Lonten N-channel 700V, 7A, 0.57Ω LonFET^{TM} Power MOSFET

Description

LonFET^{TM} 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

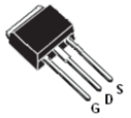
- Ultra low R_{dson}
- Ultra low gate charge (typ. Q_g = 19nC)
- 100% UIS tested
- RoHS compliant

Applications

- Power faction correction (PFC).
- Switched mode power supplies (SMPS).
- Uninterruptible power supply (UPS).

Product Summary

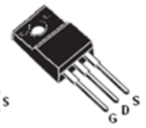
V_{DS} @ $T_{j,max}$	750V
$R_{DS(on),max}$	0.57Ω
I_{DM}	21A
$Q_{g,typ}$	19nC



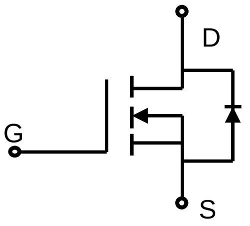
TO-251

TO-252

TO-220



TO-220F



N-Channel MOSFET

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	700	V
Continuous drain current (T_C = 25°C)	I_D	7	A
(T_C = 100°C)		4.4	A
Pulsed drain current [1]	I_{DM}	21	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	230	mJ
Avalanche energy, repetitive [1]	E_{AR}	0.5	mJ
Avalanche current, repetitive [1]	I_{AR}	7	A
Power Dissipation (T_C = 25°C)	P_D	83	W
- Derate above 25°C		0.67	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	7	A
Diode pulse current	$I_{S,pulse}$	21	A

Thermal Characteristics TO-251/TO-252/TO-220

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W

Thermal Characteristics TO-220F

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.3	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	80	°C/W

Package Marking and Ordering Information

Device	Device Package	Marking
LSC07N70	TO-220	LSC07N70
LSD07N70	TO-220F	LSD07N70
LSG07N70	TO-252	LSG07N70
LSH07N70	TO-251	LSH07N70

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	700	-	-	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}=700 V, V_{GS}=0 V,				μA
		T_j = 25°C	-	-	1	
		T_j = 125°C	-	10	-	
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=3.5 A	-			
		T_j = 25°C	-	0.51	0.57	Ω
		T_j = 150°C	-	1.2	-	
Gate resistance	R_G	f=1 MHz, open drain	-	0.4	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	-	710	-	pF
Output capacitance	C_{oss}		-	470	-	
Reverse transfer capacitance	C_{rss}		-	6	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 300V, I_D = 3.5A R_G = 12Ω, V_{GS}=10V	-	16	-	ns
Rise time	t_r		-	13	-	
Turn-off delay time	$t_{d(off)}$		-	35	-	
Fall time	t_f		-	7	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480 V, I_D=3.5A, V_{GS}=0 to 10 V	-	4	-	nC
Gate to drain charge	Q_{gd}		-	9	-	
Gate charge total	Q_g		-	19	-	
Gate plateau voltage	$V_{plateau}$		-	5.8	-	V

Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=3.5A	-	-	1.2	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=7A, dI_F/dt=100 A/μs	-	290	-	ns
Reverse recovery charge	Q_{rr}		-	3.4	-	μC
Peak reverse recovery current	I_{rrm}		-	14	-	A

Notes:

