

## 650V 0.17Ω Super Junction Power MOSFET

### Description

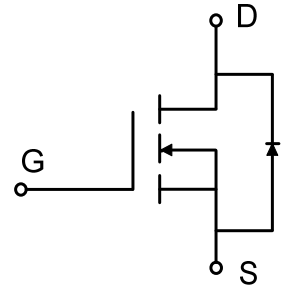
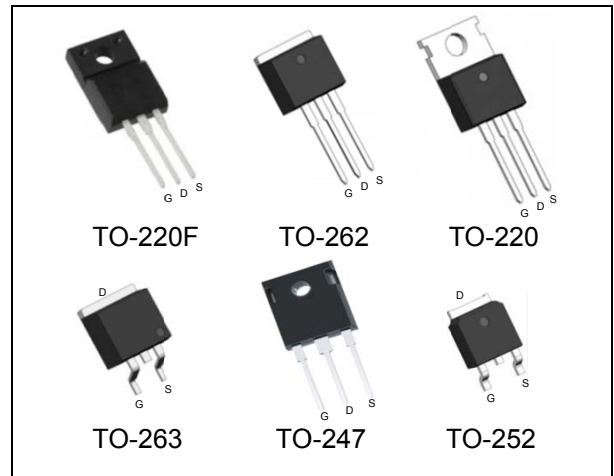
WMOS™ F2 is Wayon's 2nd generation super junction MOSFET family with fast body diode. F2 series provide all benefits of a fast switching SJ-MOSFET while offering an extremely fast body diode. WMOS™ F2 makes especially resonant switching applications more reliable.

### Features

- $V_{DS} = 700V @ T_{j,max}$
- Typ.  $R_{DS(on)} = 0.17\Omega$
- 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/WMJ/WMO	WML	Unit
Drain-source voltage	$V_{DSS}$	650		V
Continuous drain current <sup>1)</sup> ( $T_C = 25^\circ C$ )	$I_D$	18		A
( $T_C = 100^\circ C$ )		10.5		A
Pulsed drain current <sup>2)</sup>	$I_{DM}$	40		A
Gate-source voltage	$V_{GS}$	$\pm 30$		V
Avalanche energy, single pulse <sup>3)</sup>	$E_{AS}$	210		mJ
Avalanche energy, repetitive <sup>2)</sup>	$E_{AR}$	0.3		mJ
Avalanche current, repetitive <sup>2)</sup>	$I_{AR}$	2.5		A
Power dissipation ( $T_C = 25^\circ C$ )	$P_D$	135	31	W
- Derate above $25^\circ C$		1.08	0.25	W/ $^\circ C$
Operating and storage temperature range	$T_j, T_{stg}$	-55 to +150		$^\circ C$
Continuous diode forward current	$I_S$	18		A
Diode pulse current	$I_{S,pulse}$	40		A

### Thermal Characteristics

Parameter	Symbol	WMK/WMM/WMN/WMJ/WMO	WML	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.9	4	$^\circ C/W$
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 <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> =0.25 mA	650	-	-	V
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =0.25mA	2.5	3.5	4.5	V
Drain cut-off current	I <sub>DSS</sub>	V <sub>DS</sub> =650 V, V <sub>GS</sub> =0V, T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C	- -	- 80	10 -	μA
Gate leakage current, forward	I <sub>GSSF</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	-	-	200	nA
Gate leakage current, reverse	I <sub>GSSR</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	-	-	-200	nA
Drain-source on-state resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10 V, I <sub>D</sub> =5A T <sub>J</sub> = 25°C	- -	 0.17	 0.21	 Ω
Dynamic characteristics						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V, f = 1 MHz	-	1310	-	pF
Output capacitance	C <sub>OSS</sub>		-	48	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	1.5	-	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 300V, I <sub>D</sub> = 15A R <sub>G</sub> = 25Ω, V <sub>GS</sub> =10V	-	31	-	ns
Rise time	t <sub>r</sub>		-	37	-	
Turn-off delay time	t <sub>d(off)</sub>		-	97	-	
Fall time	t <sub>f</sub>		-	31	-	
Gate charge characteristics						
Gate to source charge	Q <sub>gs</sub>	V <sub>DD</sub> =480V, I <sub>D</sub> =15A, V <sub>GS</sub> =0 to 10V	-	6.8	-	nC
Gate to drain charge	Q <sub>gd</sub>		-	6.8	-	
Gate charge total	Q <sub>g</sub>		-	22.1	-	
Gate plateau voltage	V <sub>plateau</sub>		-	5.6	-	V
Reverse diode characteristics						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0 V, I <sub>F</sub> =6A	-	-	1.2	V
Reverse recovery time	t <sub>rr</sub>	V <sub>R</sub> =50V, I <sub>F</sub> =15A, dI <sub>F</sub> /dt=100A/μs	-	160	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	2.1	-	μC
Peak reverse recovery current	I <sub>rrm</sub>		-	21	-	A

