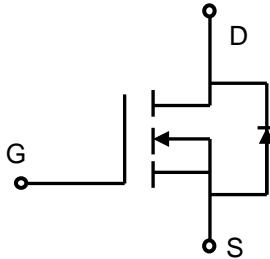


## Lonten N-channel 650V, 7A, 0.57Ω LonFET™ Power MOSFET

Description	Product Summary
LonFET™ Power MOSFET is fabricated using advanced super junction technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.	$V_{DS} @ T_{j,max}$ 700V $R_{DS(on),max}$ 0.57Ω $I_{DM}$ 21A $Q_{g,typ}$ 19nC
<b>Features</b>	
<ul style="list-style-type: none"> <li>◆ Ultra low <math>R_{ds(on)}</math></li> <li>◆ Ultra low gate charge (typ. <math>Q_g = 19nC</math>)</li> <li>◆ 100% UIS tested</li> <li>◆ RoHS compliant</li> </ul>	
	 N-Channel MOSFET



### Absolute Maximum Ratings

Parameter	Symbol	LSD07N65	Unit
Drain-Source Voltage	$V_{DSS}$	650	V
Continuous drain current ( $T_C = 25^\circ C$ )	$I_D$	7	A
( $T_C = 100^\circ C$ )		4.4	A
Pulsed drain current <sup>1)</sup>	$I_{DM}$	21	A
Gate-Source voltage	$V_{GSS}$	$\pm 30$	V
Avalanche energy, single pulse <sup>2)</sup>	$E_{AS}$	230	mJ
Avalanche energy, repetitive <sup>1)</sup>	$E_{AR}$	0.5	mJ
Avalanche current, repetitive <sup>1)</sup>	$I_{AR}$	7	A
Power Dissipation ( $T_C = 25^\circ C$ )	$P_D$	31	W
- Derate above 25°C		0.25	W/ $^\circ C$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ C$
Continuous diode forward current	$I_S$	7	A
Diode pulse current	$I_{S,pulse}$	21	A

### Thermal Characteristics

Parameter	Symbol	LSD07N65	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	80	$^\circ C/W$

## Package Marking and Ordering Information

Device	Device Package	Marking
LSD07N65	TO-220F	LSD07N65

## Electrical Characteristics

T<sub>c</sub> = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static characteristics</b>						
Drain-source breakdown voltage	V <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> =0.25 mA	650	-	-	V
Gate threshold voltage	V <sub>GSS(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> =0 V, T <sub>j</sub> = 25°C T <sub>j</sub> = 125°C	-	-	1	μA
Gate leakage current, Forward	I <sub>GSSF</sub>	V <sub>GS</sub> =30 V, V <sub>DS</sub> =0 V	-	-	100	nA
Gate leakage current, Reverse	I <sub>GSSR</sub>	V <sub>GS</sub> =-30 V, V <sub>DS</sub> =0 V	-	-	-100	nA
Drain-source on-state resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10 V, I <sub>D</sub> =3.5 A T <sub>j</sub> = 25°C T <sub>j</sub> = 150°C	-	0.51	0.57	Ω
Gate resistance	R <sub>G</sub>	f=1 MHz, open drain	-	0.4	-	Ω
<b>Dynamic characteristics</b>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	710	-	pF
Output capacitance	C <sub>oss</sub>		-	470	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	6	-	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 300V, I <sub>D</sub> = 3.5A R <sub>G</sub> = 12Ω, V <sub>GS</sub> =10V	-	16	-	ns
Rise time	t <sub>r</sub>		-	13	-	
Turn-off delay time	t <sub>d(off)</sub>		-	35	-	
Fall time	t <sub>f</sub>		-	7	-	
<b>Gate charge characteristics</b>						
Gate to source charge	Q <sub>gs</sub>	V <sub>DD</sub> =480 V, I <sub>D</sub> =3.5A, V <sub>GS</sub> =0 to 10 V	-	4	-	nC
Gate to drain charge	Q <sub>gd</sub>		-	9	-	
Gate charge total	Q <sub>g</sub>		-	19	-	
Gate plateau voltage	V <sub>plateau</sub>		-	5.8	-	
<b>Reverse diode characteristics</b>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0 V, I <sub>F</sub> =3.5A	-	-	1.2	V
Reverse recovery time	t <sub>rr</sub>	V <sub>R</sub> =50 V, I <sub>F</sub> =7A, dI <sub>F</sub> /dt=100 A/μs	-	290	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	3.4	-	
Peak reverse recovery current	I <sub>rrm</sub>		-	14	-	

