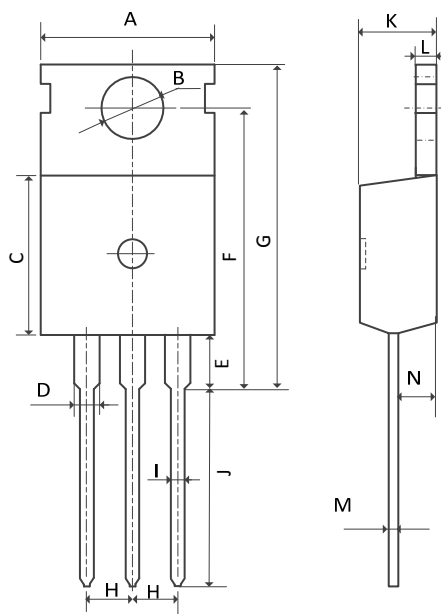
SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.46
C	0.88	1.28
D	5.90	6.22
E	0.68	1.10
F	0.68	0.91
G	2.29REF	
H	9.00	9.65
I	0.90	1.17
J	0.40	0.61
K	2.10	2.50

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

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

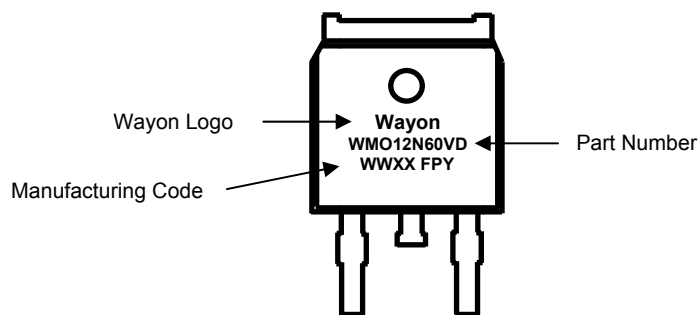
Mechanical Dimensions for TO-220

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

Ordering Information

Part	Package	Marking	Packing method
WML12N60VD	TO-220F	WML12N60VD	Tube
WMK12N60VD	TO-220	WMK12N60VD	Tube
WMN12N60VD	TO-262	WMN12N60VD	Tube
WMM12N60VD	TO-263	WMM12N60VD	Tape and Reel
WMO12N60VD	TO-252	WMO12N60VD	Tape and Reel
WMP12N60VD	TO-251	WMP12N60VD	Tube

Marking Information



Contact Information

CYG WAYON CIRCUIT PROTECTION CO., LTD.

No.1001, Shiwan(7) Road, Pudong District, Shanghai, P.R.China.201202

Tel: 86-21-50310888 Fax: 86-21-50757680 Email: market@way-on.com

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

For additional information, please contact your local Sales Representative.

CYG WAYON ® is registered trademarks of Wayon Corporation.

Disclaimer

CYG WAYON reserves the right to make changes without further notice to any Products herein to improve reliability, function, or design. The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. CYG WAYON does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Products or technical information described in this document.