

N-channel 200V 37mΩ Power MOSFET

Description

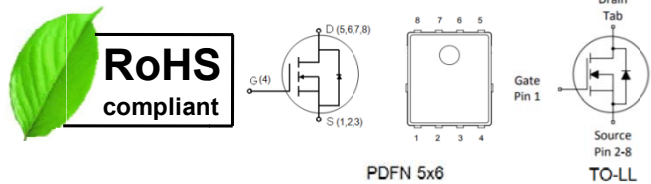
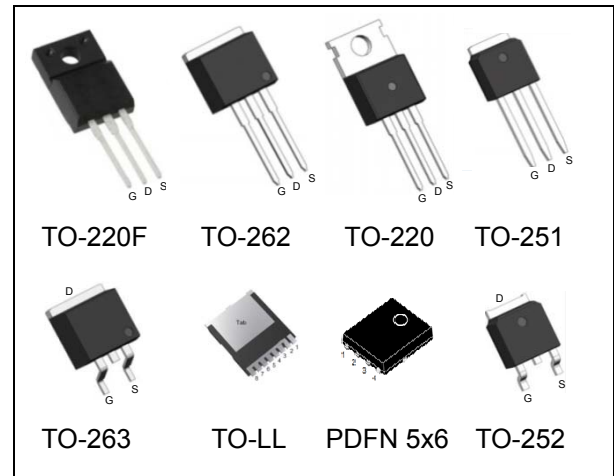
WMOSTM JN is suitable for applications which require superior power density and outstanding efficiency.

Features

- Gate charge minimized
- Typ. $R_{DS(on)} = 37 \text{ m}\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

Applications

Switching applications



Absolute Maximum Ratings

Parameter	Symbol	WMx40N20JN	WML40N20JN	Unit
Drain-source voltage	V_{DSS}	200		V
Continuous drain current ¹⁾ ($T_C = 25^\circ\text{C}$)	I_D	35		A
($T_C = 100^\circ\text{C}$)		21		A
Pulsed drain current ²⁾	I_{DM}	110		A
Gate-source voltage	V_{GS}	± 20		V
Avalanche energy, single pulse ³⁾	E_{AS}	175		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	0.2		mJ
Avalanche current, repetitive ²⁾	I_{AR}	2.5		A
Power dissipation ($T_C = 25^\circ\text{C}$)	P_D	89	31	W
- Derate above 25°C		0.72	0.25	W/ $^\circ\text{C}$
Operating and storage temperature range	$T_{j, T_{stg}}$	-55 to +150		$^\circ\text{C}$
Continuous diode forward current	I_S	35		A
Diode pulse current	$I_{S,pulse}$	110		A

Thermal Characteristics

Parameter	Symbol	WMx40N20JN	WML40N20JN	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	1.4	4	$^\circ\text{C/W}$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	80	$^\circ\text{C/W}$

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 =1 mA	200	-	-	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} =200 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	-	-	500	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10 V, I _D =10A T _J = 25°C	- -	 37	 46	 mΩ
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 100V, V _{GS} = 0V, f = 1 MHz	-	1165	-	pF
Output capacitance	C _{oss}		-	43	-	
Reverse transfer capacitance	C _{rss}		-	4.1	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 100V, I _D = 20A R _G = 4.7Ω, V _{GS} =10V	-	7	-	ns
Rise time	t _r		-	7	-	
Turn-off delay time	t _{d(off)}		-	27	-	
Fall time	t _f		-	4	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =160V, I _D =20A, V _{GS} =0 to 10V	-	7.7	-	nC
Gate to drain charge	Q _{gd}		-	4.8	-	
Gate charge total	Q _g		-	20.5	-	
Gate plateau voltage	V _{plateau}		-	5.7	-	V
Reverse diode characteristics						
Diode forward voltage	V _{SD}	V _{GS} =0 V, I _F =10A	-	-	1.2	V
Reverse recovery time	t _{rr}	V _R =50V, I _F =20A, dI _F /dt=100A/μs	-	141	-	ns
Reverse recovery charge	Q _{rr}		-	0.5	-	μC
Peak reverse recovery current	I _{rrm}		-	8	-	A

Notes:

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

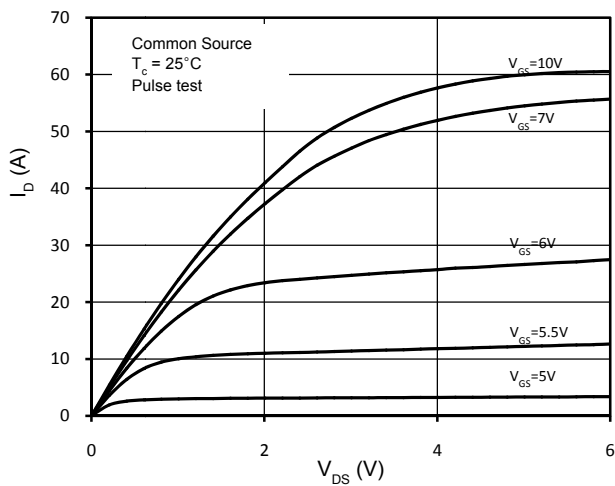


Figure 1. On-Region Characteristics

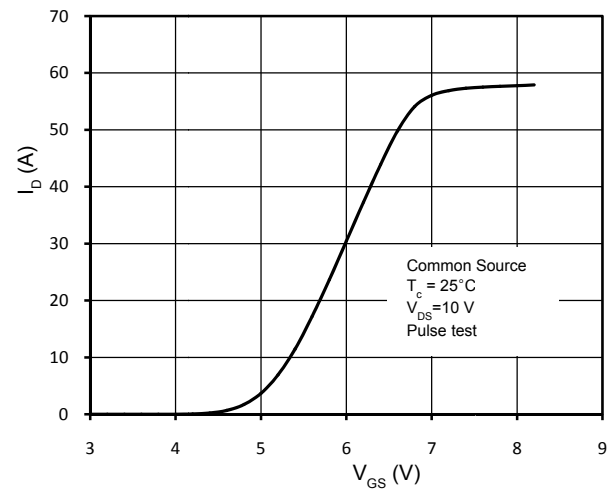


Figure 2. Transfer Characteristics

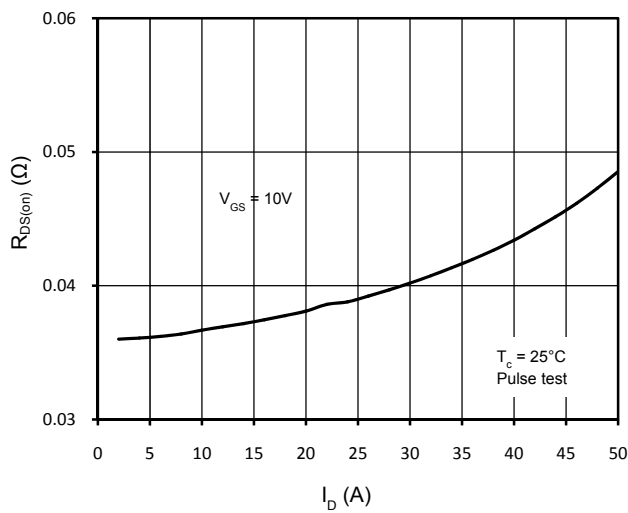


Figure 3. Static Drain-Source On Resistance

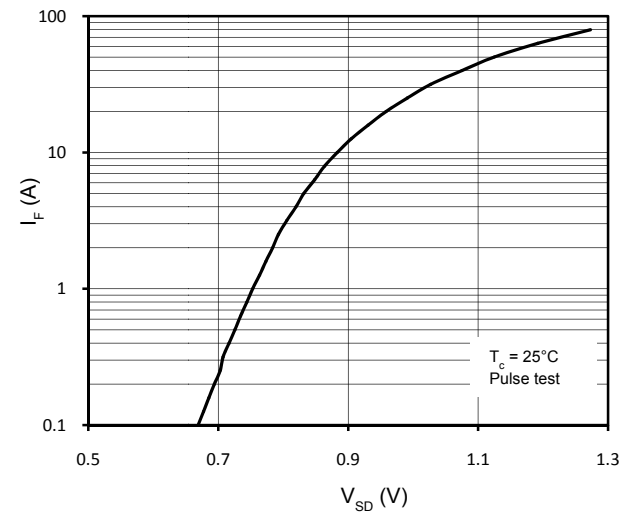
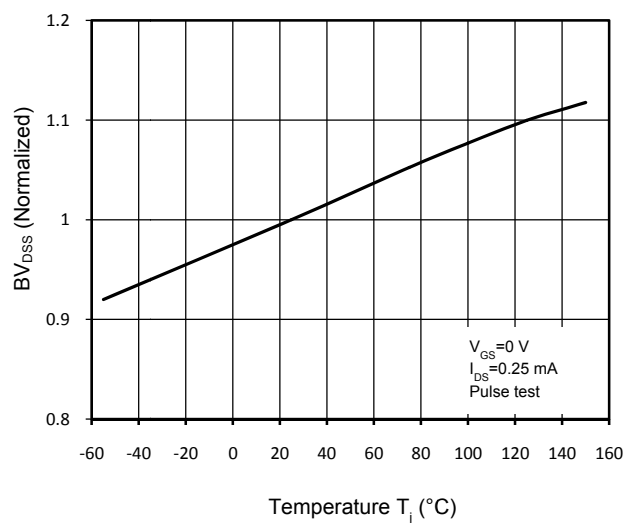
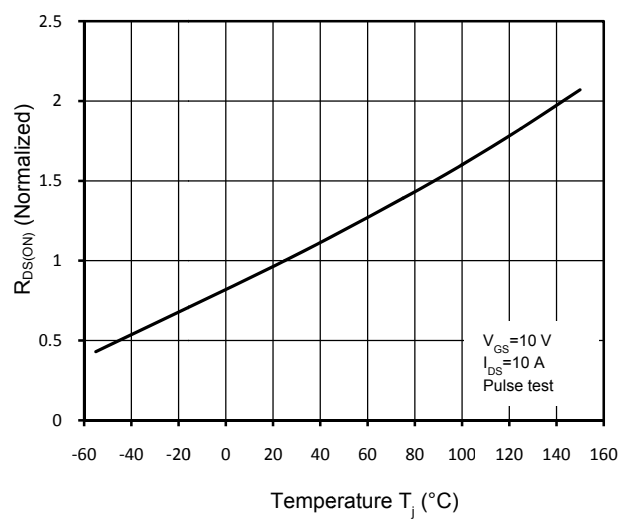


