

650V 16A 0.48Ω N-ch Power MOSFET

Description

DT2 MOS is DIN-TEK 2nd generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

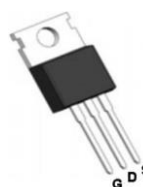
Features

- Typ. $R_{DS(on)}=0.48\Omega@V_{GS}=10V$
- 100% avalanche tested
- RoHS Compliant

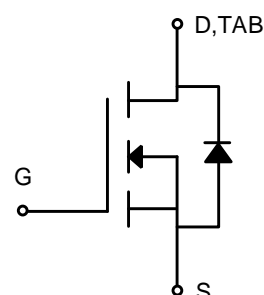
Applications

- SMPS
- Charger
- DC-DC

TO-220



TO-220F



Absolute Maximum Ratings ($T_c=25^{\circ}C$)

Parameter	Symbol	DTP16N65	DTP16N65F	Unit
Drain-source voltage	V_{DS}	650		V
Gate-source voltage	V_{GS}	± 30		V
Continuous drain current	I_D	16		A
Pulsed drain current ¹	I_{DM}	64		A
Avalanche energy, single pulse ²	E_{AS}	980		mJ
Power dissipation	P_D	156	62.5	W
Derate above 25°C		1.3	0.5	W/°C
Operating junction temperature	T_j	-55~150		°C
Storage temperature	T_{stg}	-55~150		°C
Continuous diode forward current	I_S	16		A
Diode pulse current ¹	I_{Spulse}	64		A

Thermal Characteristic

Thermal resistance, junction-to-case	$R_{\theta JC}$	0.8	2	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	30	62.5	°C/W

Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2.0	-	4.0	V
Drain-source leakage current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	μA
		$V_{DS}=520V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	100	μA
Gate-source leakage current,forward	I_{GSSF}	$V_{DS}=0V, V_{GS}=30V$	$T_J=25^\circ C$	-	-	100	nA
Gate-source leakage current,reverse	I_{GSSR}	$V_{DS}=0V, V_{GS}=-30V$	$T_J=25^\circ C$	-	-	-100	nA
Drain-source on-state resistance ³	$R_{DS(ON)}$	$V_{GS}=10V, I_D=8A$	$T_J=25^\circ C$	-	0.48	0.58	Ω

Dynamic Characteristics of MOSFET ($T_C=25^\circ C$)

				Min.	Typ.	Max.	
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V, V_{GS}=0V$		-	2740	-	pF
Output capacitance	C_{oss}			-	215	-	pF
Reverse transfer capacitance	C_{rss}			-	15	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=300V$		-	16	-	nC
Gate to drain charge	Q_{gd}	$I_D=16A$		-	16	-	nC
Total gate charge	Q_g	$V_{GS}=0$ to 10V		-	61	-	nC

Switching Characteristics of MOSFET ($T_C=25^\circ C$)

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=320V, I_D=16A,$ $R_G=25\Omega, V_{GS}=0$ to 10V		-	35	-	ns
Rise time	t_r			-	50	-	ns
Turn-off delay time	$t_{d off}$			-	160	-	ns
Fall time	t_f			-	65	-	ns

Characteristics of Body Diode ($T_C=25^\circ C$)

				Min.	Typ.	Max.	
Forward voltage	V_{SD}	$I_{SD}=16A, V_{GS}=0V$		-	-	1.4	V
Reverse recovery time	t_{rr}	$V_{DS}=320V, I_S=16A, V_{GS}=10V$ $di/dt=100A/\mu s$		-	574	-	ns
Reverse recovery current	I_{rr}			-	20	-	A
Recovery charge	Q_{rr}			-	5.7	-	μC

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ C$.
2. The E_{AS} data shows Max. rating . The test condition is $V_{DD}=50V, V_{GS}=10V, L=10mH, I_{AS}=14A, T_C=25^\circ C$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS

