Lonten N-channel 700V, 7A, 0.64Ω 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.
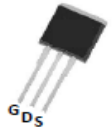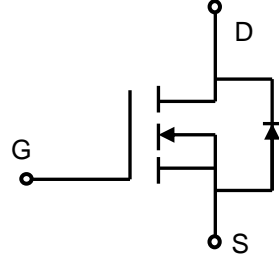
Features

◆ Ultra low $R_{DS(on)}$

◆ Ultra low gate charge (typ. Q_g = 15nC)

◆ 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
$R_{DS(on),max}$	0.64Ω
I_{DM}	21A
$Q_{g,typ}$	15nC

TO-251   TO-252   TO-220   TO-220MF

TO-262

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}	116	mJ
Avalanche energy, repetitive [3]	E_{AR}	0.5	mJ
Avalanche current, repetitive [3]	I_{AR}	7	A
Power Dissipation TO-220/TO-262 / TO-251/TO-252 (T_C = 25°C)	P_D	83	W
- Derate above 25°C		0.67	W/°C
Power Dissipation TO-220F (T_C = 25°C)		40	W
- Derate above 25°C		0.32	W/°C
Mounting torque To-220 (M3 and M3.5 screws)		60	Ncm

Mounting torque To-220F（M2.5 screws）		50	
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/TO-262

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.5	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

Thermal Characteristics TO-220MF

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.1	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	80	°C/W
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Tube	Units/Real
LSC70R640GT	TO-220	LSC70R640GT	50	
LSD70R640GT	TO-220MF	LSD70R640GT	50	
LSG70R640GT	TO-252	LSG70R640GT		2500
LSH70R640GT	TO-251	LSH70R640GT	72	
LSF70R640GT	TO-262	LSF70R640GT	72	

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	-	-	50	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30 V, V_{DS}=0 V	-	-	-50	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=3.5 A	-			
		T_j = 25°C	-	0.57	0.64	Ω
		T_j = 150°C	-	1.2	-	
Gate resistance	R_G	f=1 MHz, open drain	-	8.3	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 100 V, V_{GS} = 0 V,	-	584	-	
Output capacitance	C_{oss}	f = 1 MHz	-	23	-	pF
Reverse transfer capacitance	C_{rss}		-	1.3	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 300V, I_D = 3.5A	-	12	-	
Rise time	t_r	R_G = 12Ω, V_{GS}=10V	-	10	-	ns

Turn-off delay time	$t_{d(off)}$		-	31	-	
Fall time	t_f		-	6	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480 V, I_D=3.5A,	-	2.6	-	
Gate to drain charge	Q_{gd}	V_{GS}=0 to 10 V	-	7.1	-	nC
Gate charge total	Q_g		-	15.2	-	
Gate plateau voltage	$V_{plateau}$		-	5.8	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=3.5A	-	1.0	-	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=7A,	-	260	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=100 A/µs	-	3.0	-	µC
Peak reverse recovery current	I_{rrm}		-	17	-	A

Notes:

1. Limited by maximum junction temperature, maximum duty cycle is 0.75.

2. I_{AS} = 2A, V_{DD} = 50V, Starting T_j= 25°C.

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

Electrical Characteristics Diagrams
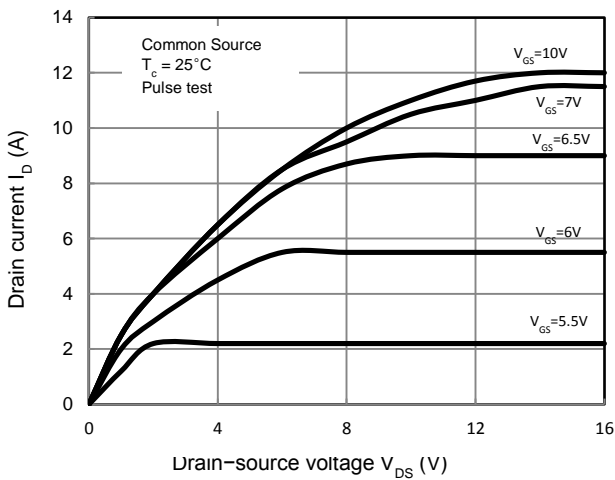
Figure 1. On-Region Characteristics

