Lonten N-channel 650V, 20A, 0.15Ω LonFET™ Power MOSFET

Description

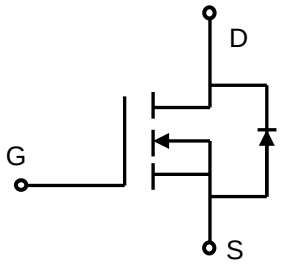
LonFET™ Power MOSFET is fabricated using advanced super junction technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

Features

- Ultra low $R_{DS(on)}$
- Ultra low gate charge (typ. Q_g = 65nC)
- 100% UIS tested
- RoHS compliant

Product Summary

V_{DS} @ $T_{j,max}$	700V
$R_{DS(on),max}$	0.15Ω
I_{DM}	60A
$Q_{g,typ}$	65nC



N-Channel MOSFET

Pb

Absolute Maximum Ratings

Parameter	Symbol	LSD20N65	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current (T_C = 25°C)	I_D	20	A
(T_C = 100°C)		13	A
Pulsed drain current [1]	I_{DM}	60	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	700	mJ
Avalanche energy, repetitive [1]	E_{AR}	20.5	mJ
Avalanche current, repetitive [1]	I_{AR}	20	A
Power Dissipation (T_C = 25°C)	P_D	34	W
- Derate above 25°C		0.28	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	20	A
Diode pulse current	$I_{S,pulse}$	60	A

Thermal Characteristics

Parameter	Symbol	LSD20N65	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.6	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	80	°C/W

Package Marking and Ordering Information

Device	Device Package	Marking
LSD20N65	TO-220F	LSD20N65

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=0.25 mA	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2		5	V
Drain cut-off current	I_{DSS}	V_{DS}=600 V, V_{GS}=0 V,	-	-	1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30 V, V_{DS}=0 V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30 V, V_{DS}=0 V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=10 A T_j = 25°C T_j = 150°C	- - -	 0.13 0.39	 0.15 -	Ω
Gate resistance	R_G	f=1 MHz, open drain	-	1.8	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V,	-	2100	-	pF
Output capacitance	C_{oss}	f = 1 MHz	-	1700	-	
Reverse transfer capacitance	C_{rss}		-	17	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 380V, I_D = 10A	-	25	-	ns
Rise time	t_r	R_G = 4.7Ω, V_{GS}=10V	-	21	-	
Turn-off delay time	$t_{d(off)}$		-	60	-	
Fall time	t_f		-	4	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480 V, I_D=10A,	-	12	-	nC
Gate to drain charge	Q_{gd}	V_{GS}=0 to 10 V	-	31	-	
Gate charge total	Q_g		-	65	-	
Gate plateau voltage	$V_{plateau}$		-	5.7	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=10A	-	-	1.4	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=20A,	-	520	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=100 A/μs	-	5.7	-	μC
Peak reverse recovery current	I_{rrm}		-	19	-	A

Notes:

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

2. I_{AS} = 7A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C

Electrical Characteristics Diagrams

Figure 1. On-Region Characteristics

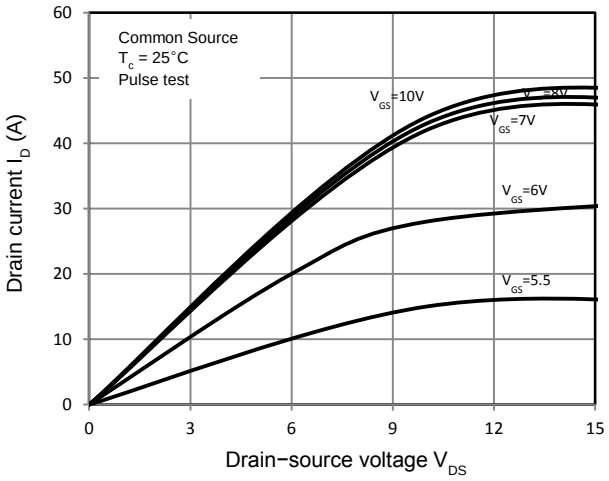


Figure 2. Transfer Characteristics

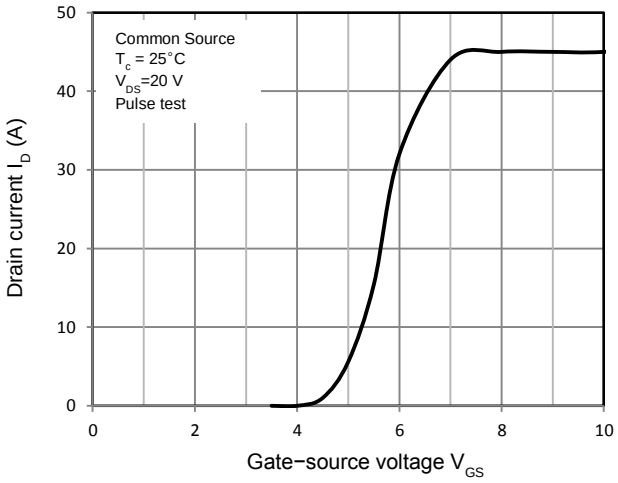


Figure 3. On-Resistance Variation vs. Drain Current