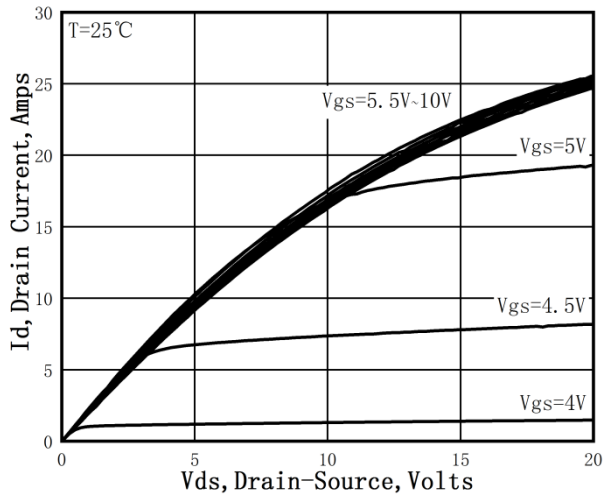


Figure 1. On-Region Characteristics

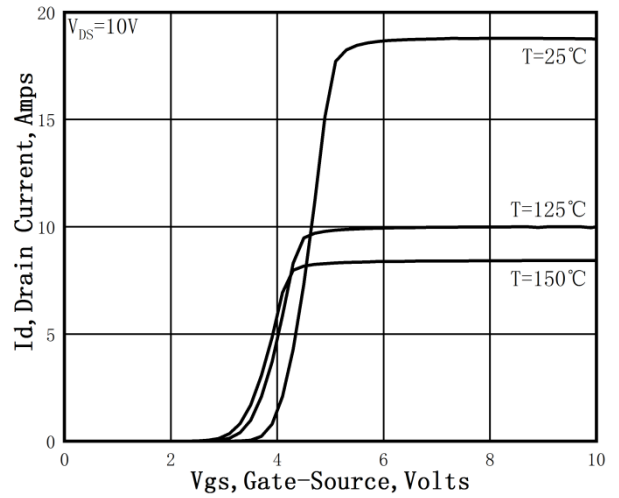


Figure 2. Transfer Characteristics

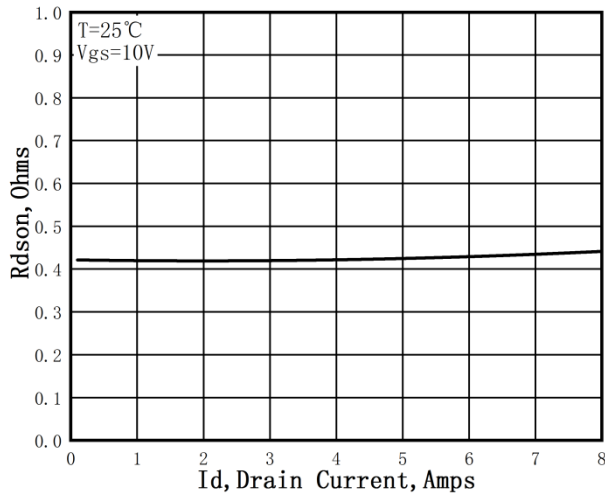


Figure 3. Static Drain-Source On Resistance

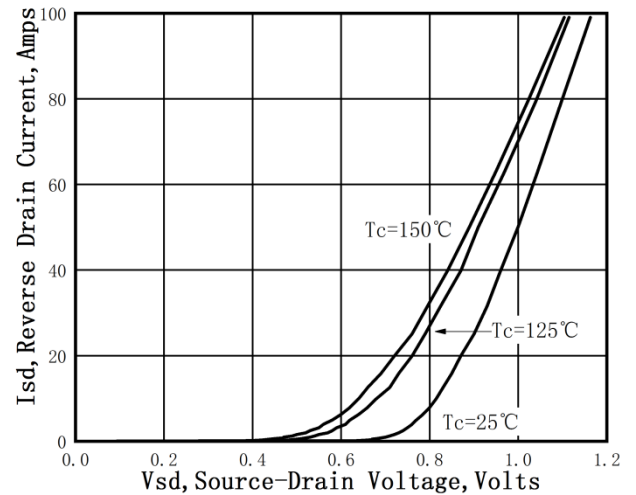


Figure 4. Typical Body Diode Transfer Characteristics

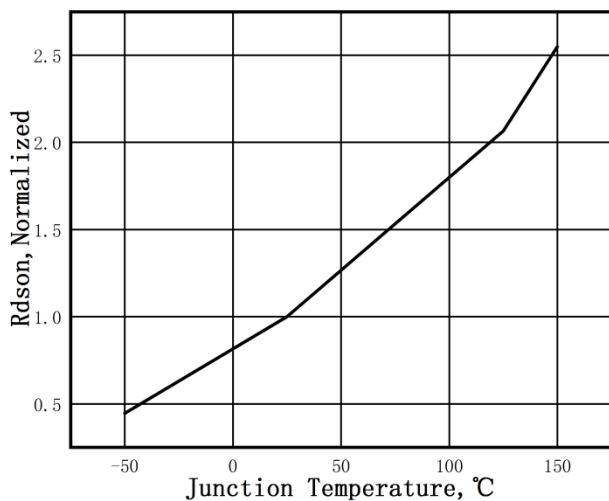