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

2. I_{AS} = 2.5A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C

Electrical Characteristics Diagrams

Figure 1. On-Region Characteristics

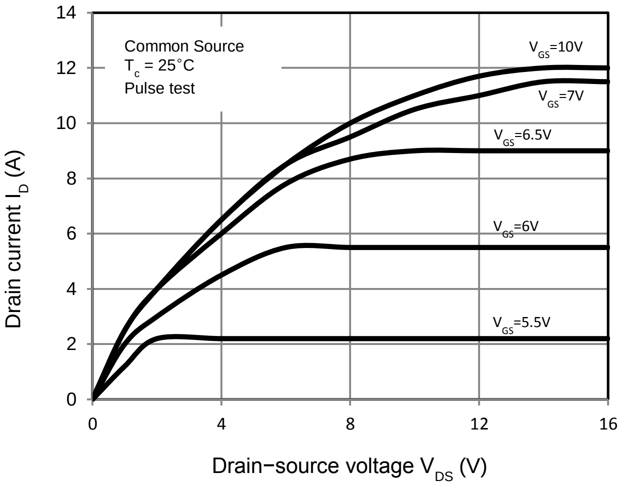


Figure 2. Transfer Characteristics

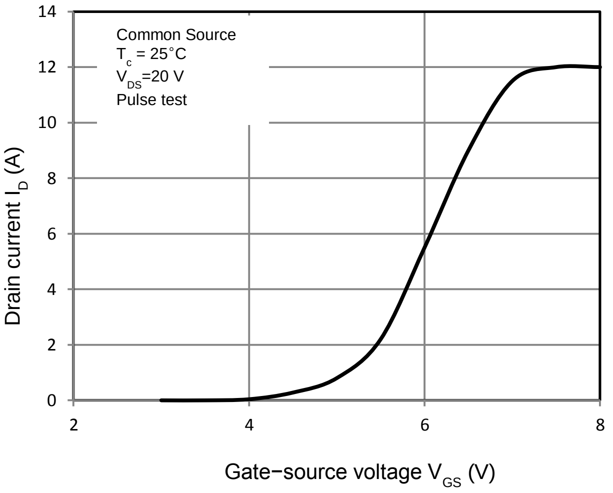


Figure 3. On-Resistance Variation vs. Drain Current