## Notes:

- Limited by  $T_{j\max}$ . Maximum duty cycle  $D=0.5$ .
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS}=2.5\text{ A}$ ,  $V_{DD}=50\text{ V}$ ,  $R_G=25\Omega$ , starting  $T_j=25^\circ\text{C}$ .

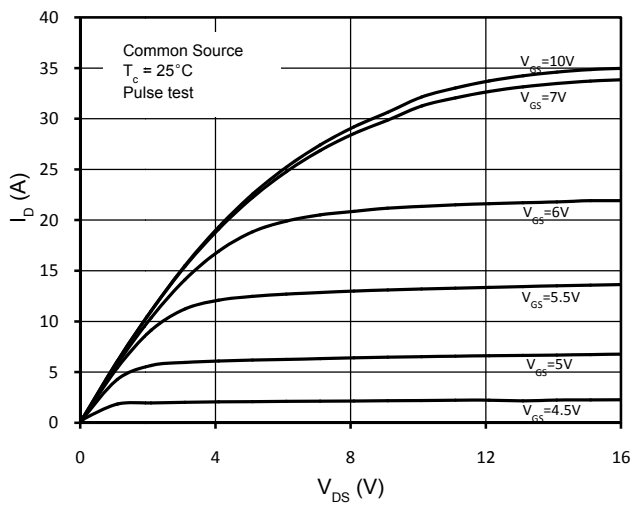


Figure 1. On-Region Characteristics