### Notes:

- Repetitive Rating: Pulse width limited by maximum junction temperature
- I<sub>AS</sub> = 2.5A, V<sub>DD</sub> = 60V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C

## Electrical Characteristics Diagrams

Figure 1. On-Region Characteristics

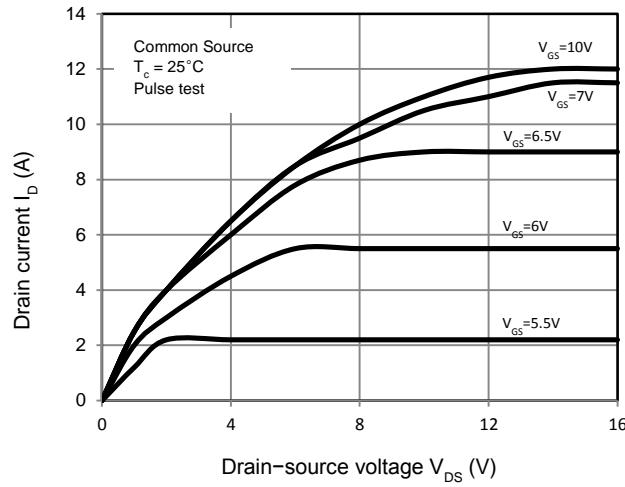


Figure 2. Transfer Characteristics

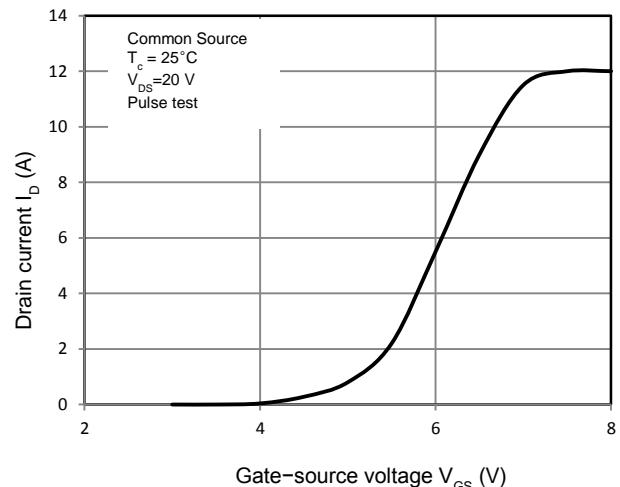