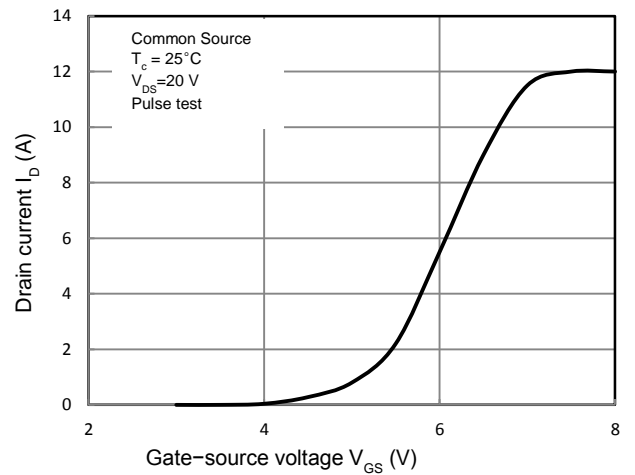Figure 2. Transfer Characteristics

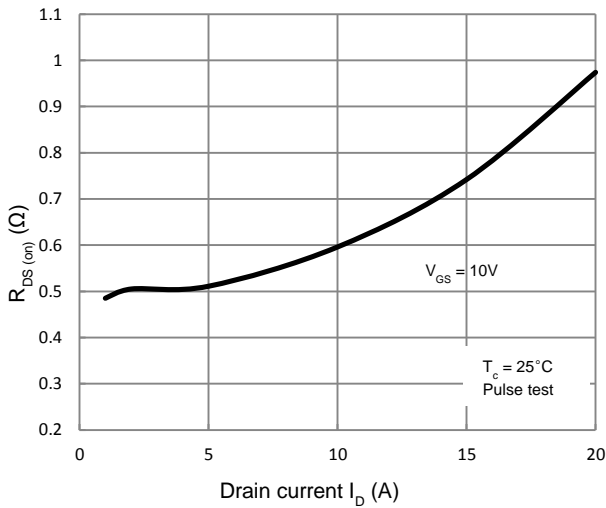Figure 3. On-Resistance Variation vs. Drain Current

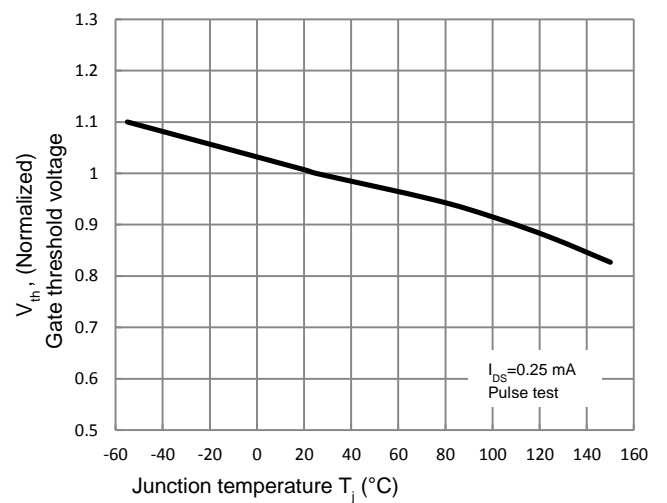
Figure 4. Threshold Voltage vs. Temperature

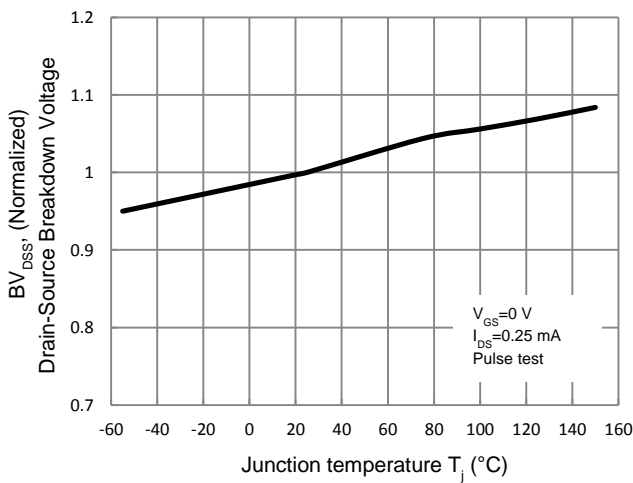Figure 5. Breakdown Voltage vs. Temperature
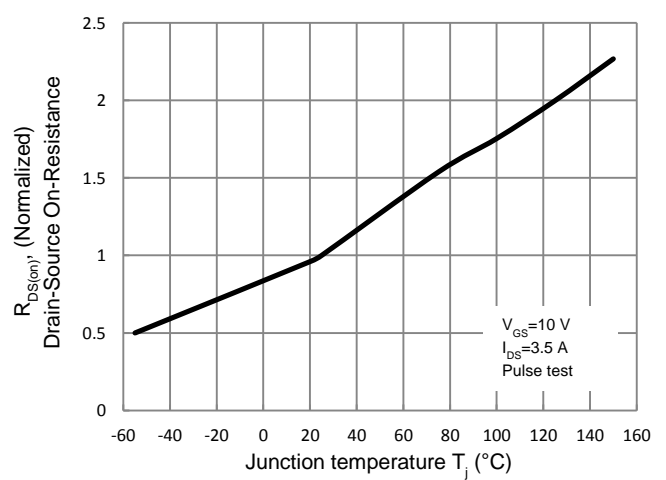