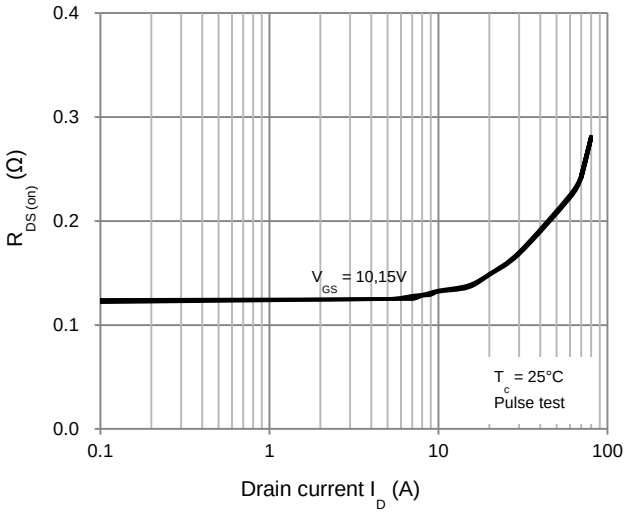


Figure 4. Threshold Voltage vs. Temperature

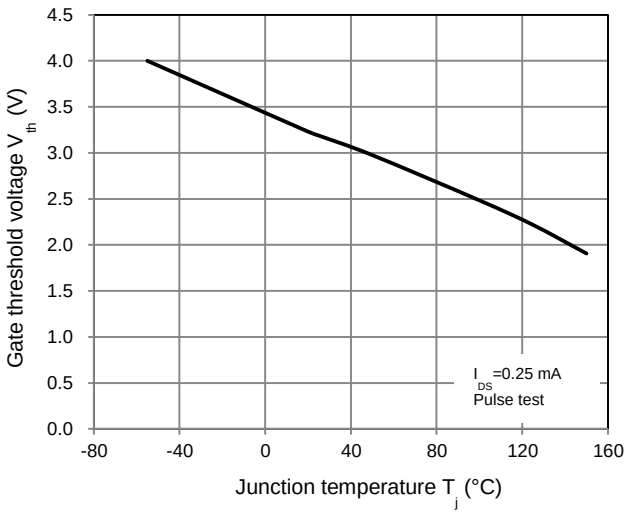


Figure 5. Breakdown Voltage vs. Temperature

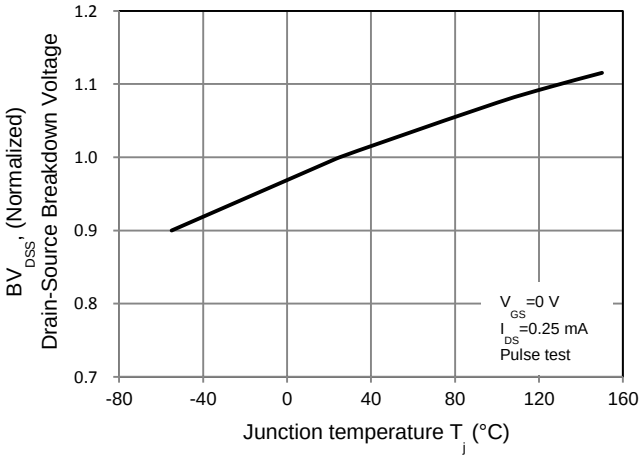


Figure 6. On-Resistance vs. Temperature

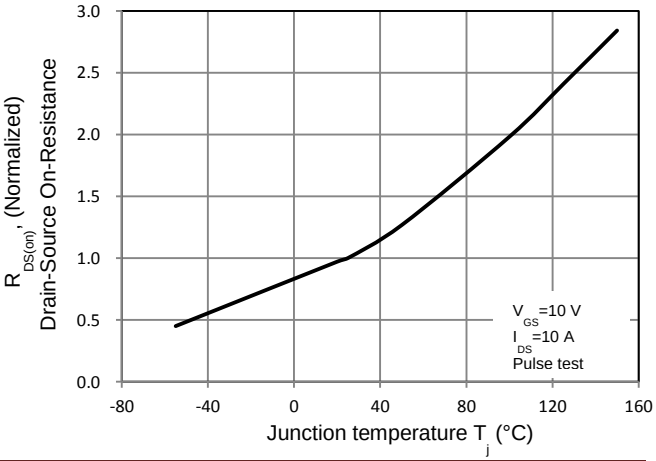


Figure 7. Capacitance Characteristics

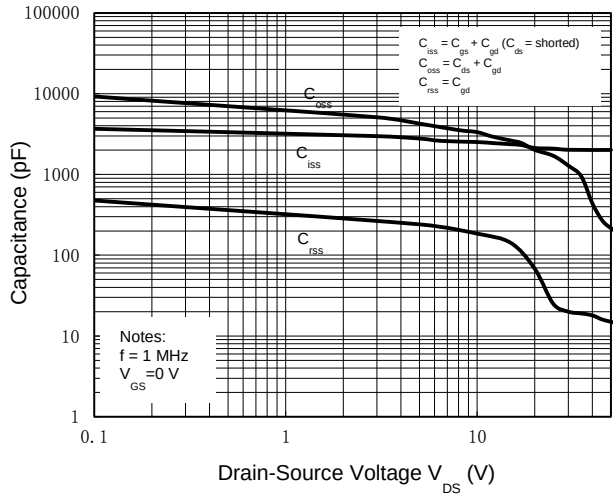


Figure 8. Gate Charge Characteristics