Figure 3. On-Resistance Variation vs. Drain Current

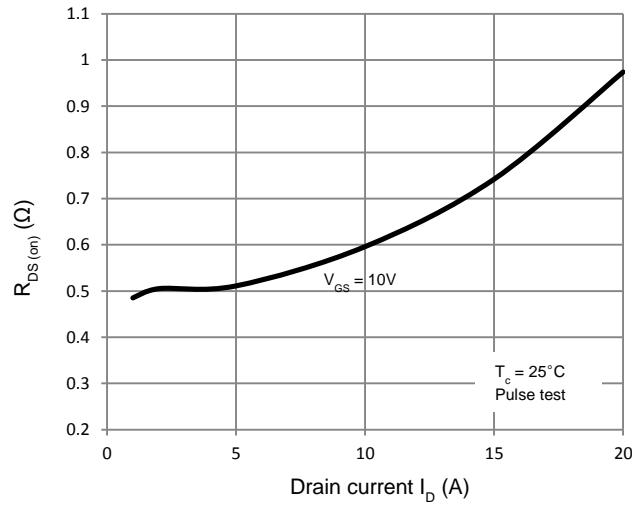


Figure 4. Threshold Voltage vs. Temperature

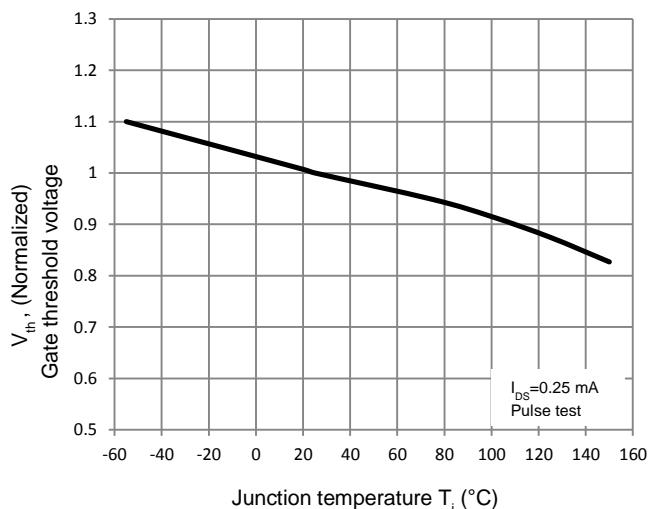


Figure 5. Breakdown Voltage vs. Temperature

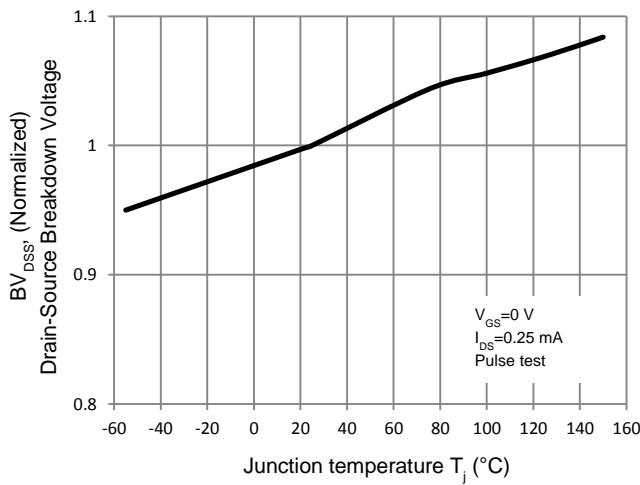


Figure 6. On-Resistance vs. Temperature

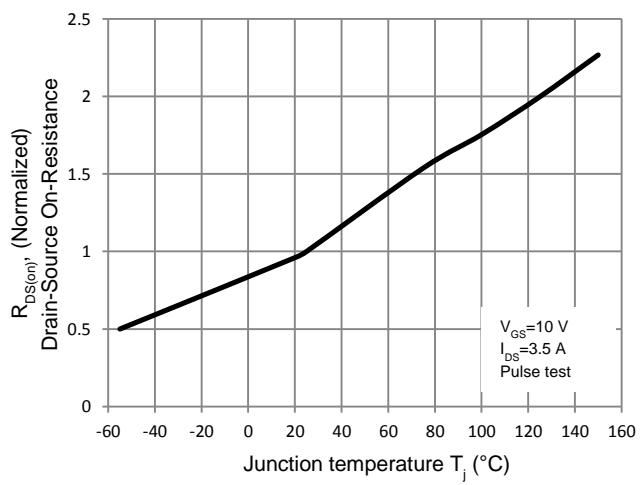


Figure 7. Capacitance Characteristics