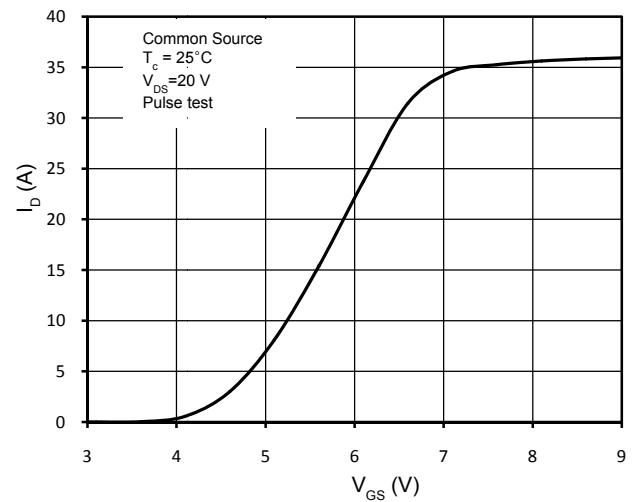


Figure 2. Transfer Characteristics

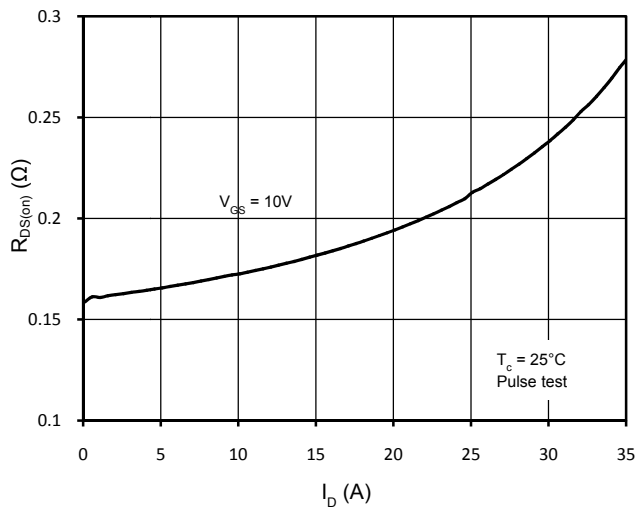


Figure 3. Static Drain-Source On Resistance

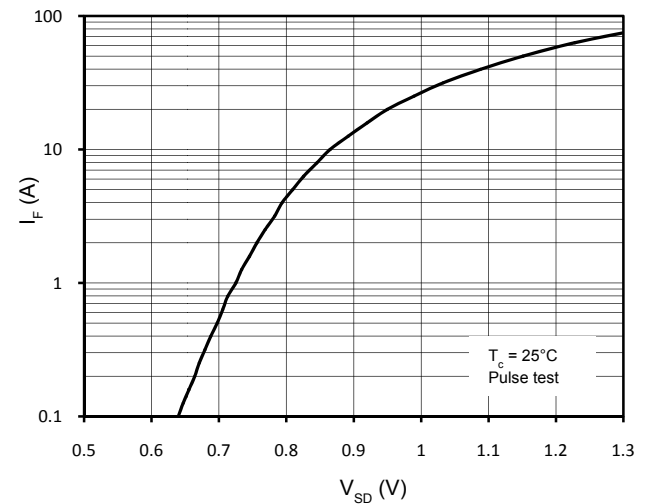
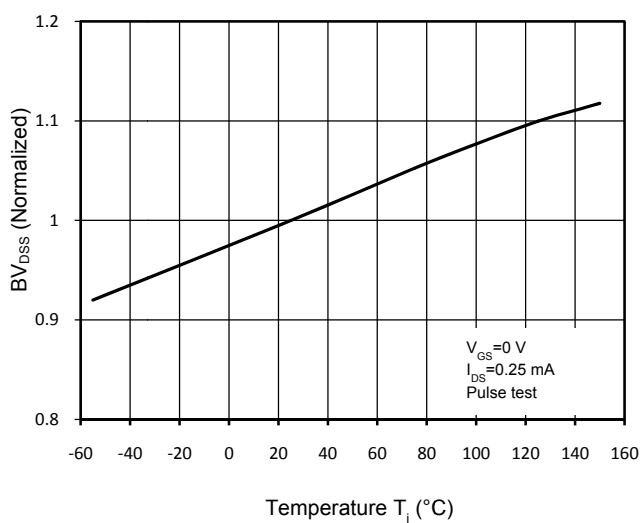
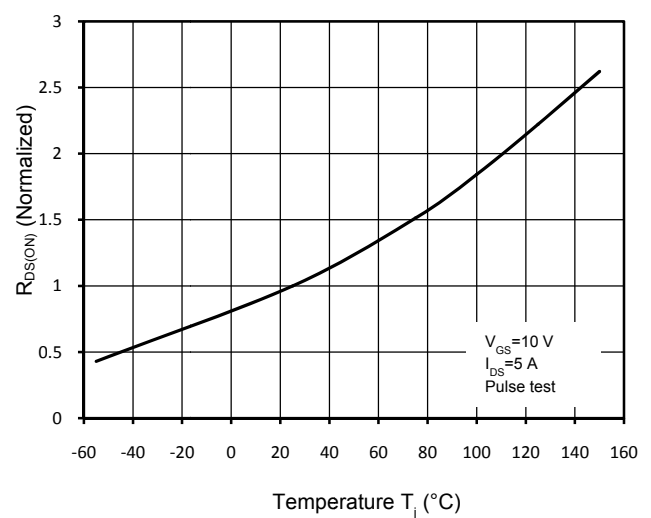