Figure 5. Normalized $R_{DS(on)}$ vs. Temperature

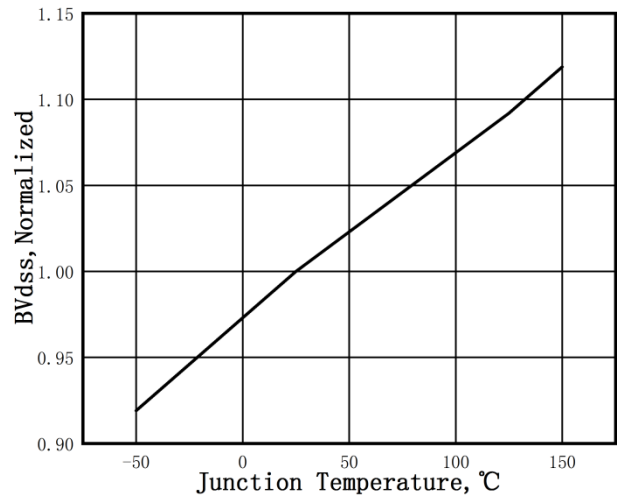


Figure 6. Normalized BV_{DSS} vs. Temperature



Vds, Drain to Source Voltages, Volts
Figure 7. Capacitance Characteristics

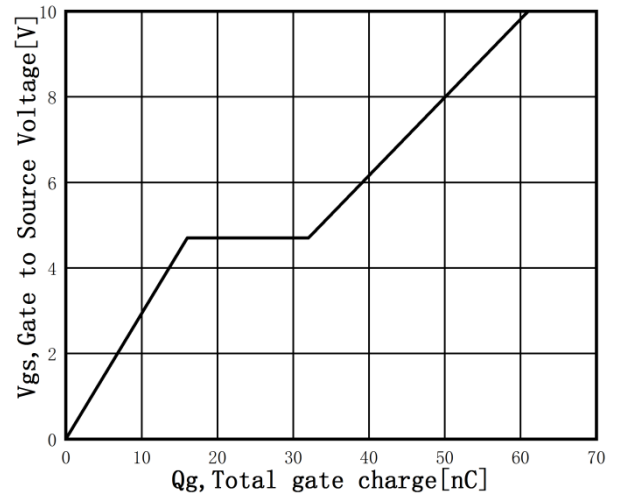


Figure 8. Gate Charge Characteristics

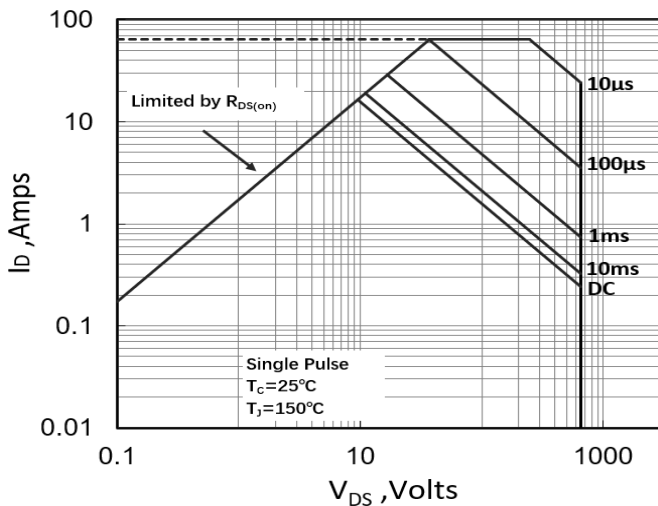


Figure 9. Maximum Safe Operating Area (TO-220)