Figure 6. On-Resistance vs. Temperature

Figure 7. Capacitance Characteristics

Figure 8. Gate Charge Characterist
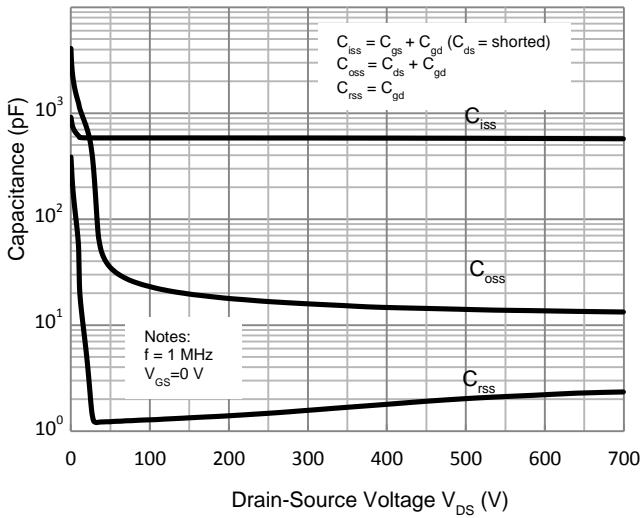
Figure 9.1 Maximum Safe Operating Area
TO-220MF
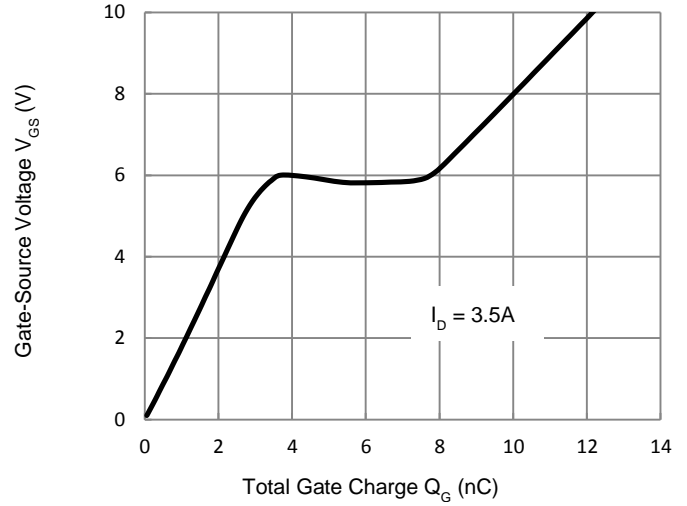
Figure 9.2 Maximum Safe Operating Area
TO-220/TO-251/TO-252/TO-262

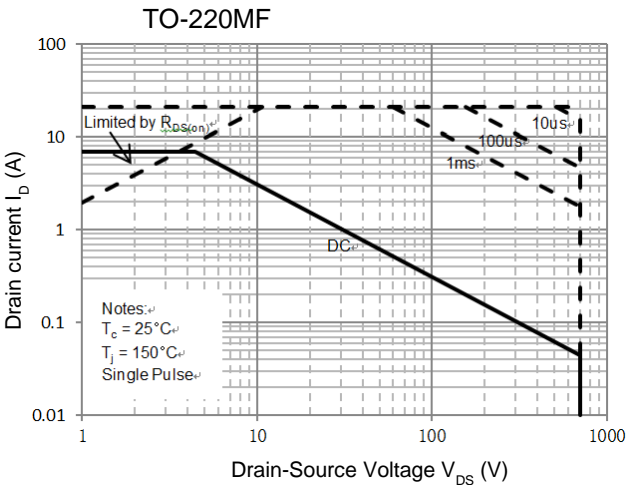Figure 10.1 Power Dissipation vs. Temperature
TO-220MF
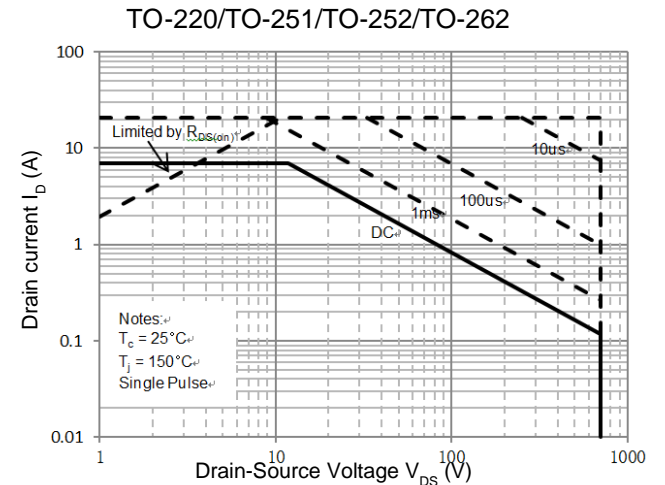
Figure 10.2 Power Dissipation vs. Temperature
TO-220/TO-251/TO-252/TO-262