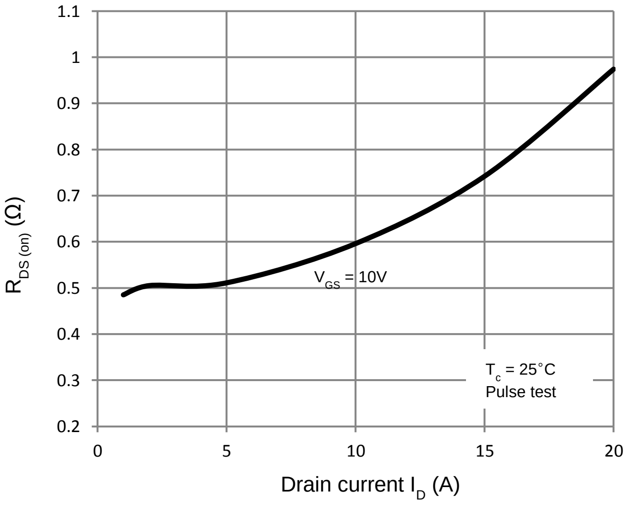


Figure 4. Threshold Voltage vs. Temperature

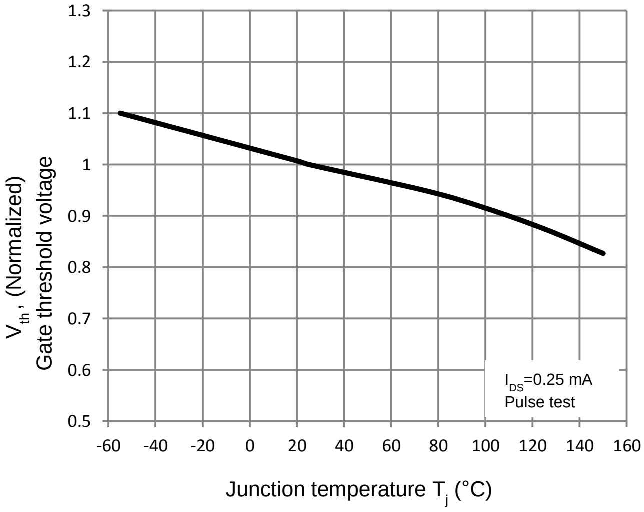


Figure 5. Breakdown Voltage vs. Temperature

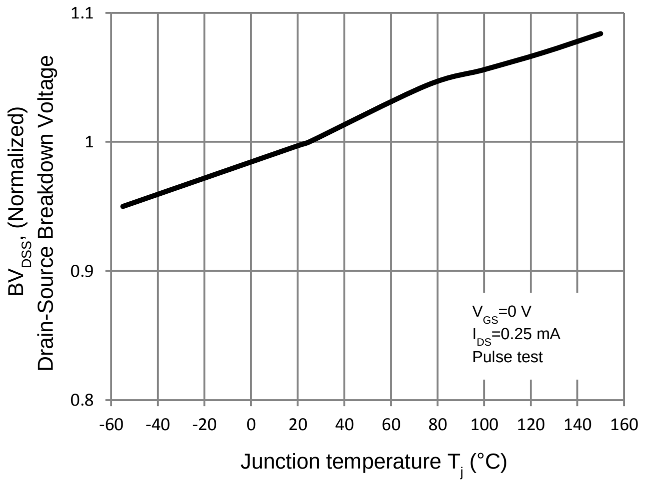


Figure 6. On-Resistance vs. Temperature

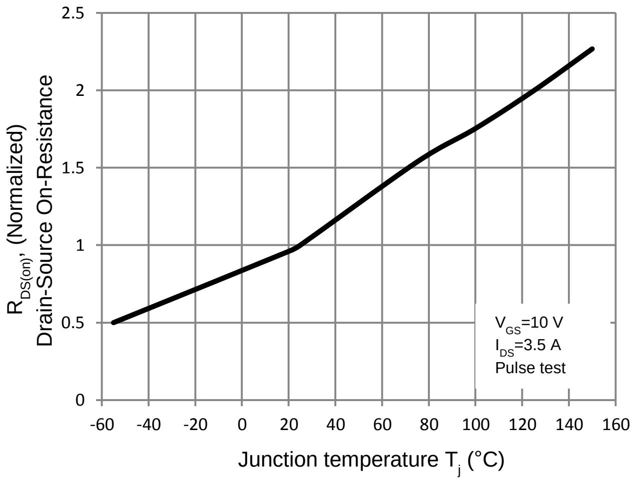


Figure 7. Capacitance Characteristics