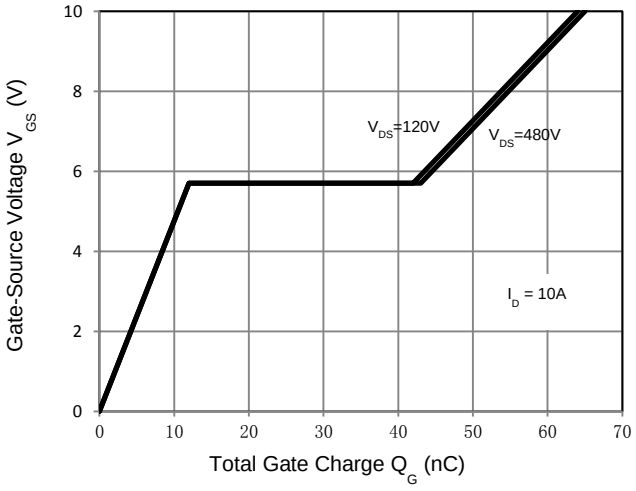


Figure 9. Maximum Safe Operating Area

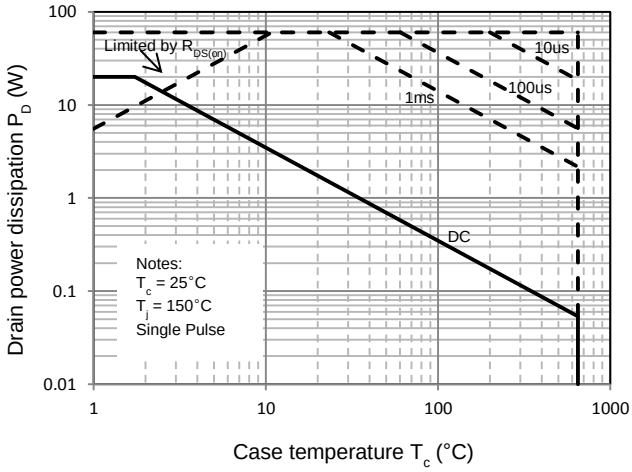


Figure 10. Power Dissipation vs. Temperature

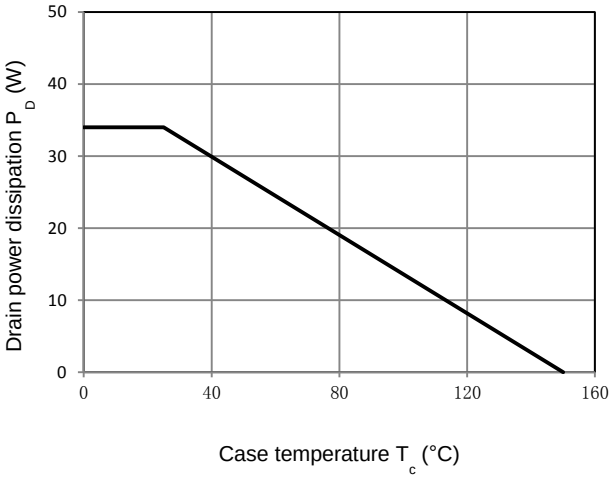
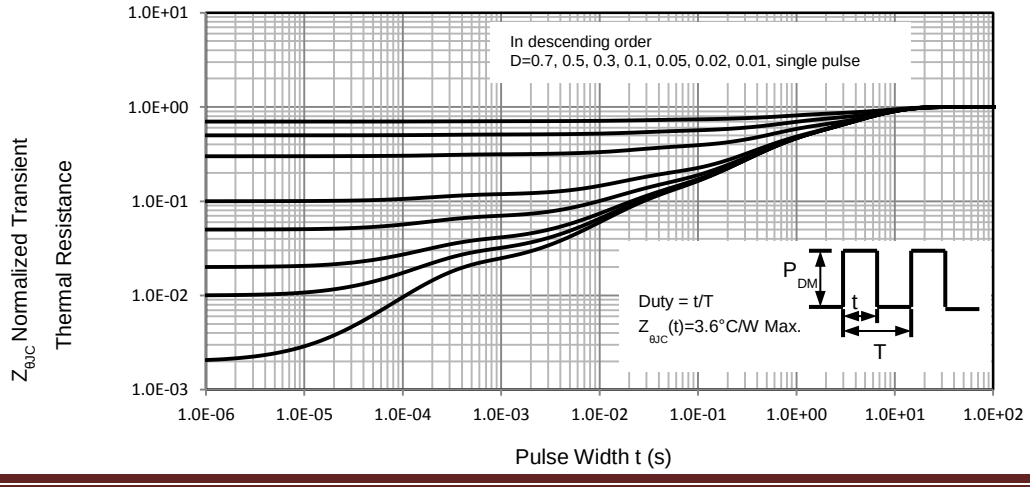
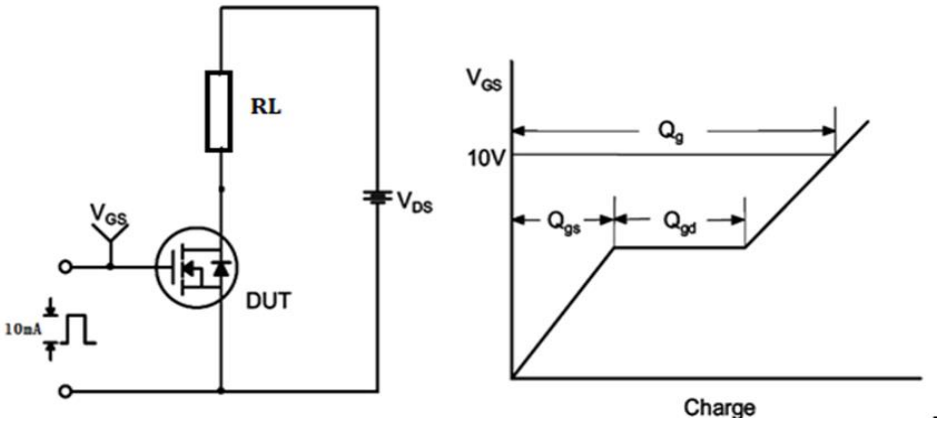


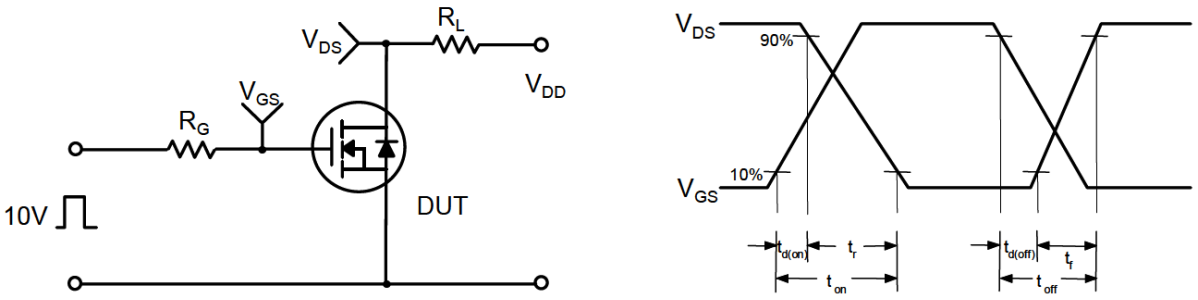
Figure 11. Transient Thermal Response Curve