Figure 11.1 Transient Thermal Response Curve

TO-220MF

Figure 11.1 Transient Thermal Response Curve

TO-220/TO-251/TO-252
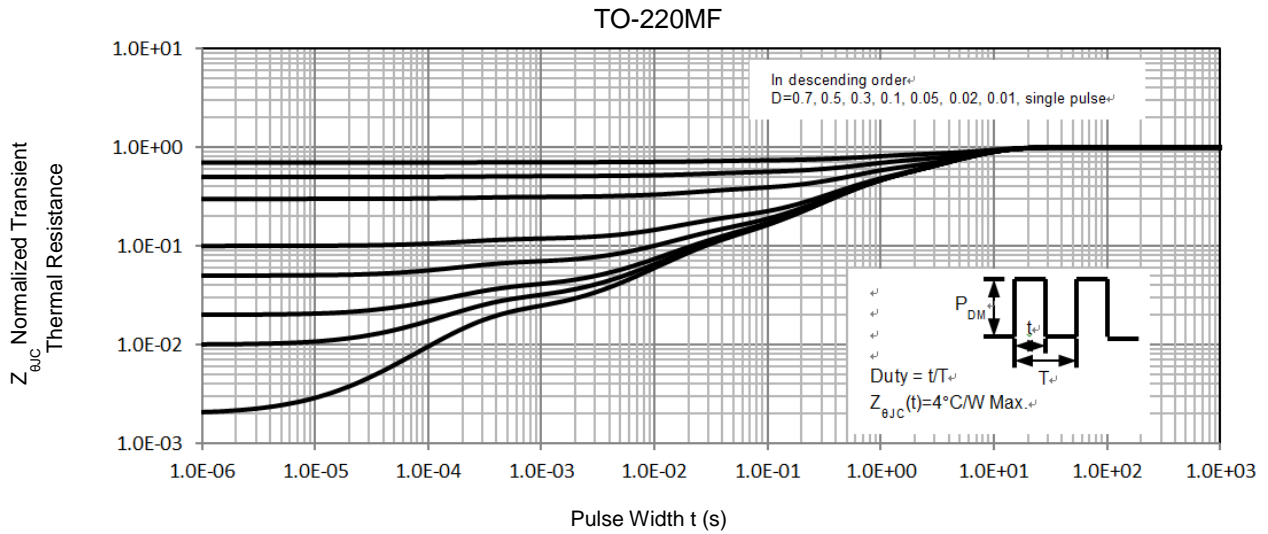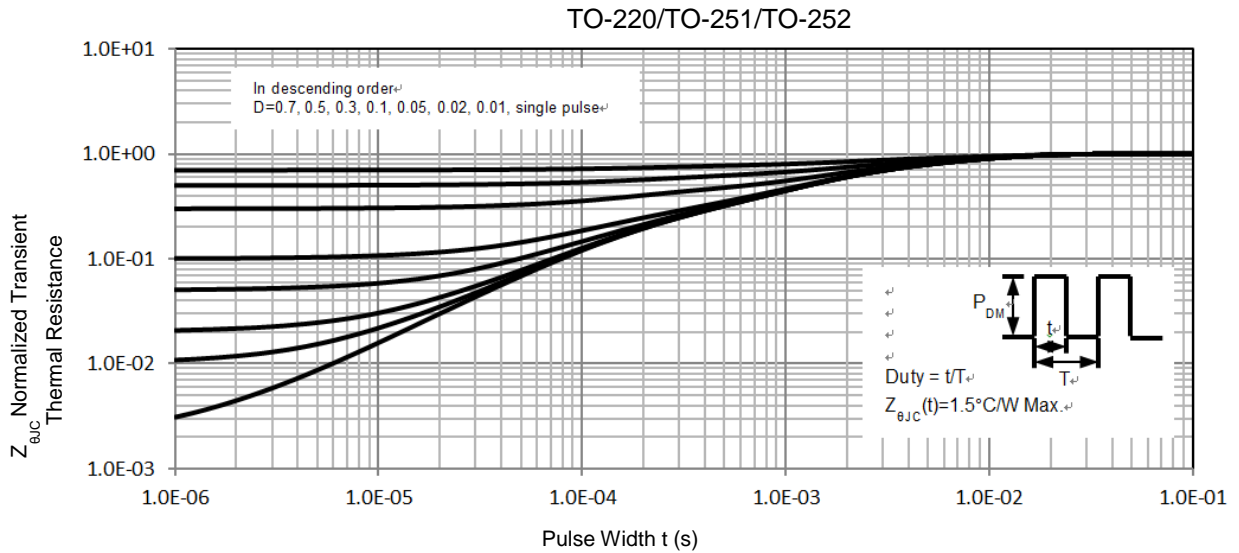
Gate Charge Test Circuit & Waveform
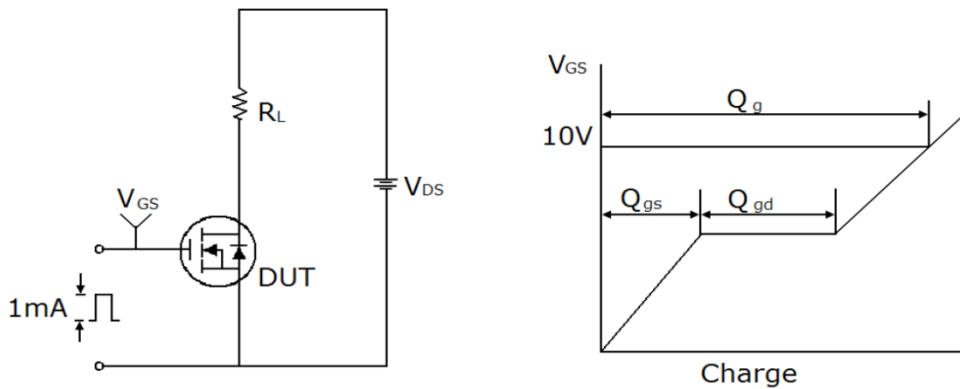