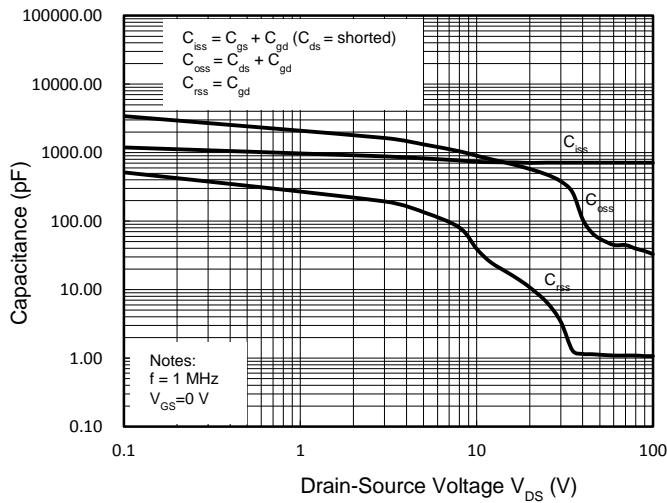


Figure 8. Gate Charge Characteristics

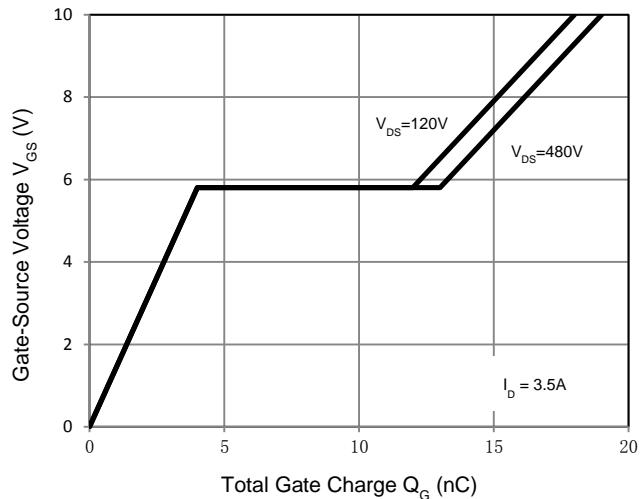


Figure 9. Maximum Safe Operating Area

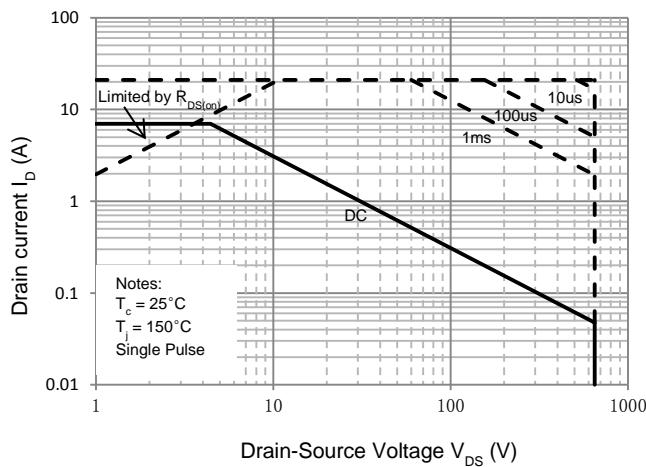


Figure 10. Power Dissipation vs. Temperature

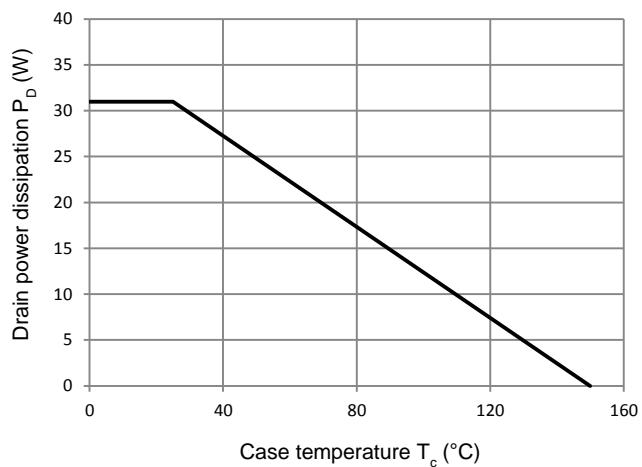
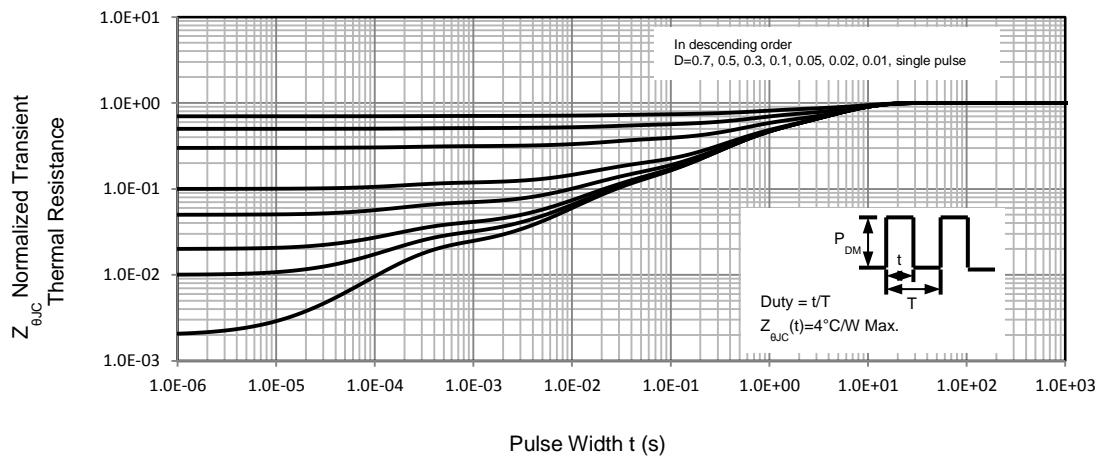
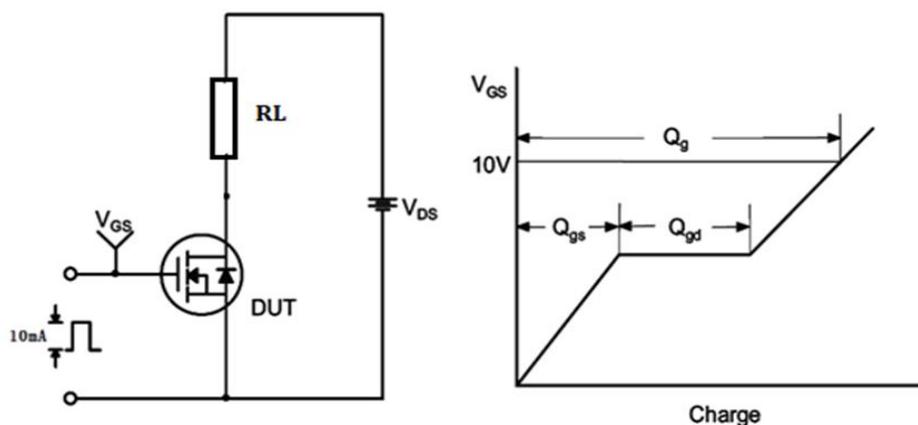