Figure 4. Body-Diode Forward Characteristics

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

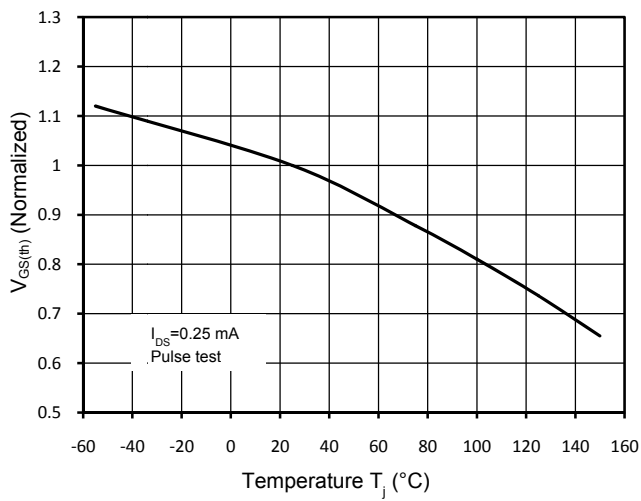


Figure 7. Threshold Voltage vs. Temperature

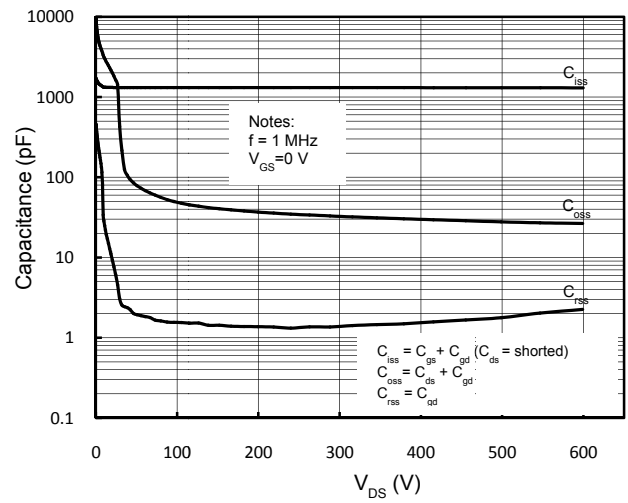


Figure 8. Capacitance Characteristics

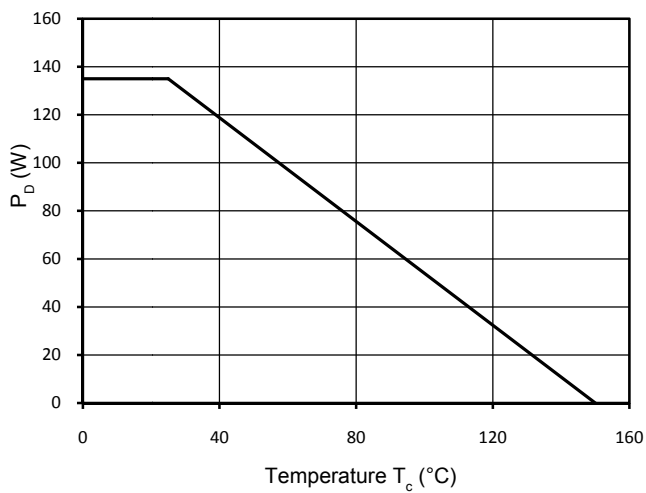


Figure 9. Power Dissipation

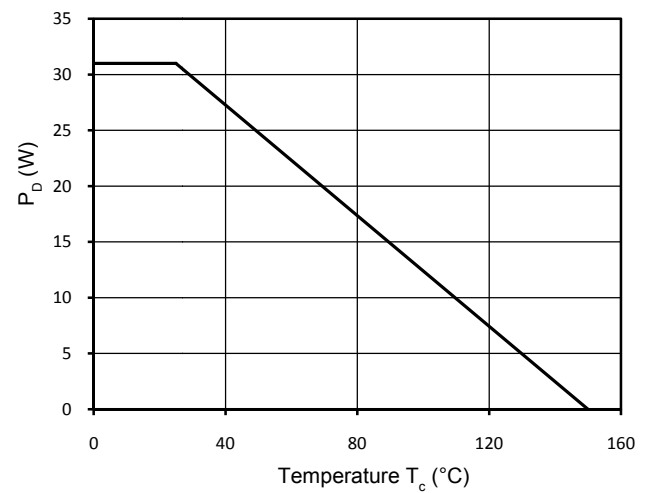


Figure 10. Power Dissipation (TO-220F)