Switching Test Circuit & Waveforms
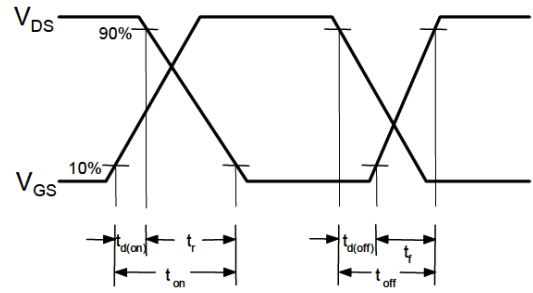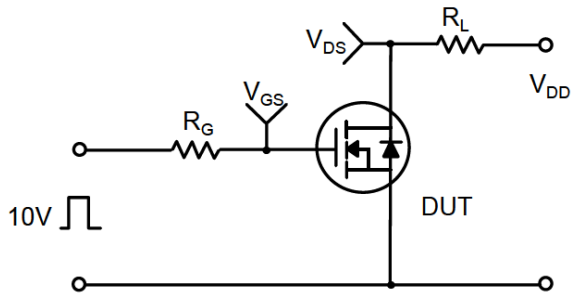
Unclamped Inductive Switching Test Circuit & Waveforms
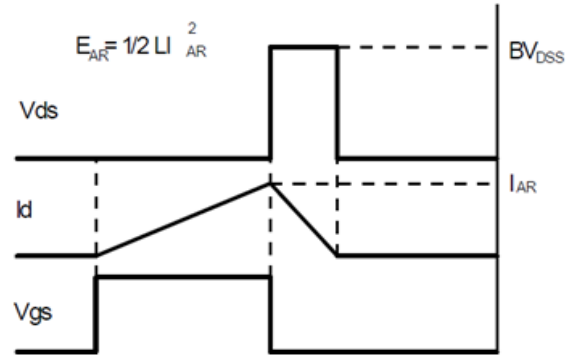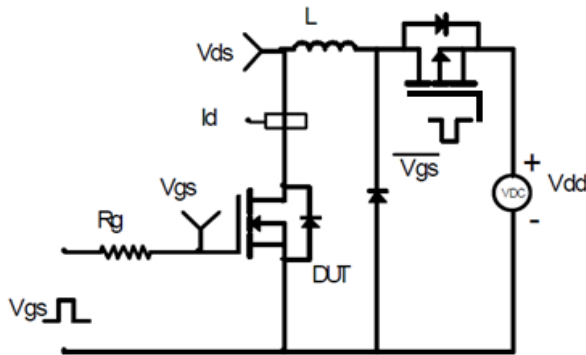
Mechanical Dimensions for TO-251