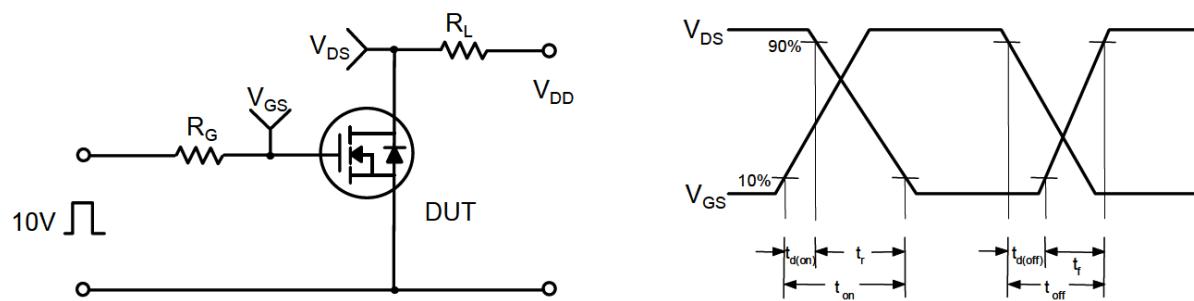
Figure 11. Transient Thermal Response Curve



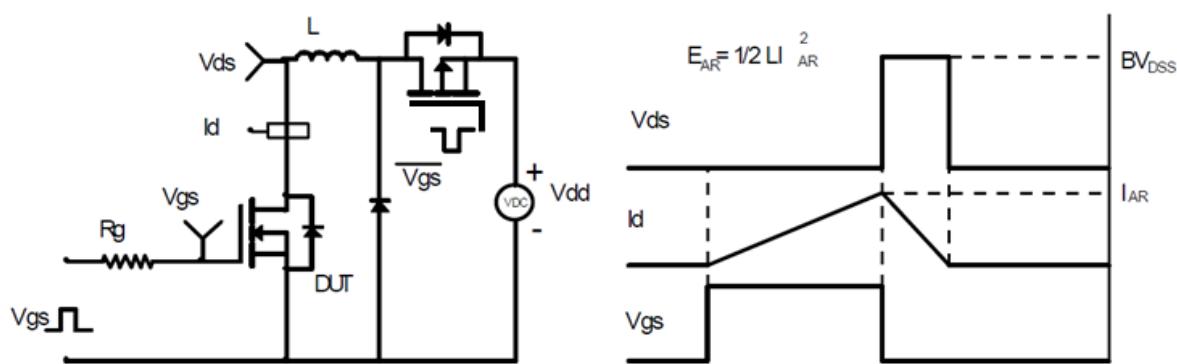
### Gate Charge Test Circuit & Waveform



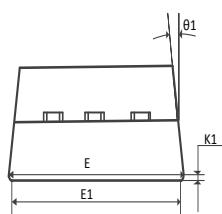
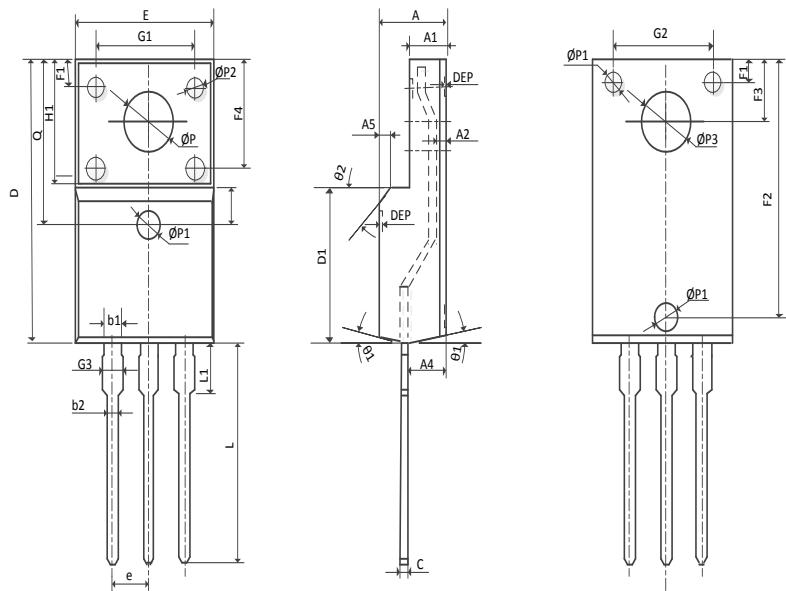
### Switching Test Circuit & Waveforms



### Unclamped Inductive Switching Test Circuit & Waveforms



## Mechanical Dimensions for TO-220F



COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
E	10.04	10.20	10.36	0.395	0.402	0.408
A	4.50	4.70	4.90	0.177	0.185	0.193
A1	2.34	2.54	2.74	0.092	0.100	0.108
A2	0.70	0.85	1.00	0.028	0.033	0.039
A4	2.65	2.75	2.85	0.104	0.108	0.112
A5	1.00REF			0.039REF		
C	0.42	0.50	0.58	0.017	0.020	0.023
D	15.67	15.87	16.07	0.617	0.625	0.633
Q	9.20REF			0.362REF		
H1	6.70REF			0.264REF		