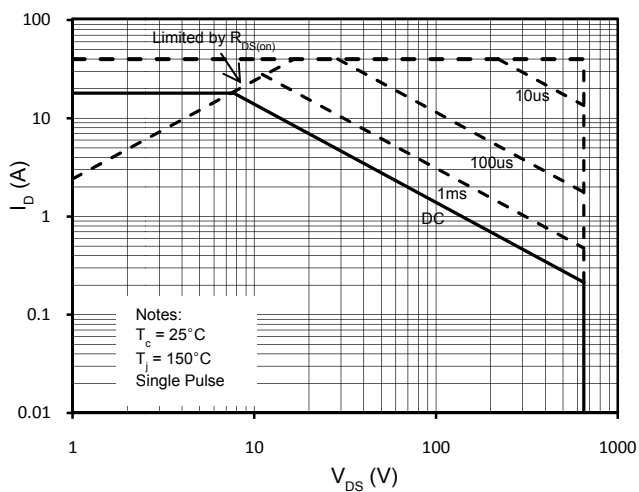


Figure 11. Maximum Safe Operating Area

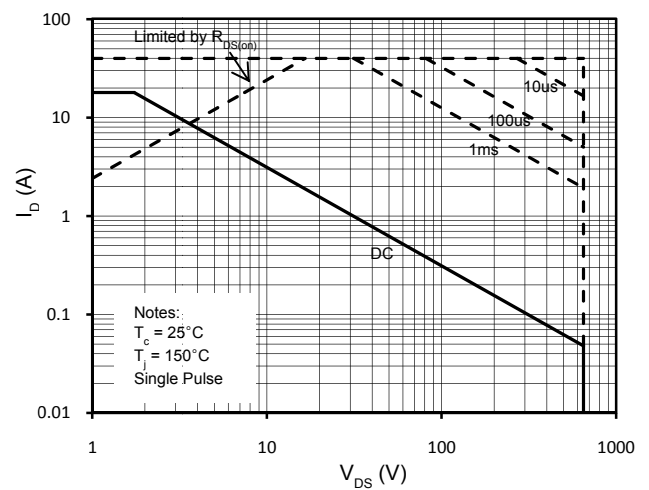


Figure 12. Maximum Safe Operating Area (TO-220F)

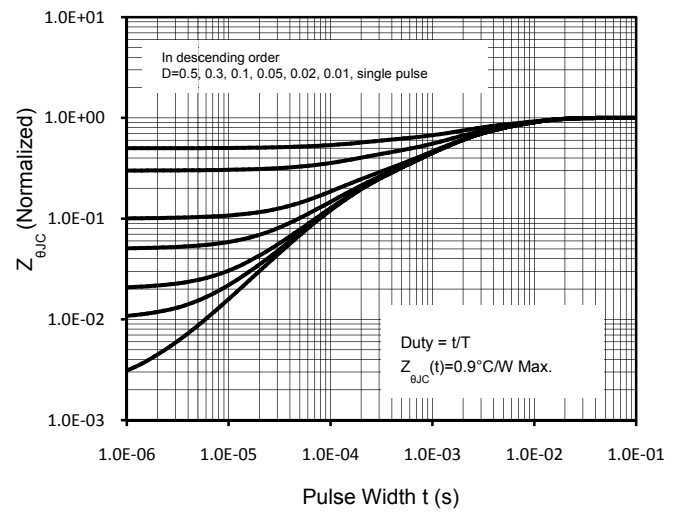
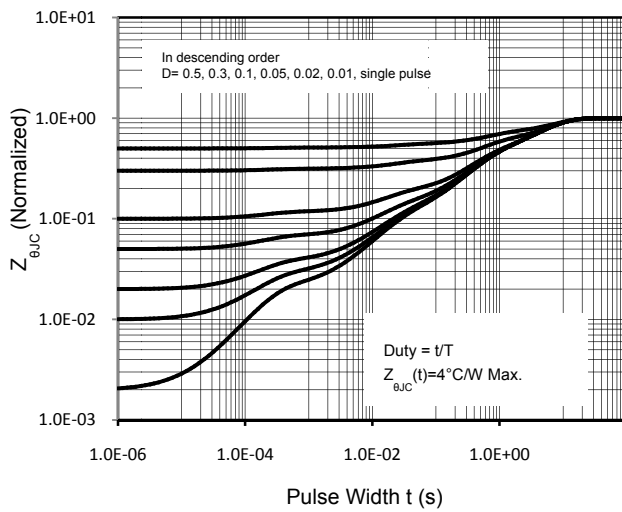


Figure 13. Transient Thermal Response Curve (TO-220F) Figure 14. Transient Thermal Response Curve