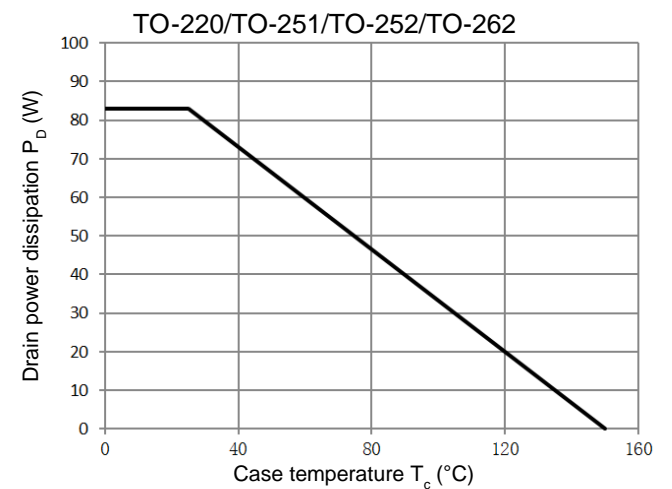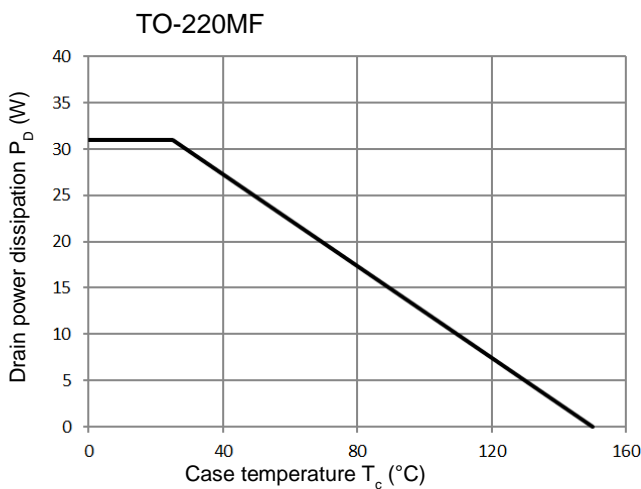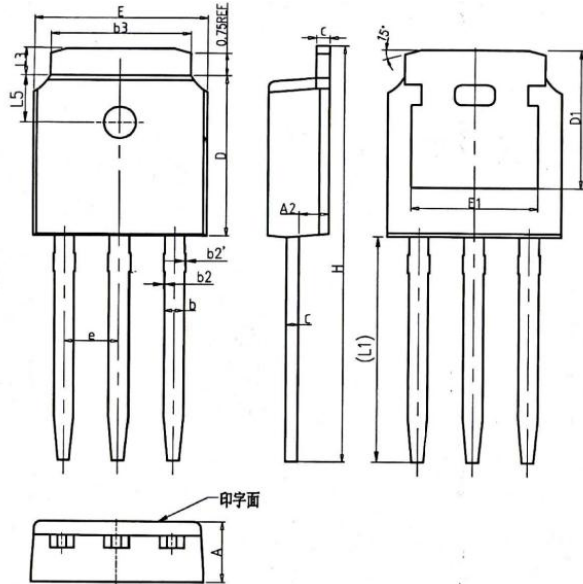| COMMON DIMENSIONS			
SYMBOL	MM		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b2	0.00	0.04	0.10
b2'	0.00	0.04	0.10
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	—	—
e	2.286BSC		
H	16.22	16.52	16.82
L1	9.15	9.40	9.65
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

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TO-251 Part Marking Information