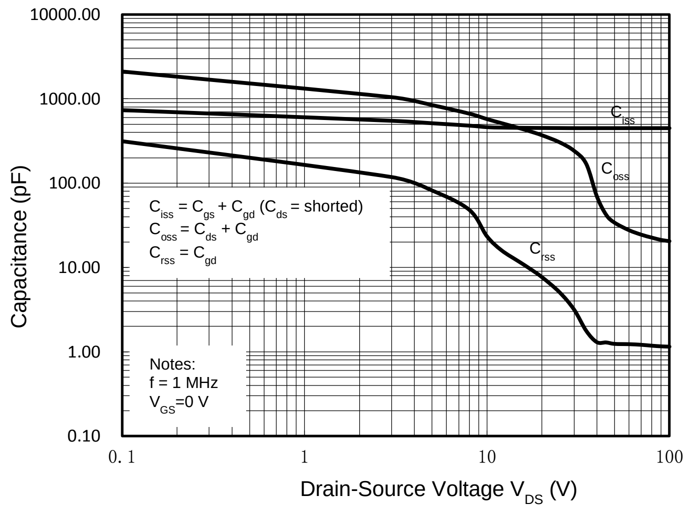


Figure 8. Gate Charge Characteristics

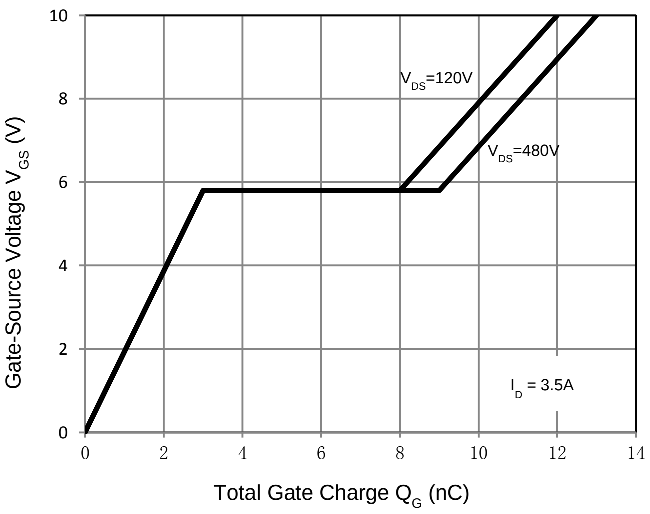


Figure 9. Maximum Safe Operating Area

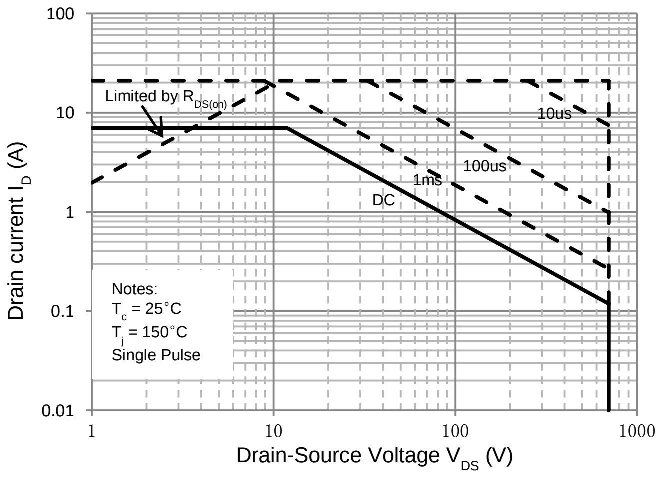


Figure 10. Power Dissipation vs. Temperature

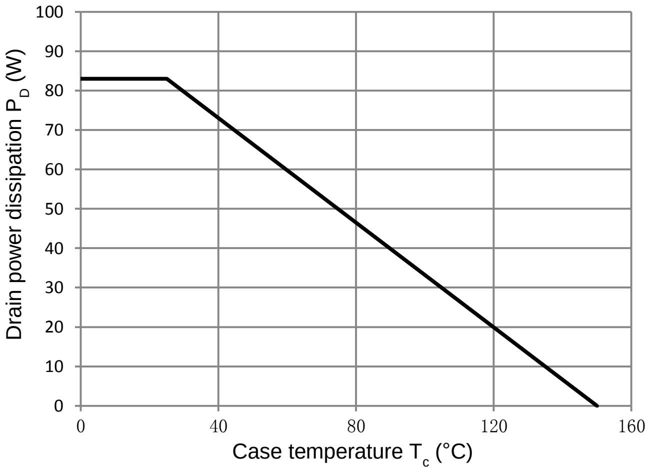
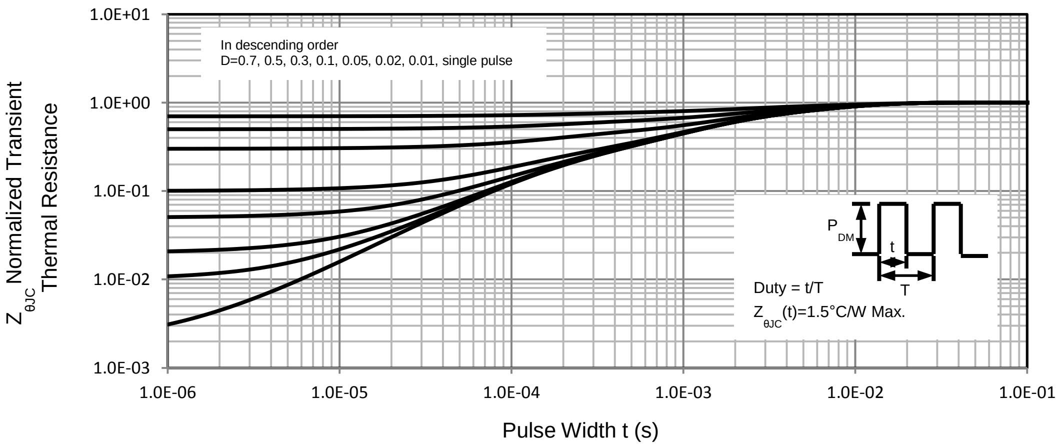
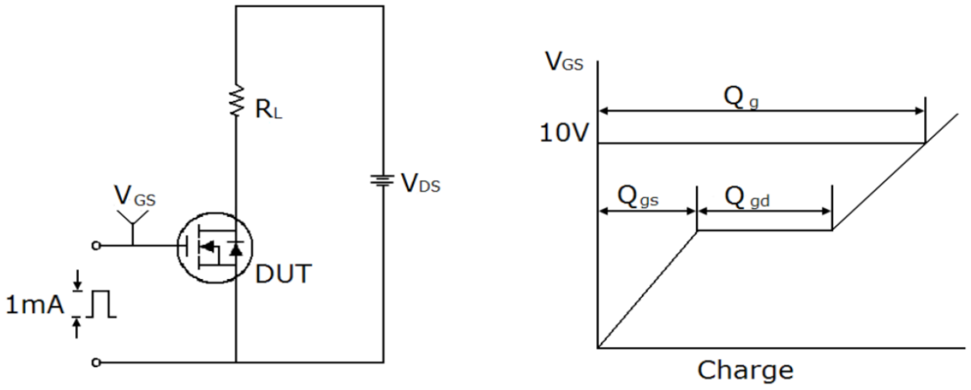