Figure 4. Body-Diode Forward Characteristics

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

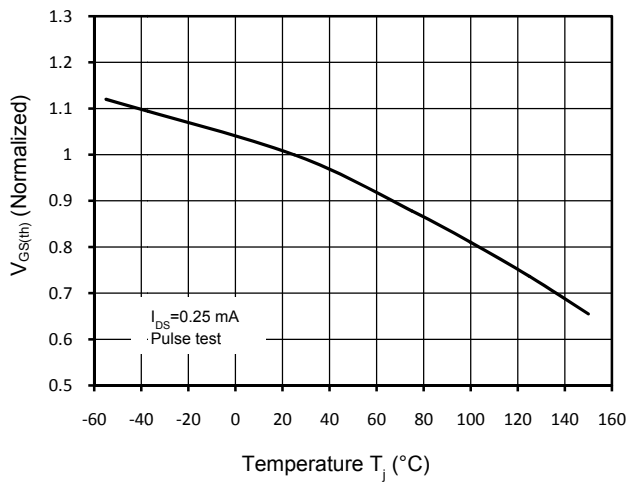


Figure 7. Threshold Voltage vs. Temperature

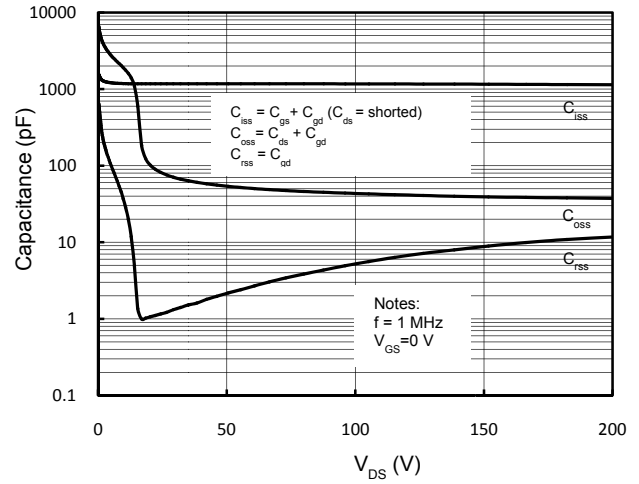


Figure 8. Capacitance Characteristics

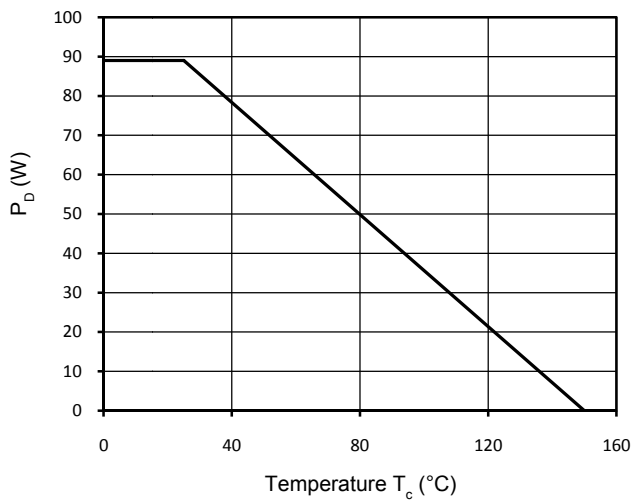