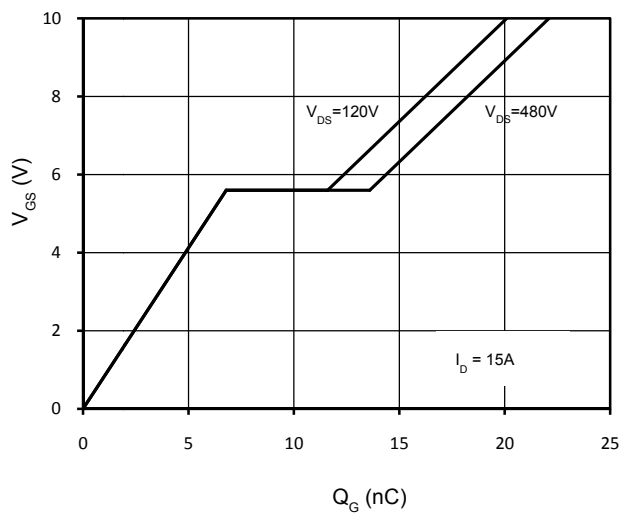
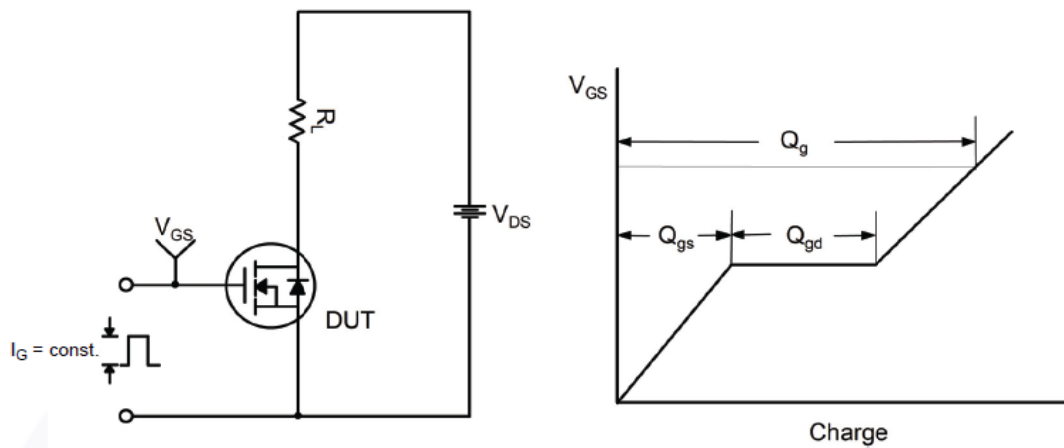
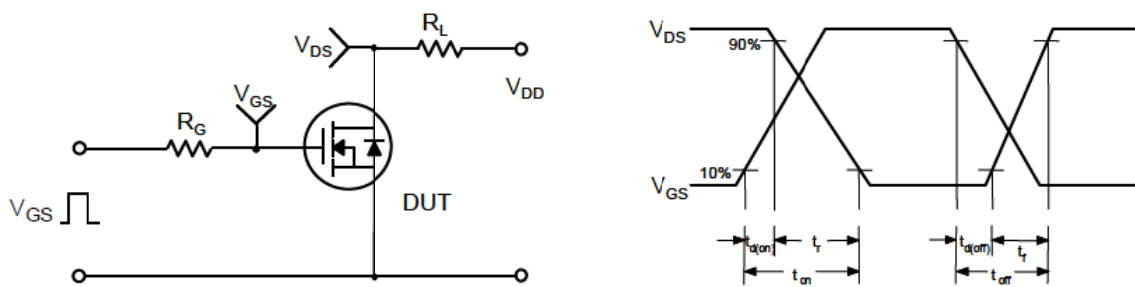


Figure 15. Gate Charge Characteristics

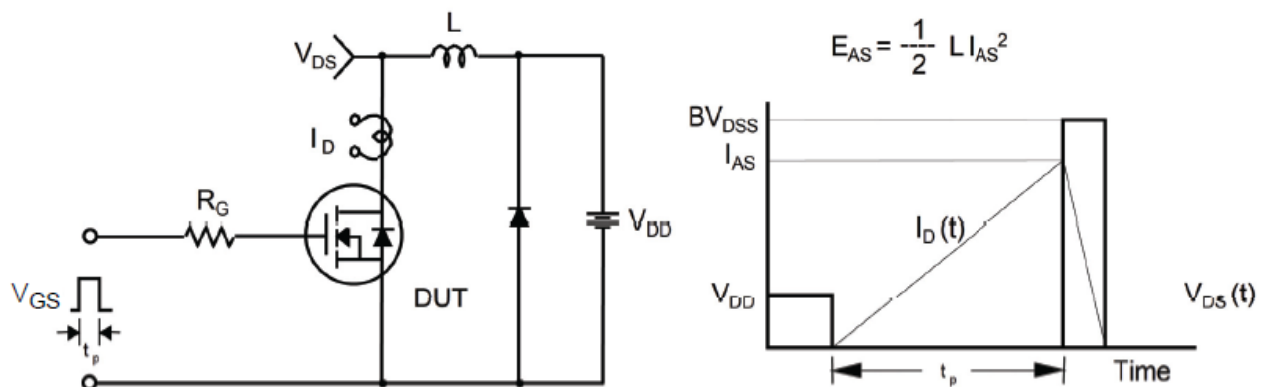
## Gate Charge Test Circuit &amp; Waveform



