UMW 10N65F

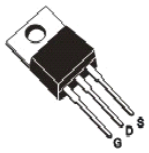
650V N-Channel MOSFET

1.Features

- $V_{DS\ (V)}$=650V
- I_D=10A
- $R_{DS(ON)}$=0.9Ω

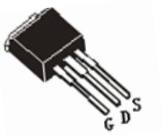
2.Pinning information

Pin	Symbol	Description
1	G	GATE
2	D	DRAIN
3	S	SOURCE



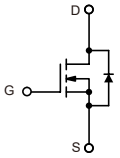
TO-220

TO-220F



TO-262

TO-263



N-Channel

3.Absolute Maximum Ratings T_C= 25°C

Parameter		Symbol	Rating	Units
Drain-source Voltage		V_{DS}	650	V
gate-source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	10	A
Continuous Drain Current	T_C=100°C	I_D	6	A
Drain Current －Pulsed ①		I_{DM}	40	A
Power Dissipation		P_D	50	W
Junction Temperature		T_J	150	°C
Storage Temperature		T_{STG}	-55 to 150	°C
Single Pulse Avalanche Energy ②		E_{AS}	500	mJ

4.Thermal resistance rating

Parameter	Symbol	MAX			Units
		TO-220	TO-220F	TO-262/263	
Thermal Resistance Junction-case	R_{thJC}	0.8	2.5	1	°C/W
Thermal Resistance Junction-ambient	R_{thJA}	62.5	62.5	62.5	°C/W

5.Electrical Characteristic (T_C=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	650			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		0.65		V/°C
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2		4	V
Drain-source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V, T_J=25°C			1	μA
		V_{DS}=480V, V_{GS}=0V, T_J=125°C			10	μA
Forward Transconductance	g_{fs}	V_{GS}=40V, I_D=5A ③		8		S
Gate-body Leakage Current (V_{DS}=0)	I_{GSS}	V_{GS}=±20V			±100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5A ③		0.75	0.9	Ω
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz		1570		pF
Turn -Off Delay Time	$t_{D(off)}$	V_{DD}=300V,I_D=10A,R_G=25Ω ③		130		ns
Total Gate Charge	Q_g	I_D=10A,V_{DS}=480V,V_{GS}=10V③		45		nC
Gate-to-Source Charge	Q_{gs}			7.5		nC
Gate-to-Drain Charge	Q_{gd}			18.5		nC
Continuous Diode Forward Current	I_S				10	A
Diode Forward Voltage	V_{SD}	T_J=25°C, I_S=10A, V_{GS}=0V ③			1.4	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=10A		420		ns
Reverse Recovery Charge	Q_{rr}	di/dt=100A/μs ③		4.2		uC

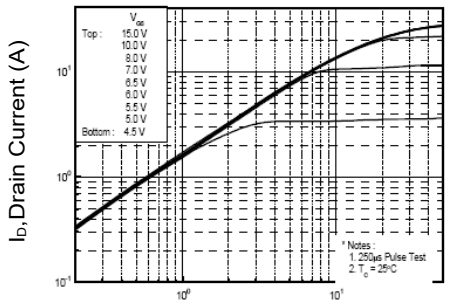
Notes:

① Repetitive rating: Pulse width limited by maximum junction temperature.

② Starting T_J=25°C, V_{DD} =50V, L=10mH, R_G =25Ω, I_{AS}=10A.

③ Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

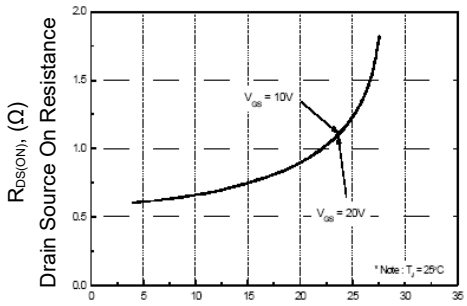
6.1Typical characteristic



I_D,Drain Current (A)

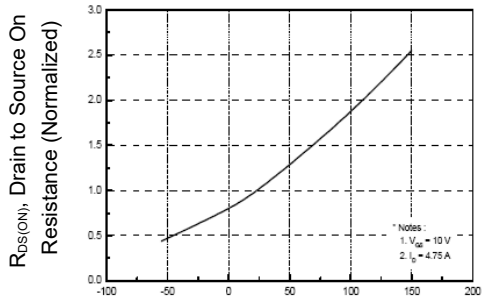
V_{DS},Drain to Source Voltage (V)