Lonten Logo

Lonten
LSH70R640GT
ABYWW99

Part Number

"**AB**"
Foundry & Assembly Code

"**99**"
Manufacturing Code

"**YWW**"
Date Code
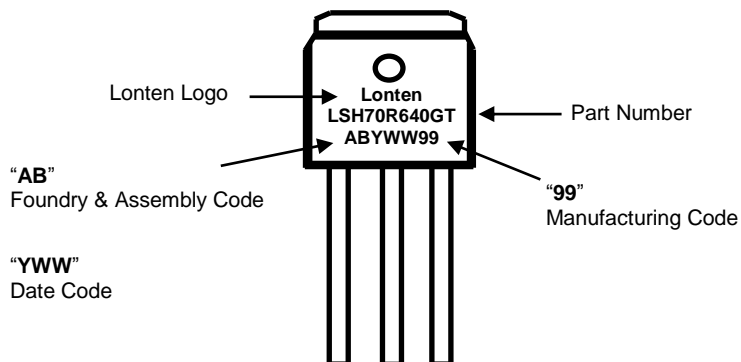
Mechanical Dimensions for TO-252
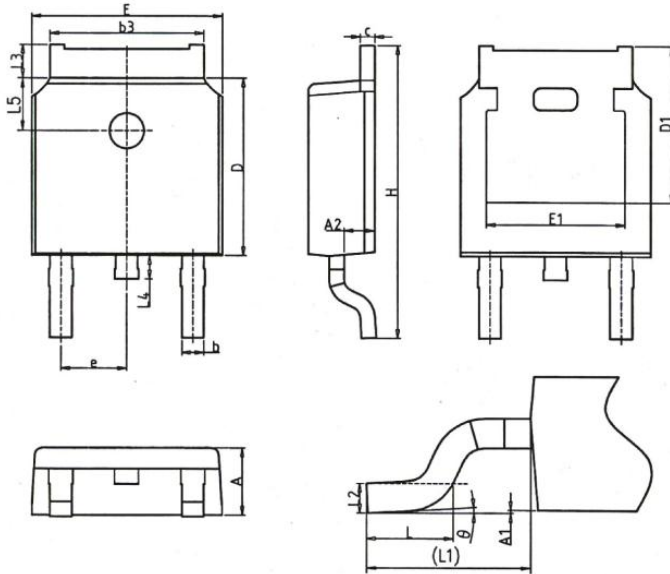
COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	—	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	—	—
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	—	1.28
L4	0.50	—	1.00
L5	1.65	1.80	1.95
θ	0°	—	8°

TO-252 Part Marking Information

Lonten Logo

Lonten
LSG70R640GT
ABYWW99

Part Number

"**AB**"
Foundry & Assembly Code

"**99**"
Manufacturing Code

"**YWW**"
Date Code
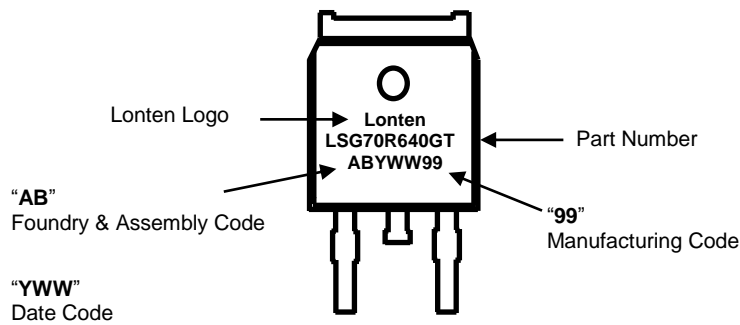
Mechanical Dimensions for TO-220
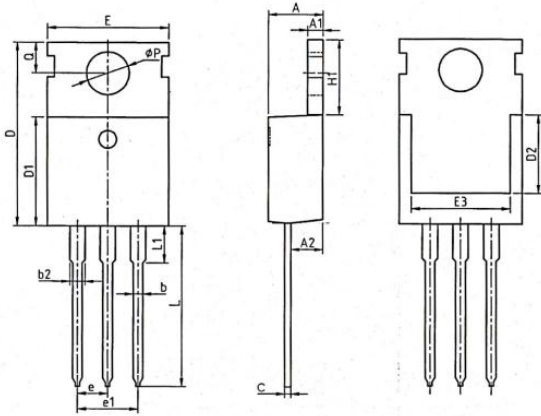
COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.37	4.57	4.70	0.172	0.180	0.185
A1	1.25	1.30	1.40	0.049	0.051	0.055
A2	2.20	2.40	2.60	0.087	0.094	0.102
b	0.70	0.80	0.95	0.028	0.031	0.037
b2	1.17	1.27	1.47	0.046	0.050	0.058
c	0.45	0.50	0.60	0.018	0.020	0.024
D	15.10	15.60	16.10	0.594	0.614	0.634
D1	8.80	9.10	9.40	0.346	0.358	0.370
D2	5.50	—	—	0.217	—	—
E	9.70	10.00	10.30	0.382	0.394	0.406
E3	7.00	—	—	0.276	—	—
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
H1	6.25	6.50	6.85	0.246	0.256	0.270
L	12.75	13.50	13.80	0.502	0.531	0.543
L1	—	3.10	3.40	—	0.122	0.134
Øp	3.40	3.60	3.80	0.134	0.142	0.150
Q	2.60	2.80	3.00	0.102	0.110	0.118