e	2.54BSC			0.1BSC		
ØP	3.183REF			0.125REF		
L	12.78	12.98	13.18	0.503	0.511	0.519
L1	3.25	3.45	3.65	0.128	0.136	0.144
D1	9.17REF			0.362REF		
ØP1	1.40	1.50	1.60	0.055	0.059	0.063
ØP2	1.15	1.20	1.25	0.045	0.047	0.049
ØP3	3.45REF			0.136REF		
ø1	5°	7°	9°	5°	7°	9°
ø2	-	45°	-	-	45°	-
DEP	0.05	0.10	0.15	0.002	0.004	0.006
F1	1.90	2.00	2.10	0.075	0.079	0.083
F2	13.80	13.90	14.00	0.543	0.547	0.551
F3	3.20	3.30	3.40	0.126	0.130	0.134
F4	5.30	5.40	5.50	0.209	0.213	0.217
G1	6.60	6.70	6.80	0.260	0.264	0.268
G2	6.90	7.00	7.10	0.272	0.276	0.280
G3	1.10	1.30	1.50	0.043	0.051	0.059
b1	1.05	1.20	1.35	0.041	0.047	0.053
b2	0.70	0.80	0.85	0.028	0.031	0.033
E1	9.90	10.00	10.10	0.390	0.394	0.398
K1	0.65	0.70	0.75	0.026	0.028	0.030

## TO-220F Part Marking Information