Figure 1: Typical Output Characteristics, Tc=25°C



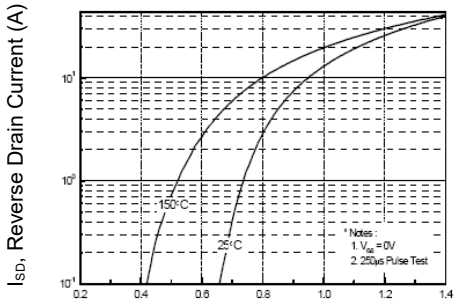
I_D,Drain Current (A)

Figure 2: Typical Output Characteristics, Tc=150°C



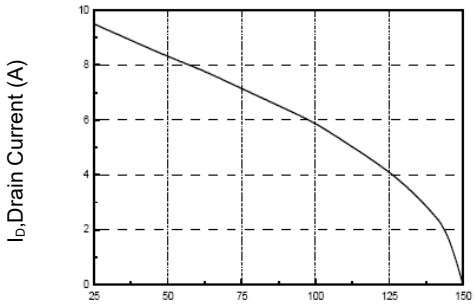
T_J,Junction Temperature (°C)

Figure 3: Normalized On-Resistance Vs.Temperature



V_{SD},Source to Drain Voltage (V)

Figure 4: Typical Source-Drain Diode Forward Voltage



T_C,Case Temperature (°C)

Figure 5: Maximum Drain Current Vs.Case Temperature

6.2Typical characteristic

10N65(TO-220)

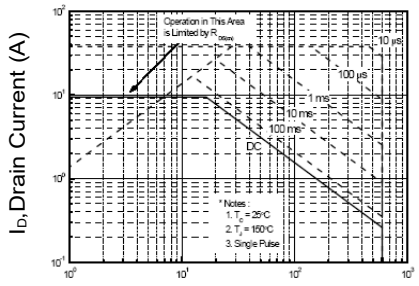


Figure 7: Maximum Safe Operating Area

10N65(TO-220F)

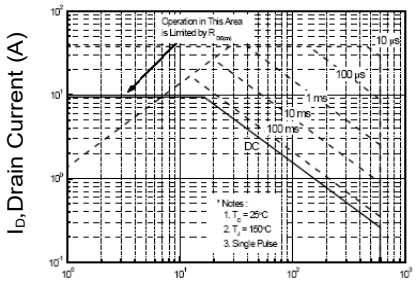


Figure 8: Maximum Safe Operating Area

10N65(TO-262&263)

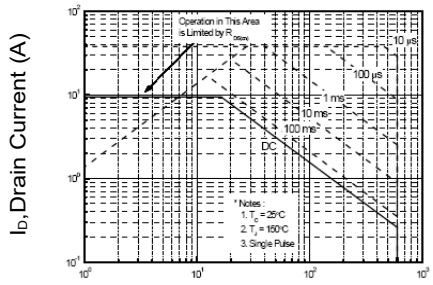
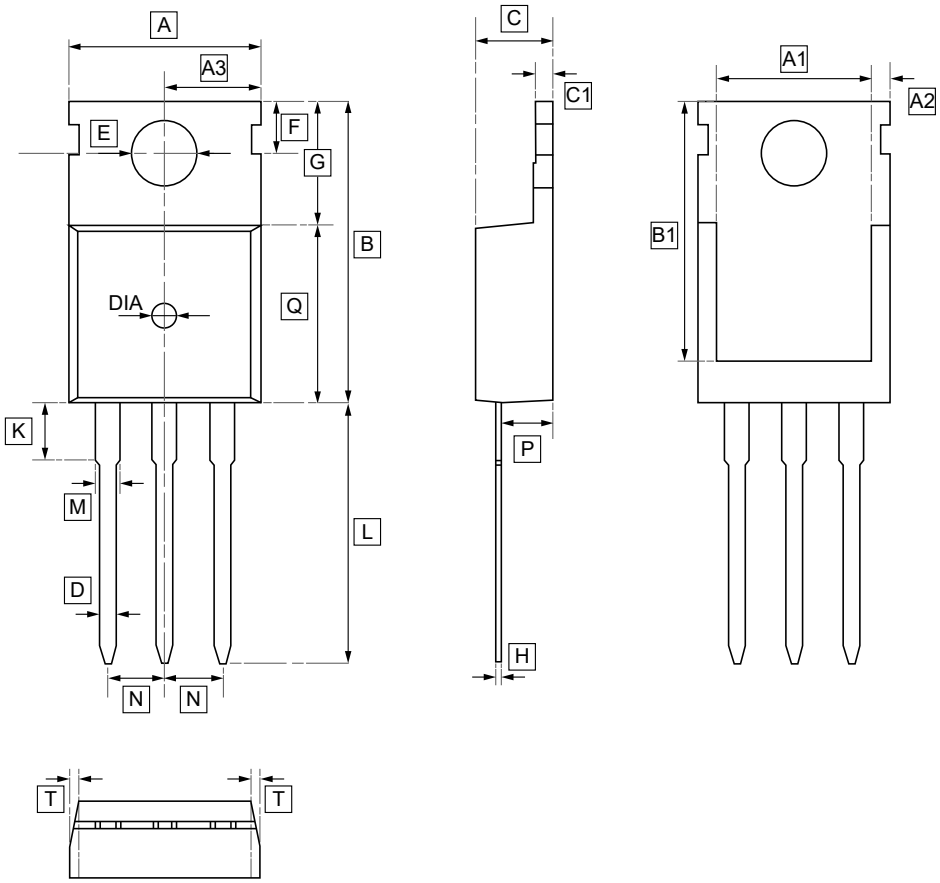