Figure 9. Power Dissipation

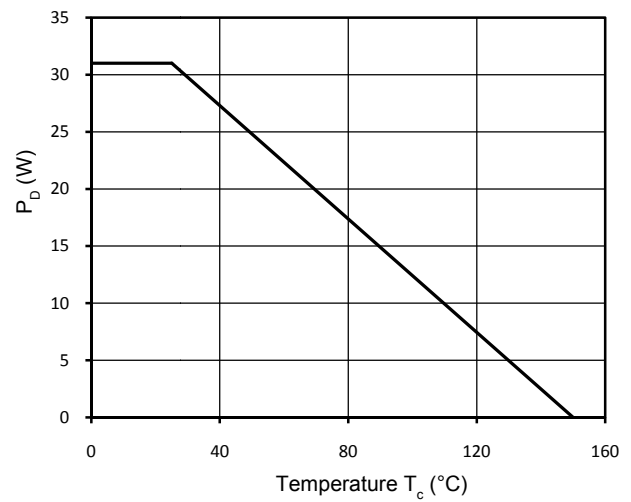


Figure 10. Power Dissipation (TO-220F)

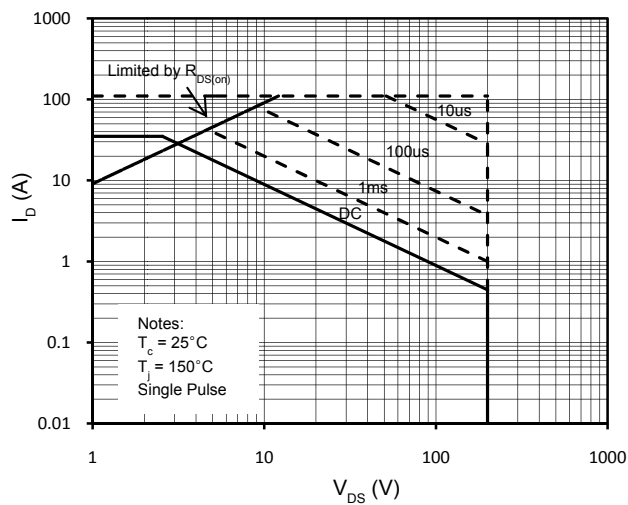


Figure 11. Maximum Safe Operating Area

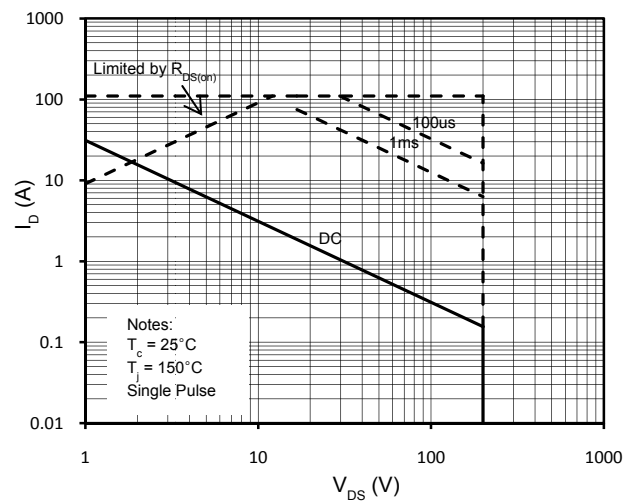


Figure 12. Maximum Safe Operating Area (TO-220F)