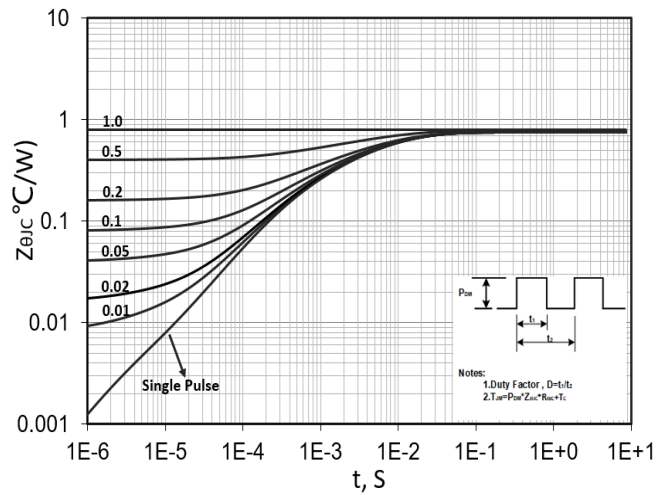


Figure 10. Transient Thermal Response Curve (TO-220)

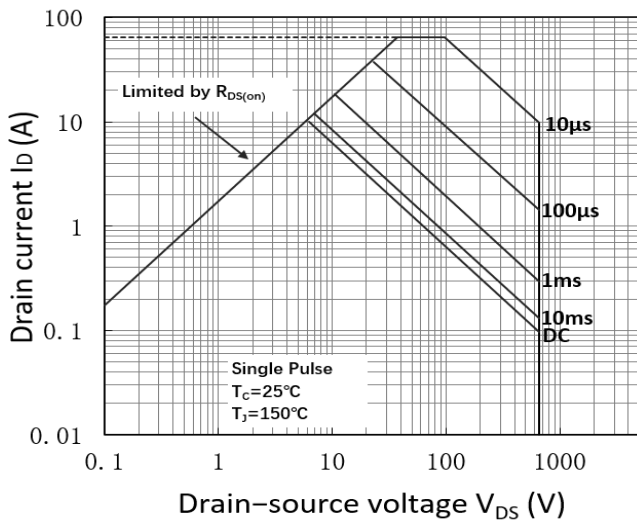


Figure 11. Maximum Safe Operating Area (TO-220F)