Figure 9: Maximum Safe Operating Area

7.1TO-220 Package Outline Dimensions

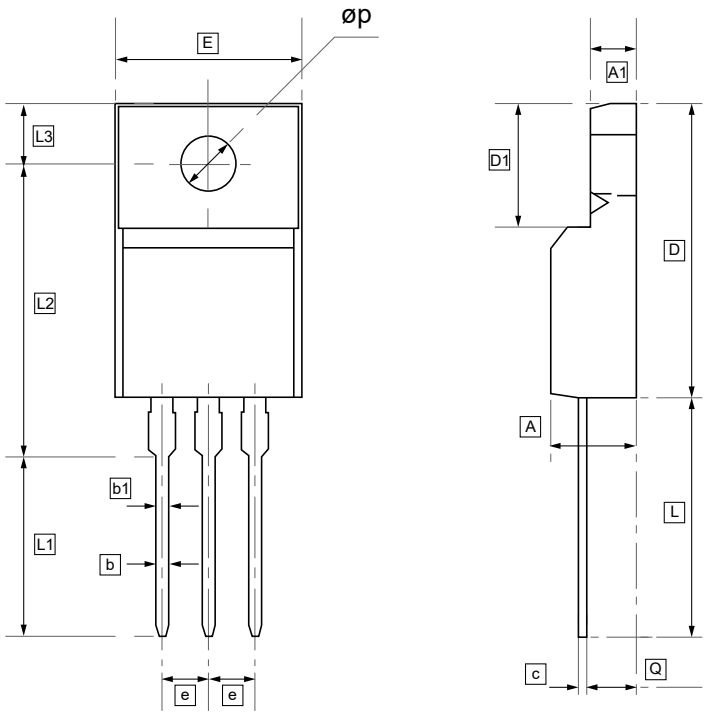


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	C	C1	D	E	F	G
Min	9.7	8.44	1.05	4.8	15.4	12.9	4.28	1.1	0.6	3.4	2.65	5.2
Max	10.3	8.84	1.25	5.2	16.2	13.5	4.68	1.5	1.0	3.8	3.25	5.8

Symbol	H	K	L	L1	M	N	P	Q	T	DIA
Min	0.4	2.9	12.8	2.7	1.15	2.49	2.1	8.7	W:0.35	⊙1.5 (deep 0.2)
Max	0.6	3.3	13.6	3.3	1.35	2.59	2.7	9.3		