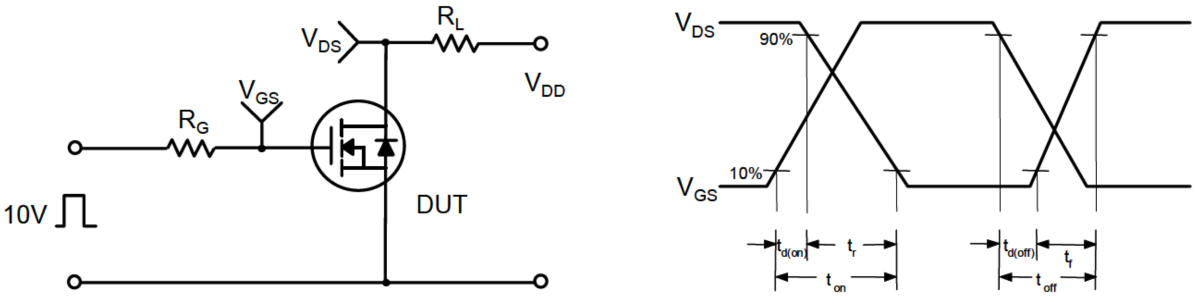
Figure 11. Transient Thermal Response Curve



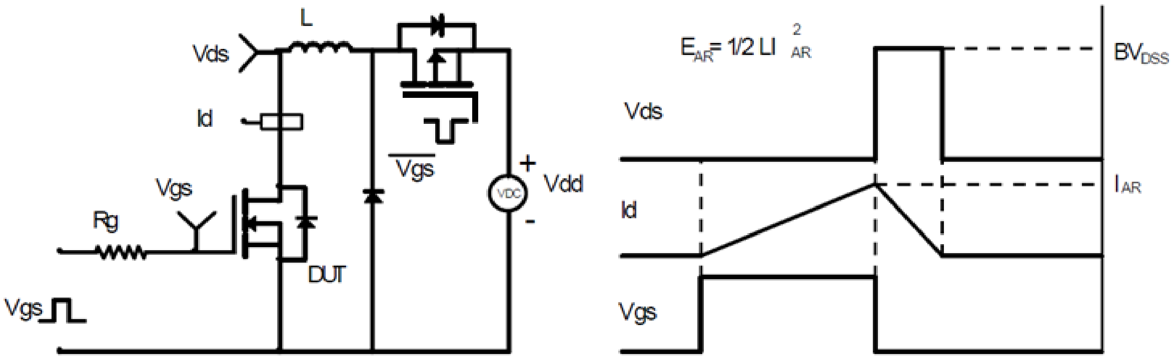
Gate Charge Test Circuit & Waveform



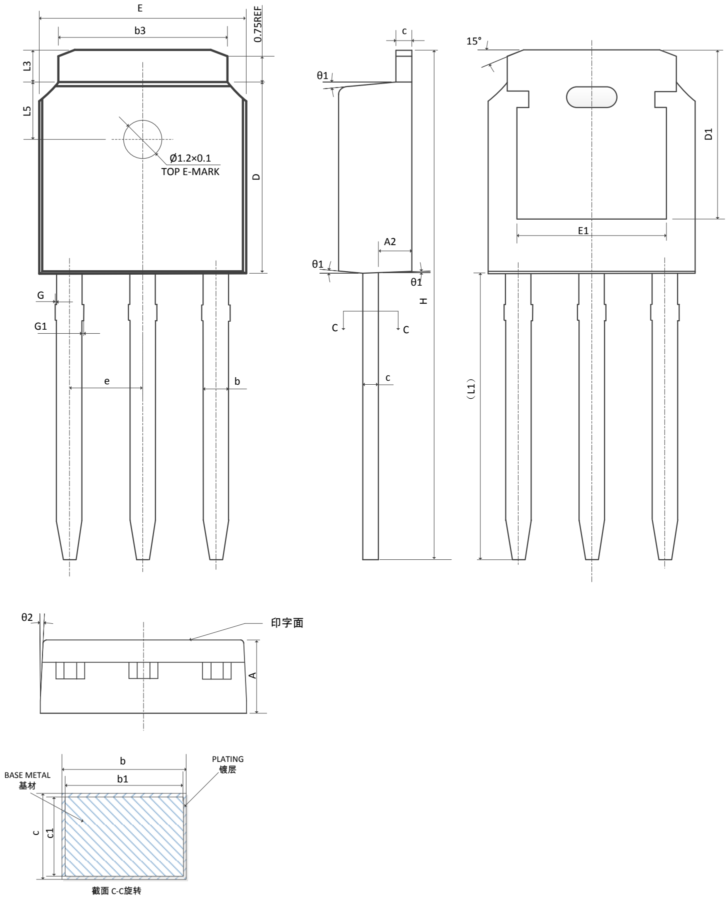
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