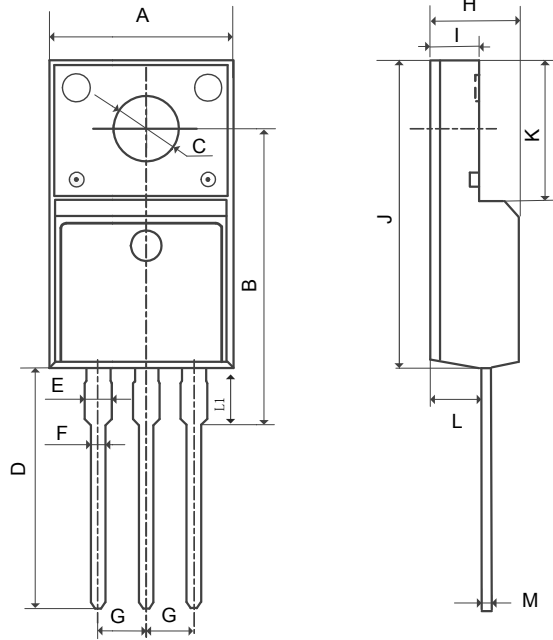
## Switching Test Circuit &amp; Waveforms



## Unclamped Inductive Switching Test Circuit &amp; Waveforms



## Mechanical Dimensions for TO-220F

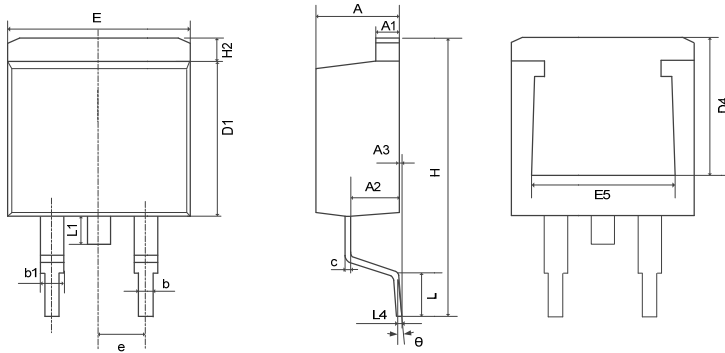


## COMMON DIMENSIONS

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

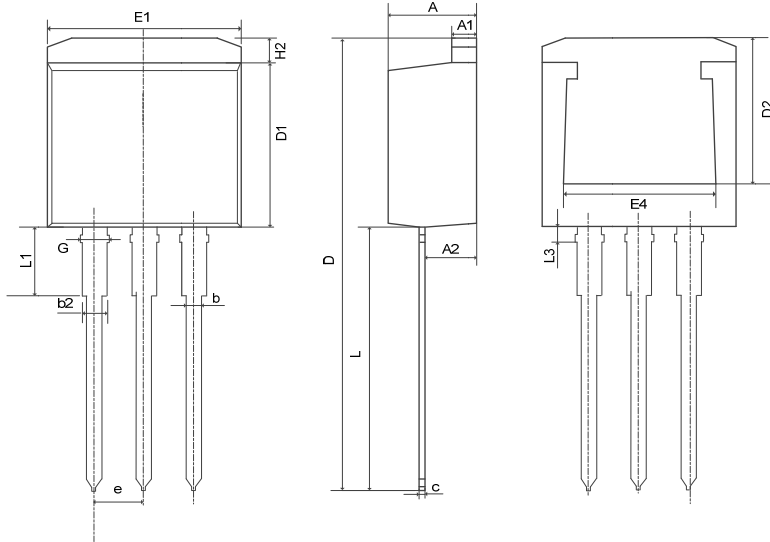


SYMBOL	MM	
	MIN	MAX
A	4.37	4.89
A1	1.17	1.42
A2	2.49	2.89
b	0.70	0.96
b1	1.17	1.47
c	0.30	0.53
D1	8.45	8.90
D4	6.60	—
E	9.86	10.40
E5	7.06	—
e	2.54BSC	
H	14.70	15.50
H2	1.07	1.47
L	2.00	2.70
L1	1.40	1.70
L4	0.25BSC	
θ	0°	9°