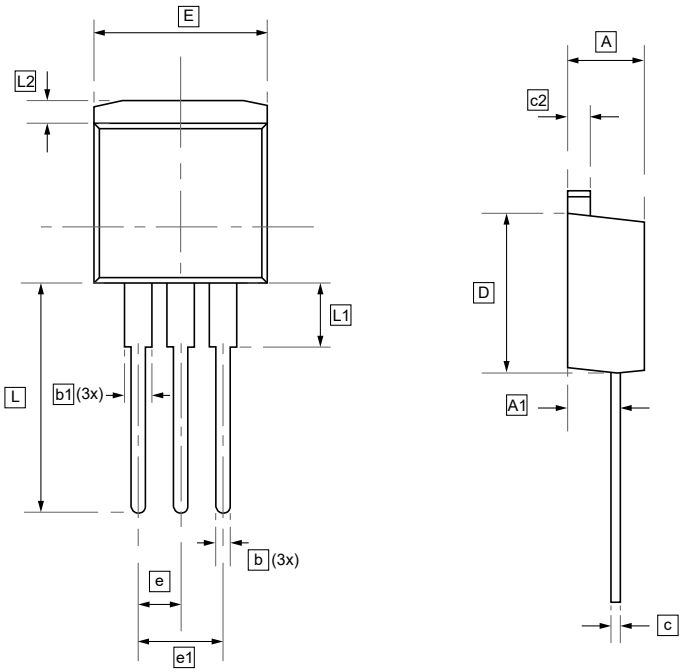
7.2TO-220F Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	b	b1	c	D	D1	E	e	L	L1	L2	L3	øp	Q
Min	4.40	2.30	0.45	1.10	0.35	14.50	6.10	9.60	-	12.50	9.10	15.00	3.00	3.00	2.30
Max	4.95	2.90	0.90	1.70	0.90	17.00	9.00	10.30	-	14.30	10.05	16.00	4.00	3.50	2.80

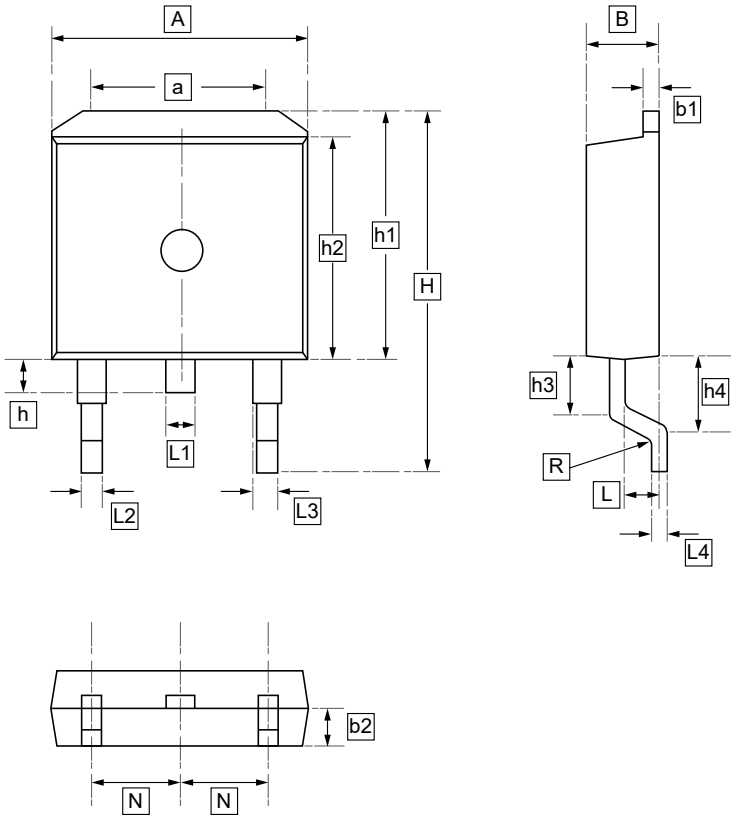
7.2TO-262 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	b	b1	c	c2	D	e	e1	E	L	L1	L2
Min	3.80	2.00	0.60	1.20	0.40	1.10	-	-	-	9.90	12.50	0.80	-
Max	4.80	2.80	1.00	1.40	0.70	1.40	9.60	-	5.30	10.70	14.50	1.20	1.50

7.3TO-263 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	a	B	b1	b2	H	h	h1	h2	h3	h4	L	L1	L2	L3
Min	9.6	7.2	4.3	1.25	2.2	15.2	1.34	10.3	9.1	1.34	2.5	2.2	1.2	0.7	1.2
Max	10.0	7.6	4.7	1.35	2.6	15.8	1.74	10.7	9.3	1.74	2.9	2.6	1.4	0.9	1.4

Symbol	L4	N	R
Min	0.4	2.4	0.45
Max	0.6	2.5	0.55

8.Ordering information

yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW 10N65F	TO-220F	1000	Tube and box

9.Disclaimer

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