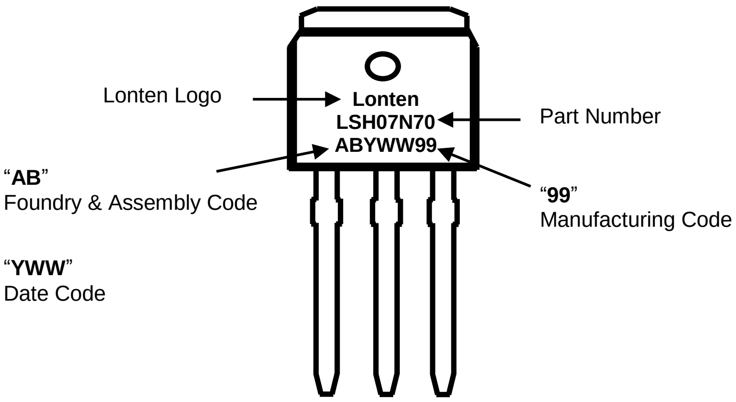
Mechanical Dimensions for TO-251



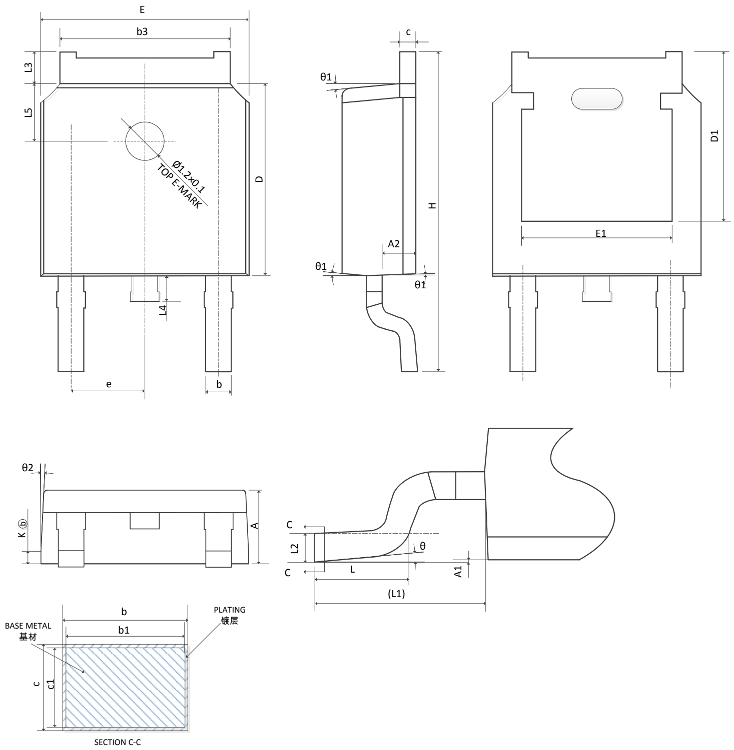
COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A2	0.97	1.07	1.17
b	0.72	0.78	0.85
b1	0.71	0.76	0.81
b3	5.23	5.33	5.46
c	0.47	0.53	0.58
c1	0.46	0.51	0.56
D	6.00	6.10	6.20
D1	5.30REF		
E	6.50	6.60	6.70
E1	4.70	4.83	4.92
e	2.286BSC		
H	16.10	16.40	16.60
L1	9.20	9.40	9.60
L3	0.90	1.02	1.25
L5	1.70	1.80	1.90
θ1	5°	7°	9°
θ2	5°	7°	9°