## Mechanical Dimensions for TO-262

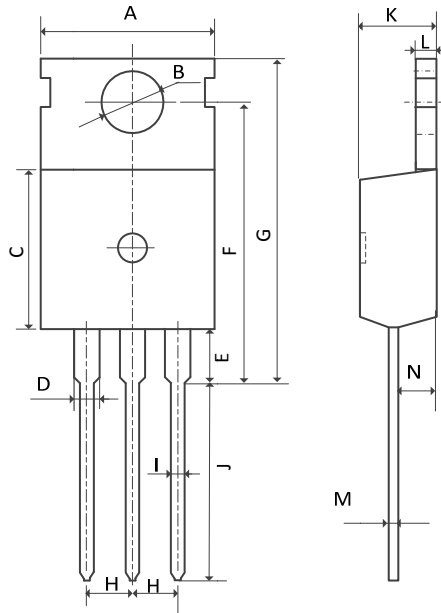
## COMMON DIMENSIONS



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

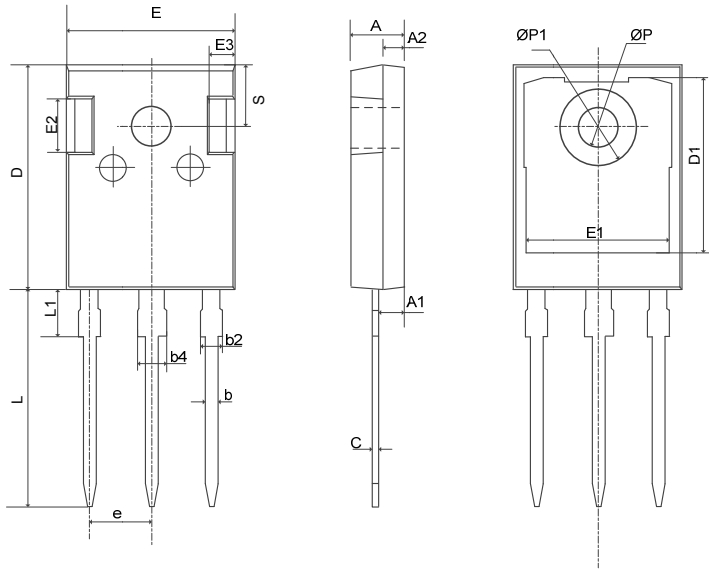
## COMMON DIMENSIONS



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

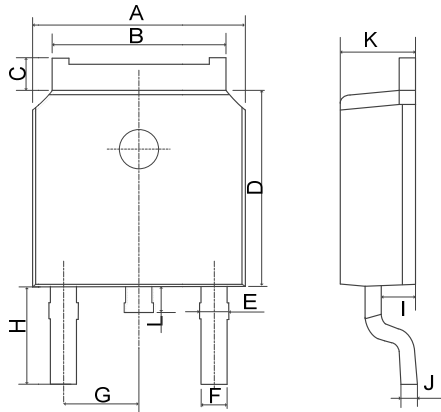
## Mechanical Dimensions for TO-247

## 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	

# Mechanical Dimensions for TO-252



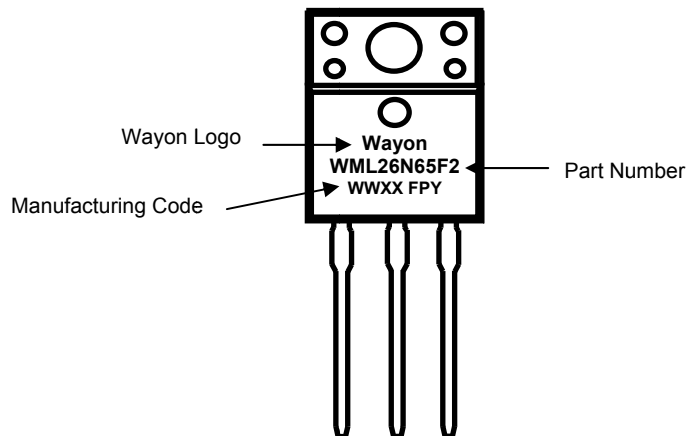
## COMMON DIMENSIONS

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
WML26N65F2	TO-220F	WML26N65F2	Tube
WMK26N65F2	TO-220	WMK26N65F2	Tube
WMN26N65F2	TO-262	WMN26N65F2	Tube
WMM26N65F2	TO-263	WMM26N65F2	Tape and Reel
WMO26N65F2	TO-252	WMO26N65F2	Tape and Reel
WMJ26N65F2	TO-247	WMJ26N65F2	Tube

## Marking Information




## Contact Information

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>

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