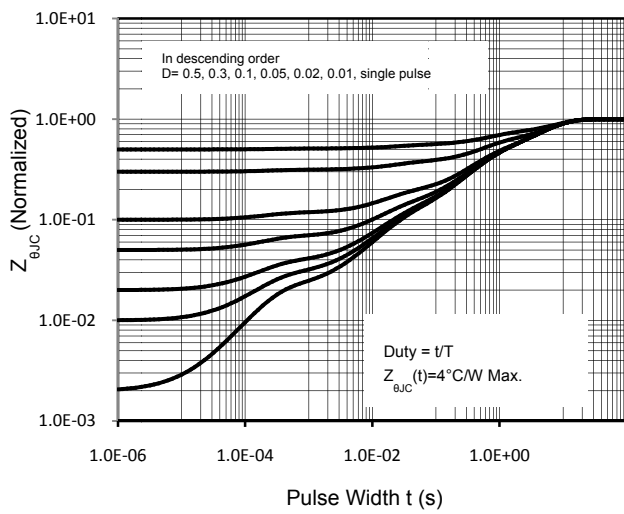


Figure 13. Transient Thermal Response Curve (TO-220F)

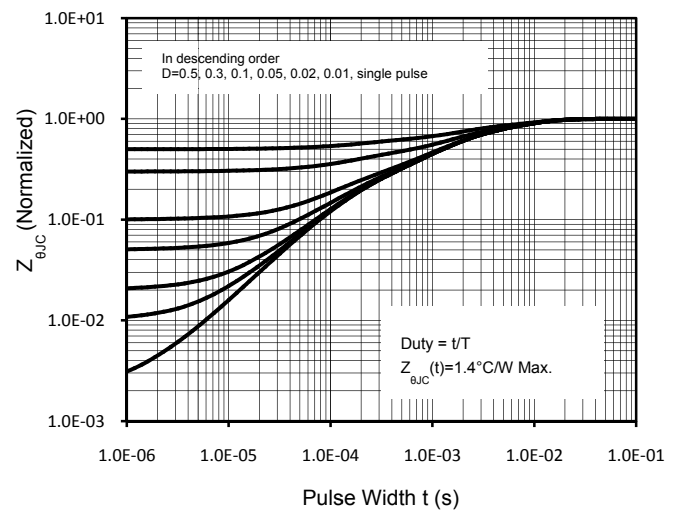


Figure 14. Transient Thermal Response Curve

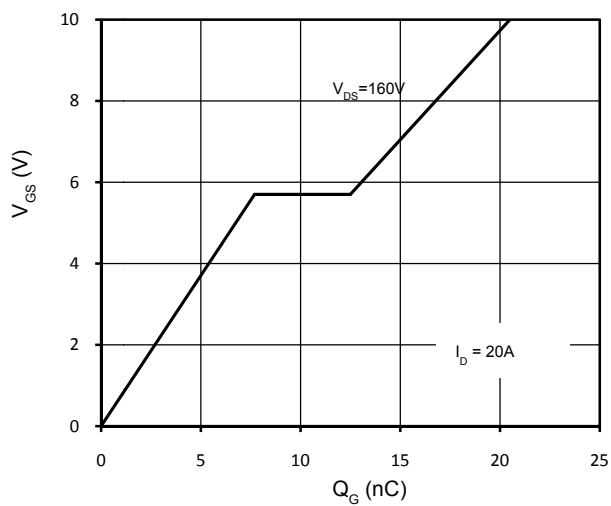
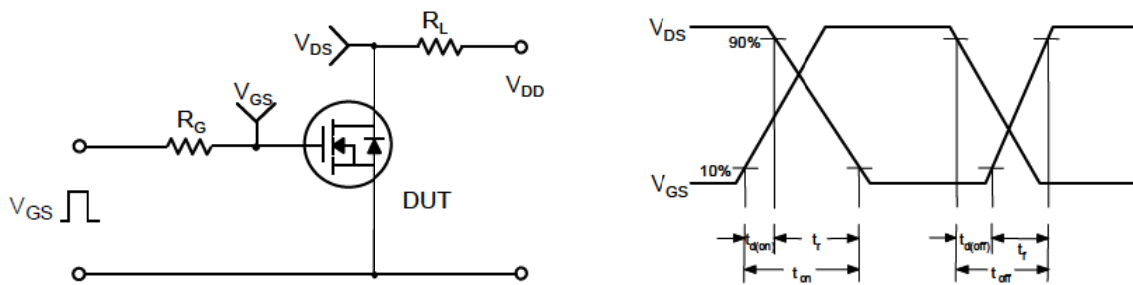