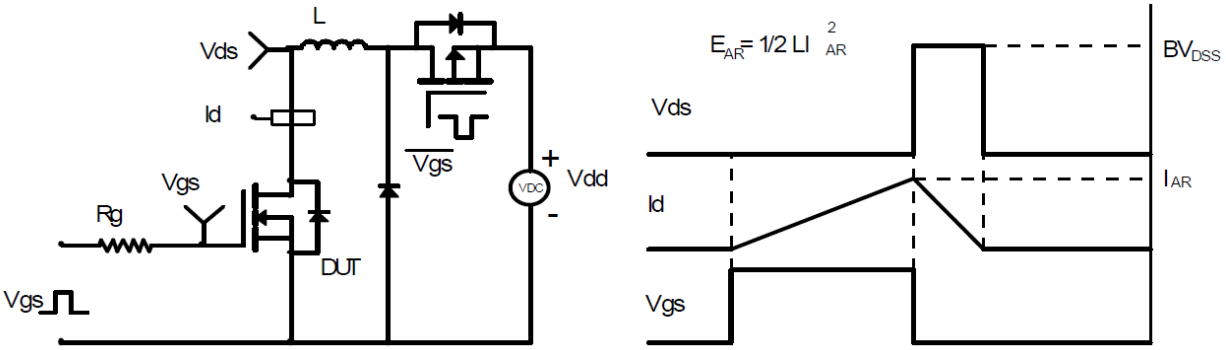
Gate Charge Test Circuit & Waveform



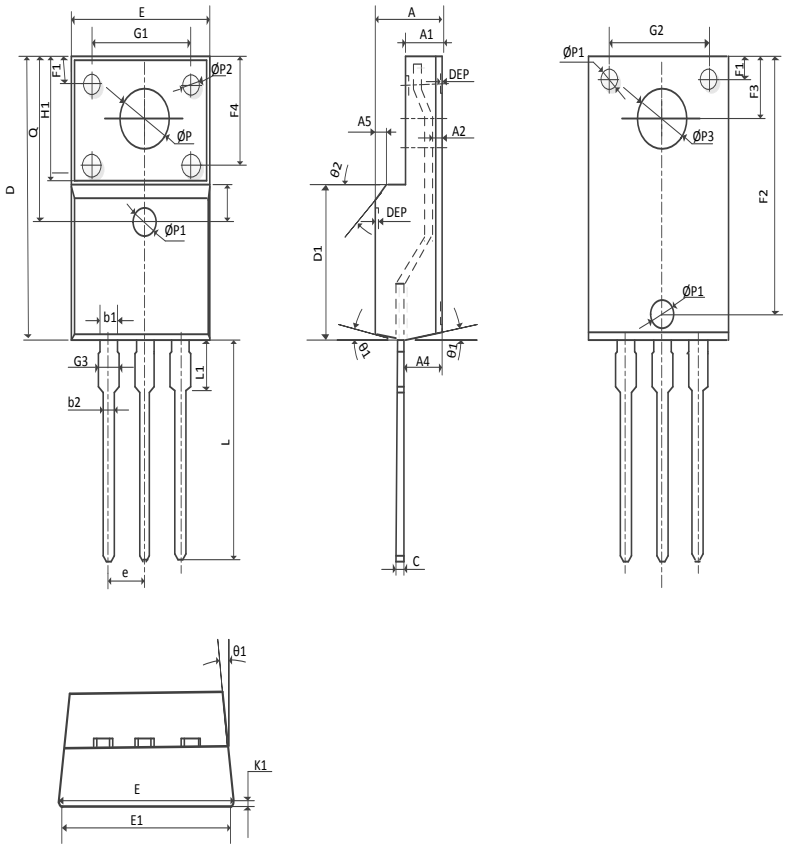
Switching Test Circuit & Waveforms



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		
θ1	5°	7°	9°	5°	7°	9°
θ2	-	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