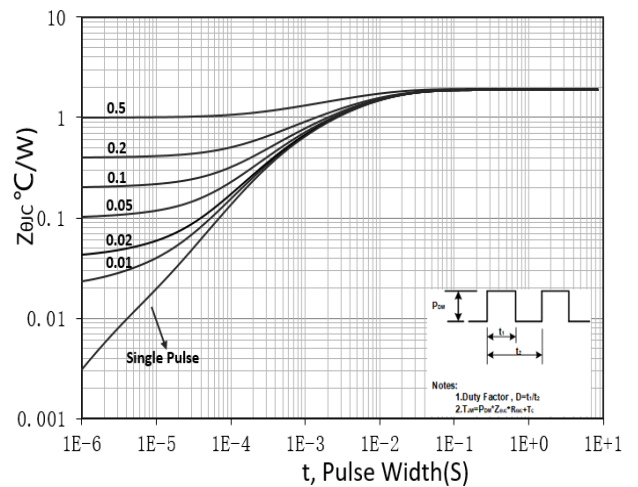
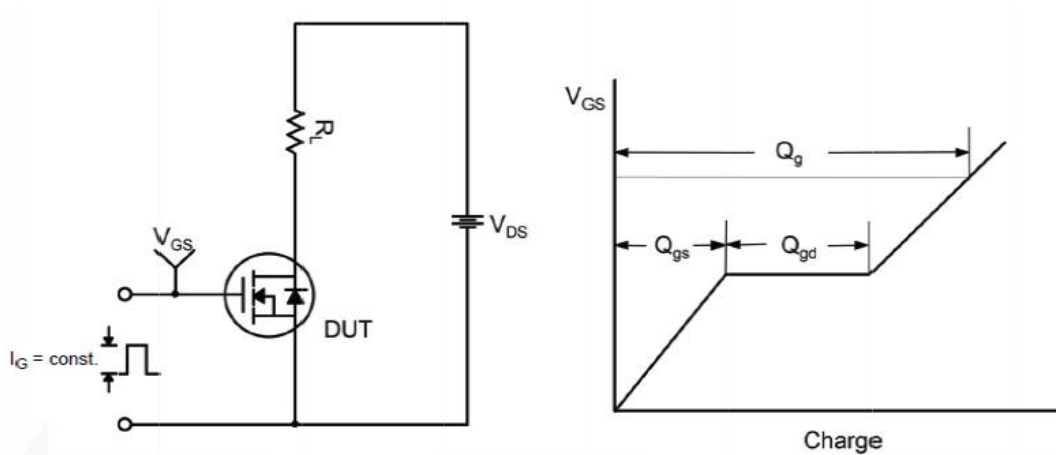


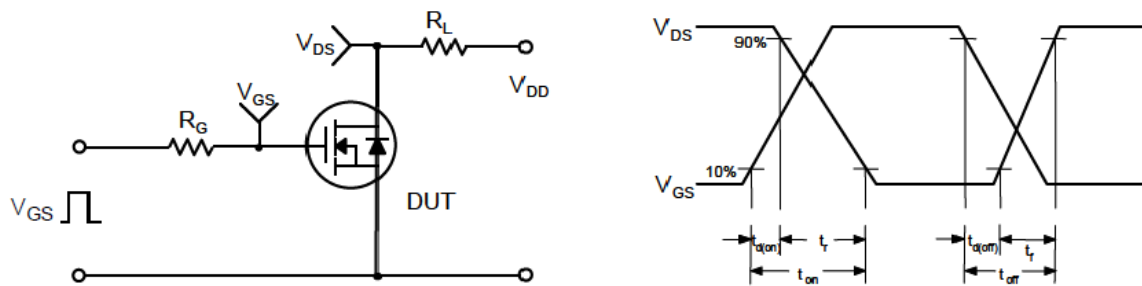
Figure 12. Transient Thermal Response Curve (TO-220F)