TO-220 Part Marking Information

Lonten Logo

Part Number

"**AB**"
Foundry & Assembly Code

"**99**"
Manufacturing Code

"**YWW**"
Date Code

Lonten
LSC70R640GT
ABYWW99
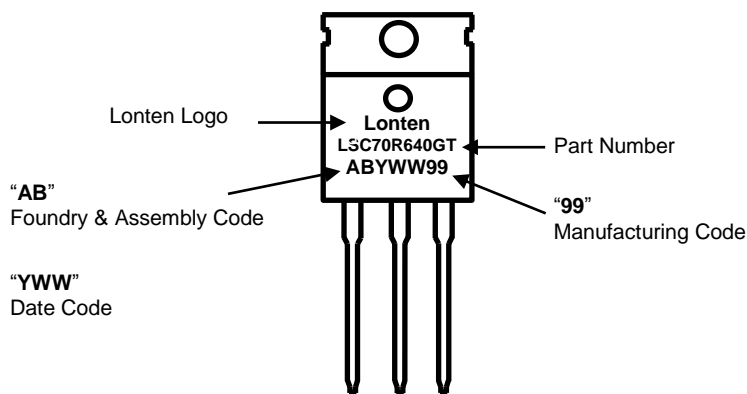
Mechanical Dimensions for TO-220MF
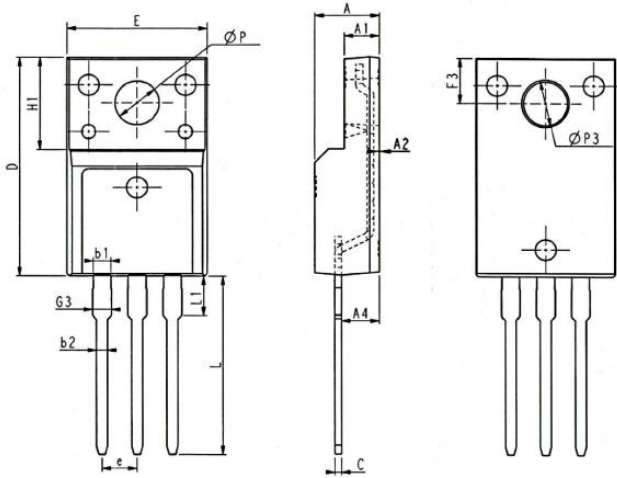
COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
E	9.96	10.16	10.36	0.392	0.400	0.408
A	4.50	4.70	4.90	0.177	0.185	0.193
A1	2.34	2.54	2.74	0.092	0.100	0.108
A2	0.30	0.45	0.60	0.012	0.002	0.024
A4	2.65	2.76	2.96	0.104	0.109	0.117
C	0.40	0.50	0.65	0.016	0.020	0.026
D	15.57	15.87	16.17	0.613	0.625	0.637
H1	6.70REF			0.264REF		
e	2.54BSC			0.1BSC		
ØP	3.03	3.18	3.38	0.119	0.125	0.133
L	12.68	12.98	13.28	0.499	0.511	0.523
L1	2.88	3.03	3.18	0.113	0.119	0.125
ØP3	3.15REF			0.124REF		
F3	3.15	3.30	3.45	0.124	0.130	0.136
G3	1.25	1.35	1.55	0.049	0.053	0.061
b1	1.18	1.28	1.43	0.046	0.050	0.056
b2	0.70	0.80	0.95	0.028	0.031	0.037

TO-220MF Part Marking Information

Lonten Logo

Lonten
LSD70R640GT
ABYWW99

Part Number

"**AB**"
Foundry & Assembly Code

"**99**"
Manufacturing Code

"**YWW**"
Date Code

Mechanical Dimensions for TO-262

TO-262 Part Marking Information

Lonten Logo → **Lonten**

LSF70R640GT ← Part Number

ABYWW99

"**AB**"
Foundry & Assembly Code

"**99**"
Manufacturing Code

"**YWW**"
Date Code
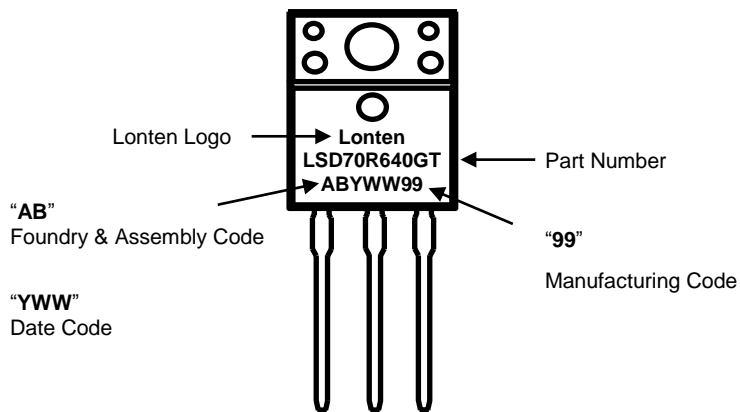
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