TO-251 Part Marking Information



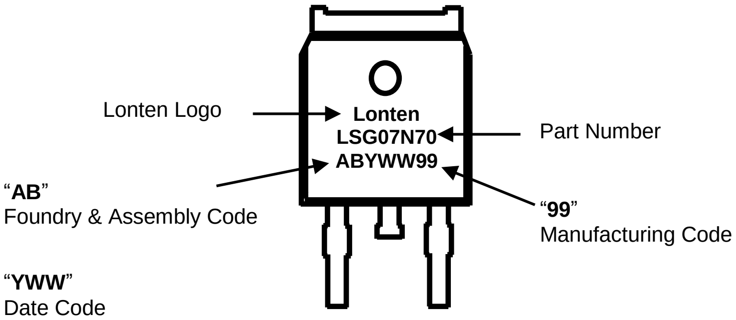
Mechanical Dimensions for TO-252



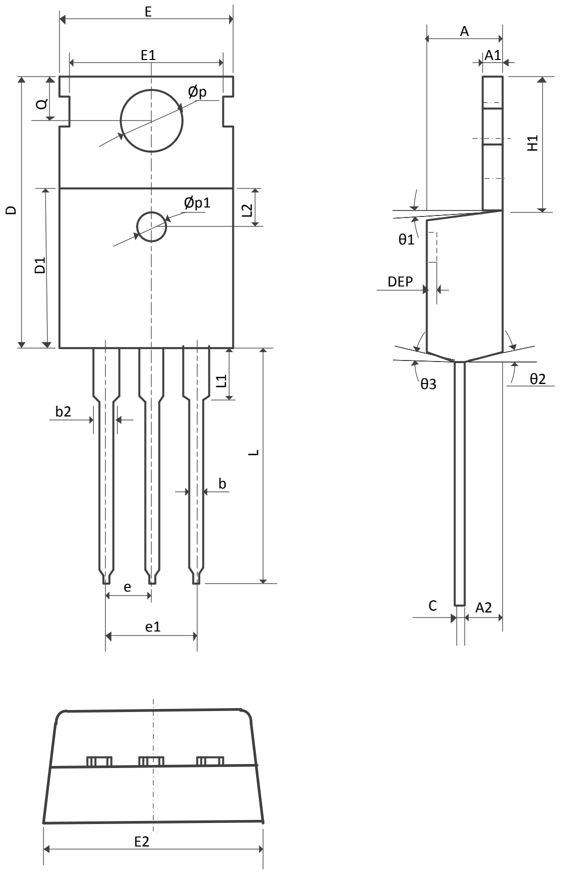
COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	—	0.10
A2	0.97	1.07	1.17
b	0.72	0.78	0.85
b1	0.71	0.76	0.81
b3	5.23	5.33	5.46
c	0.47	0.53	0.58
c1	0.46	0.51	0.56
D	6.00	6.10	6.20
D1	5.30REF		
E	6.50	6.60	6.70
E1	4.70	4.83	4.92
e	2.286BSC		
H	9.90	10.10	10.30
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.90	—	1.25
L4	0.60	0.80	1.00
L5	1.70	1.80	1.90
θ	0°	—	8°
θ1	5°	7°	9°
θ2	5°	7°	9°
K	0.40REF		