Figure 15. Gate Charge Characteristics

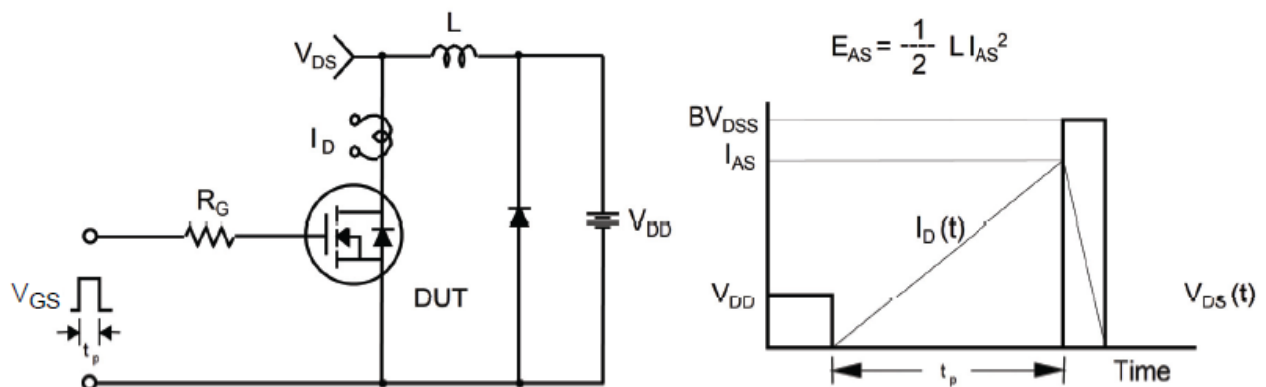
Gate Charge Test Circuit & Waveform



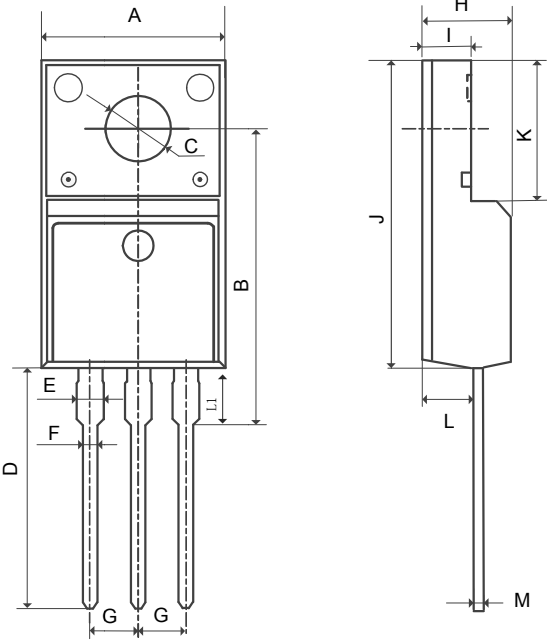
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO-220F

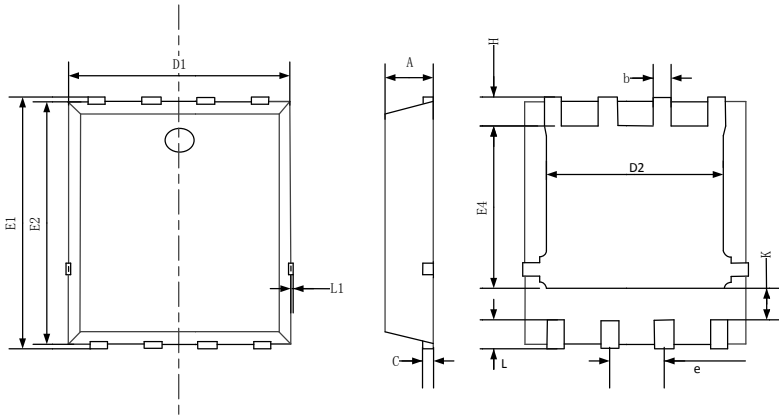


COMMON DIMENSIONS

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 PDFN 5x6

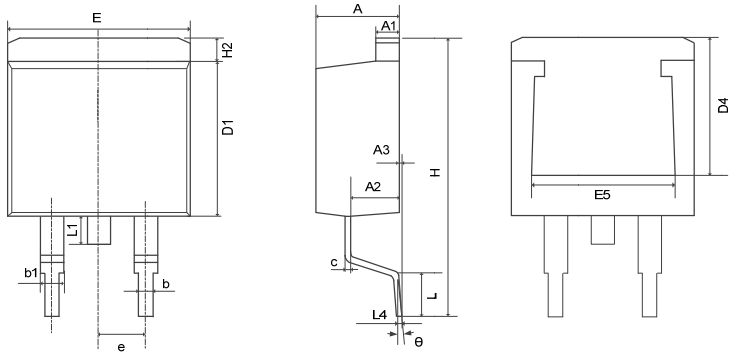
COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	1.0	1.2
b	0.3	0.5
C	0.15	0.35
D1	5.0	5.4
D2	3.8	4.3
E1	5.95	6.35
E2	5.66	6.06
E4	3.52	3.92
e	1.17	1.37
H	0.4	0.6
K	1.15	1.6
L	0.3	0.7
L1		0.12