Test Circuit

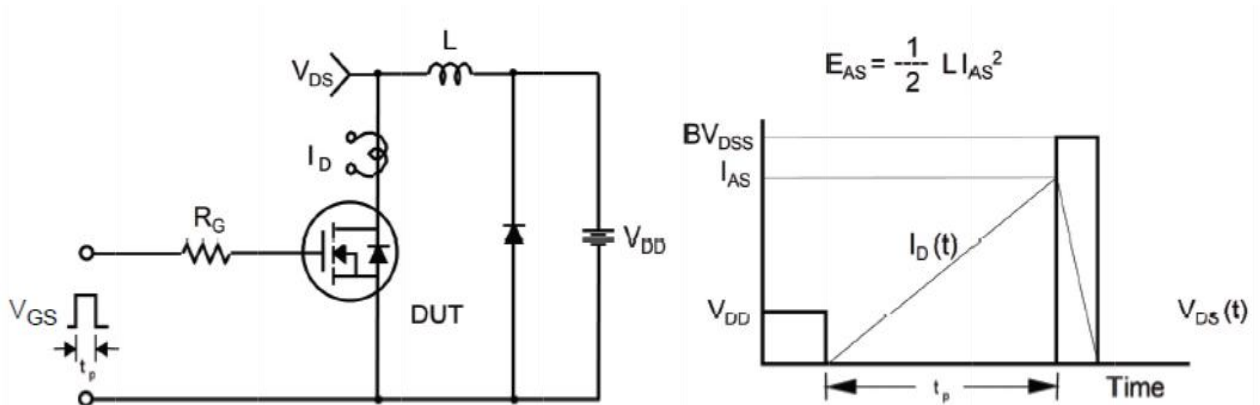
Gate Charge Test Circuit & Waveform



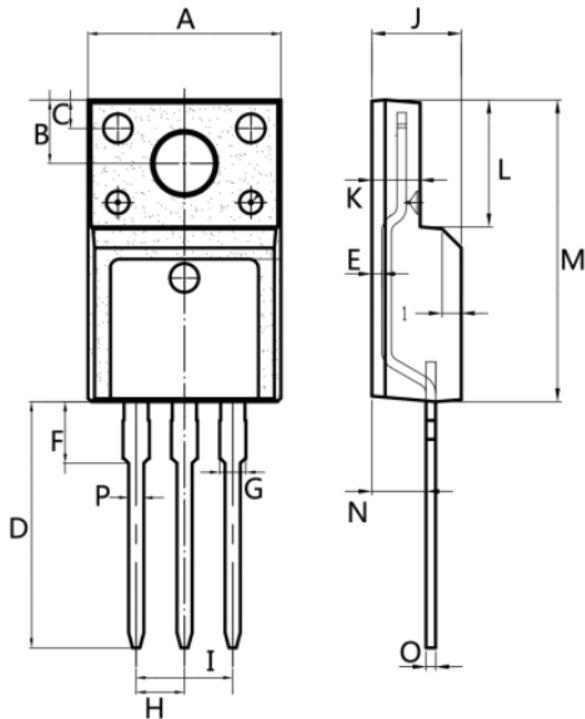
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



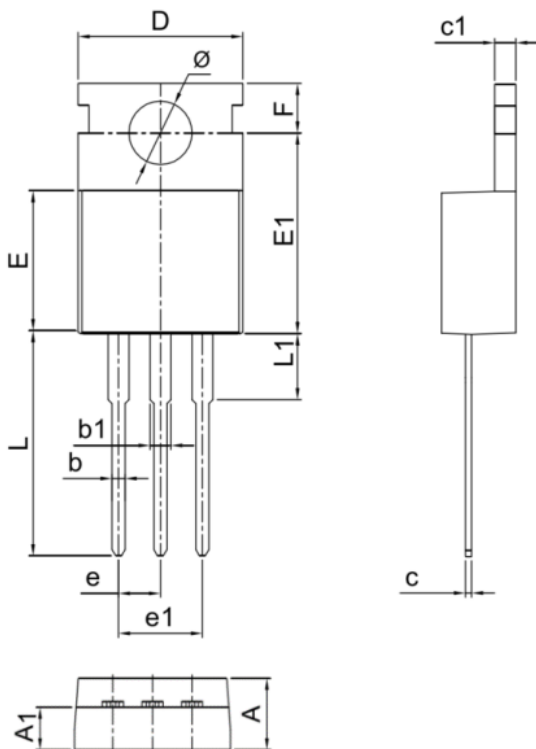
Mechanical Dimensions for TO-220F



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.95	10.36
B	2.95	3.55
C	1.25	1.6
D	12.64	13.5
E	0.40	0.60
F	2.80	3.80
G	1.14	1.58
H	2.44	2.64
I	4.88	5.26
J	4.50	4.90
K	2.34	2.80
L	6.48	6.90
M	15.40	16.07
N	2.66	3.50
O	0.40	0.64
P	0.70	0.94

Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.30	4.70
A1	2.30	2.82
b	0.70	0.94
b1	1.17	1.41
c	0.30	0.64
c1	1.17	1.44
D	9.70	10.20
E	8.50	9.30
E1	12.00	12.50
e	2.44	2.64
e1	4.88	5.26
F	2.60	2.94
L	13.00	14.00
L1	3.385	4.20
Ø	3.74	3.95

Ordering Information

Part	Package	Packing method
DTP16N65F	TO-220F	Tube
DTP16N65	TO-220	Tube

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