TO-252 Part Marking Information

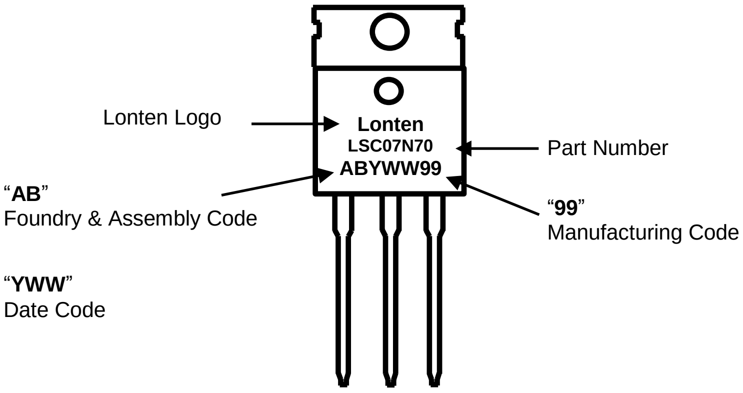


Mechanical Dimensions for TO-220

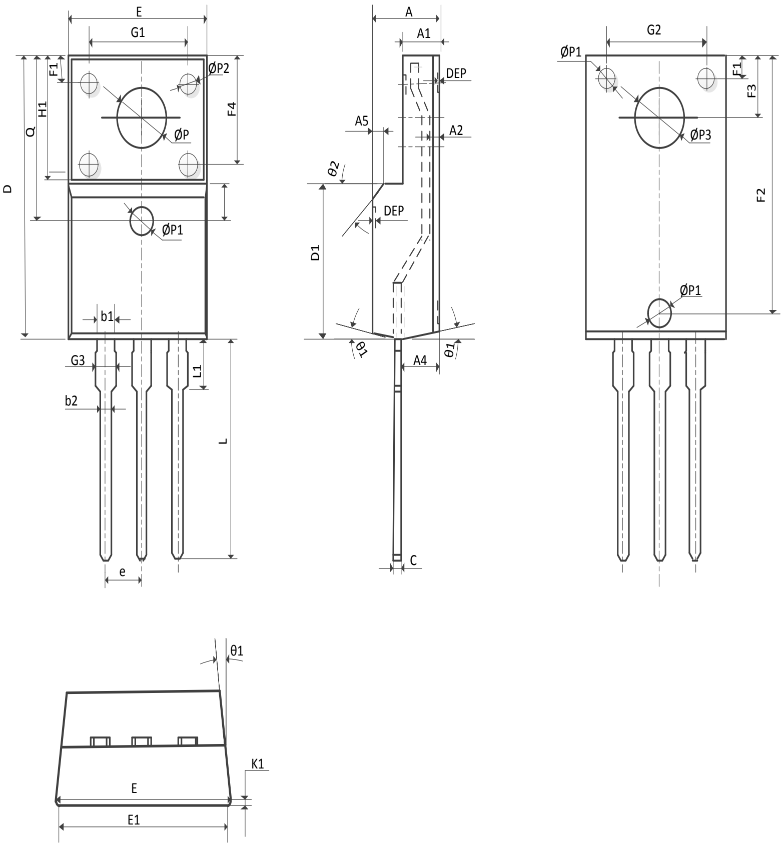


SYMBOL	COMMON DIMENSIONS					
	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.27	1.30	1.37	0.050	0.051	0.054
A2	2.35	2.40	2.50	0.091	0.094	0.098
b	0.77	0.80	0.90	0.030	0.031	0.035
b2	1.17	1.27	1.36	0.046	0.050	0.054
c	0.48	0.50	0.56	0.019	0.020	0.022
D	15.40	15.60	15.80	0.606	0.614	0.622
D1	9.00	9.10	9.20	0.354	0.358	0.362
DEP	0.05	0.10	0.20	0.002	0.004	0.008
E	9.80	10.00	10.20	0.386	0.394	0.402
E1	–	8.70	–	–	0.343	–
E2	9.80	10.00	10.20	0.386	0.394	0.401
Øp1	1.40	1.50	1.60	0.055	0.059	0.063
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
H1	6.40	6.50	6.60	0.252	0.256	0.260
L	12.75	13.50	13.65	0.502	0.531	0.537
L1	–	3.10	3.30	–	0.122	0.130
L2		2.50REF			0.098REF	
Øp	3.50	3.60	3.63	0.137	0.142	0.143
Q	2.73	2.80	2.87	0.107	0.110	0.116
θ1	5°	7°	9°	5°	7°	9°
θ2	1°	3°	5°	1°	3°	5°
θ3	1°	3°	5°	1°	3°	5°

TO-220 Part Marking Information

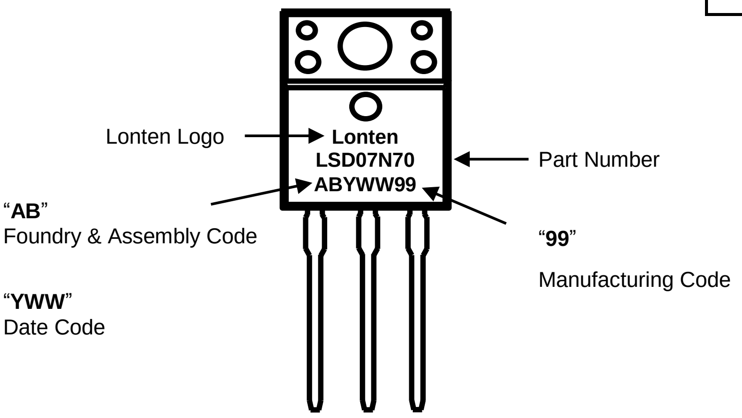


Mechanical Dimensions for TO-220F



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



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