Mechanical Dimensions for TO-263

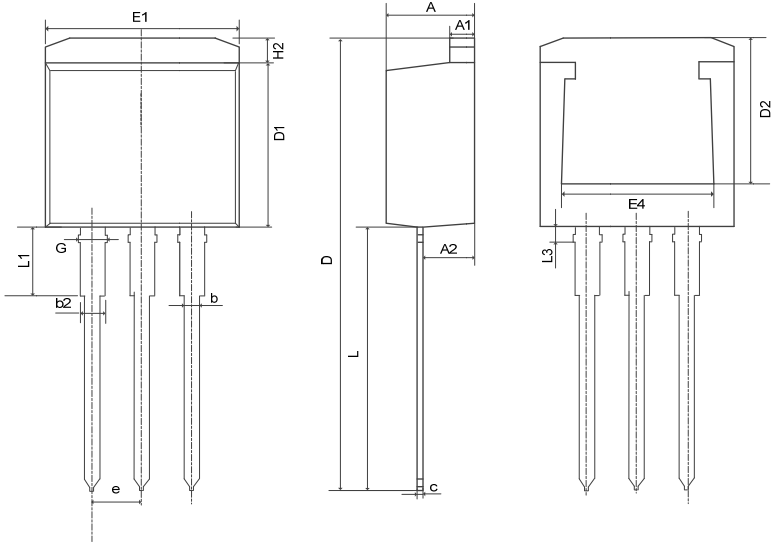
COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	4.37	4.89
A1	1.17	1.42
A2	2.19	2.89
b	0.70	0.96
b1	1.17	1.47
c	0.30	0.60
D1	8.45	9.35
D4	6.60	—
E	9.80	10.40
E5	7.06	—
e	2.54BSC	
H	14.70	16.00
H2	1.07	1.47
L	2.00	2.70
L1	1.15	1.75
L4	0.25BSC	
θ	0°	9°

Mechanical Dimensions for TO-262

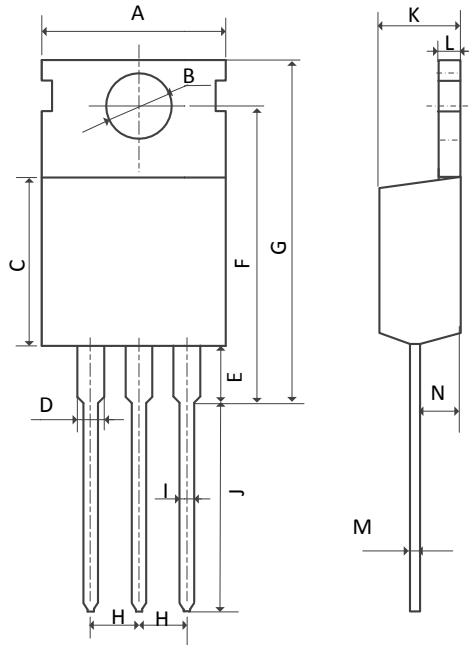
COMMON DIMENSIONS



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

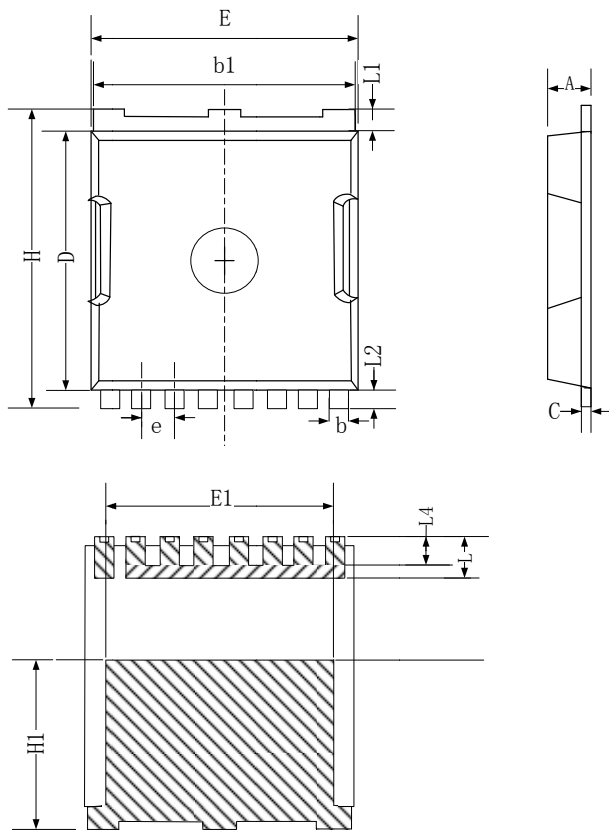
Mechanical Dimensions for TO-220

COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.90
G	19.60MAX	
H	2.54REF	
I	0.70	0.95
J	9.25	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60

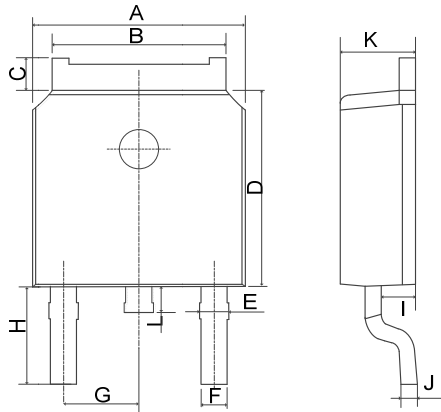
Mechanical Dimensions for TO-LL



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	2.15	2.45
b	0.7	0.95
b1	9.6	9.95
C	0.4	0.6
D	10.1	10.6
E	9.6	10.1
E1	7.9	8.5
e	1.20BSC	
H	11.38	11.88
H1	6.65	7.2
L	1.4	2
L1	0.5	0.9
L2	0.48	0.72
L4	1	1.3

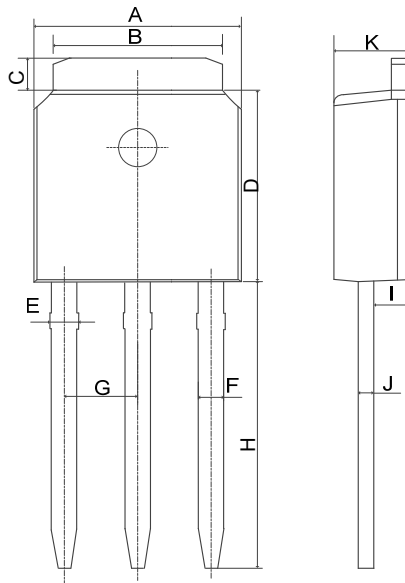
Mechanical Dimensions for TO-252



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-251



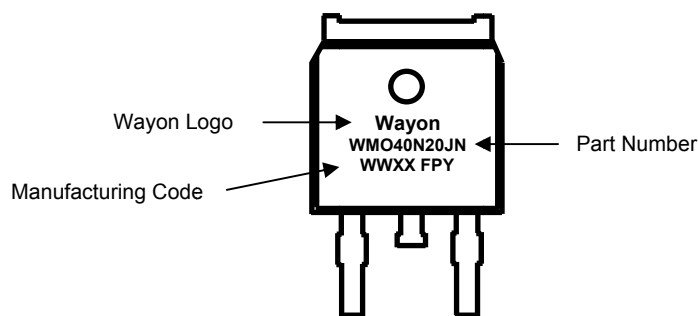
COMMON DIMENSIONS

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	9.00	9.65
I	0.85	1.17
J	0.40	0.61
K	2.10	2.50

Ordering Information

Part	Package	Marking	Packing method
WML40N20JN	TO-220F	WML40N20JN	Tube
WMK40N20JN	TO-220	WMK40N20JN	Tube
WMN40N20JN	TO-262	WMN40N20JN	Tube
WMM40N20JN	TO-263	WMM40N20JN	Tape and Reel
WMO40N20JN	TO-252	WMO40N20JN	Tape and Reel
WMLL40N20JN	TO-LL	WMLL40N20JN	Tape and Reel
WMB40N20JN	PDFN 5x6	WMB40N20JN	Tape and Reel
WMP40N20JN	TO-251	WMP40N20JN	Tube

Marking Information



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