Lonten N-channel 40V, 120A, 2.8mΩ Power MOSFET

Description

These N-Channel enhancement mode power field effect transistors are using split gate trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

Features

- 40V,120A, $R_{DS(on),max}$ =2.8mΩ@V_{GS} = 10V
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green device available

Applications

- Motor Drives
- UPS
- DC-DC Converter

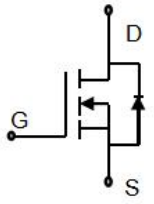
Product Summary

V_{DSS}	40V
$R_{DS(on),max}$@ V_{GS}=10V	2.8mΩ
I_D	120A

Pin Configuration

TO-251

TO-252



N-Channel MOSFET

Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	40	V
Continuous drain current (T_C = 25°C)[1]	I_D	120	A
Continuous drain current (T_C = 100°C)		81	A
Pulsed drain current[2]	I_{DM}	360	A
Gate-Source voltage	V_{GSS}	±18	V
Avalanche energy[3]	E_{AS}	225	mJ
Power Dissipation (T_C = 25°C)	P_D	57.6	W
Storage Temperature Range	T_{STG}	-55 to +150	°C
Operating Junction Temperature Range	T_J	-55 to +150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.67	°C/W

Package Marking and Ordering Information

Device	Device Package	Marking
LSGH04R028	TO-251	LSGH04R028
LSGG04R028	TO-252	LSGG04R028

Electrical Characteristics

T_J = 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=250uA	40	---	---	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	1.0	---	2.2	V
Drain-source leakage current	I_{DSS}	V_{DS}=40 V, V_{GS}=0V, T_J = 25°C	---	---	1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=20 V, V_{DS}=0 V	---	---	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-20 V, V_{DS}=0 V	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=50 A	---	---	2.8	mΩ
		V_{GS}=4.5 V, I_D=20 A	---	---	5.3	mΩ
Forward transconductance	g_{fs}	V_{DS} =10V , I_D=20A	---	131	---	S
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, F = 1MHz	---	3210	---	pF
Output capacitance	C_{oss}		---	2130	---	
Reverse transfer capacitance	C_{rss}		---	343	---	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 15V,V_{GS}=10V, I_D = 20A R_G=1.6Ω	---	9	---	ns
Rise time	t_r		---	4	---	
Turn-off delay time	$t_{d(off)}$		---	45	---	
Fall time	t_f		---	7	---	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DS}=15V, I_D=15A, V_{GS}= 10 V	---	7	---	nC
Gate to drain charge	Q_{gd}		---	17.5	---	
Gate charge total	Q_g		---	67	---	
Drain-Source diode characteristics and Maximum Ratings						
Continuous Source Current	I_S		---	---	120	A
Pulsed Source Current[4)]	I_{SM}		---	---	360	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=40A, T_J=25℃	---	0.85	1.2	V
Reverse Recovery Time	t_{rr}	I_S=I_F, di/dt=100A/us, T_J=25℃ [5)]	---	---	26	ns
Reverse Recovery Charge	Q_{rr}		---	---	95	nC

Notes:

1: The maximum junction current rating is package limited.

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

3: V_{DD}=23V, V_{GS}=10V, L=0.5mH, I_{AS}=30A, R_G=25Ω, Starting T_J=25℃.

4: Pulse Test：Pulse Width ≤300 μs, Duty Cycle≤2%.

5: Guaranteed by design, not subject to production.

Electrical Characteristics Diagrams

Fig 1: Output Characteristics

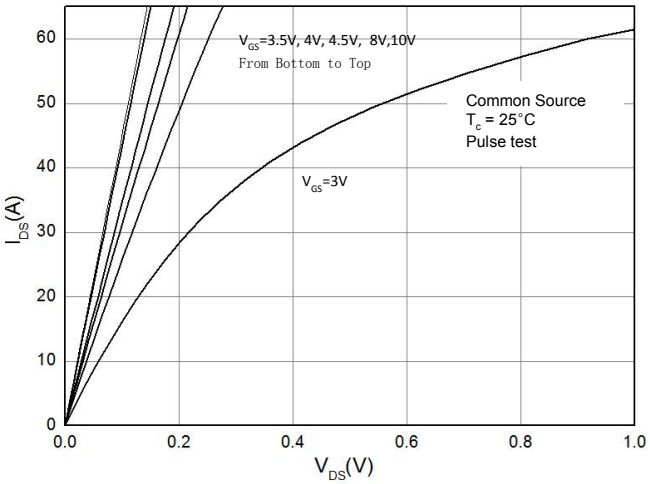


Fig 2: Transfer Characteristics

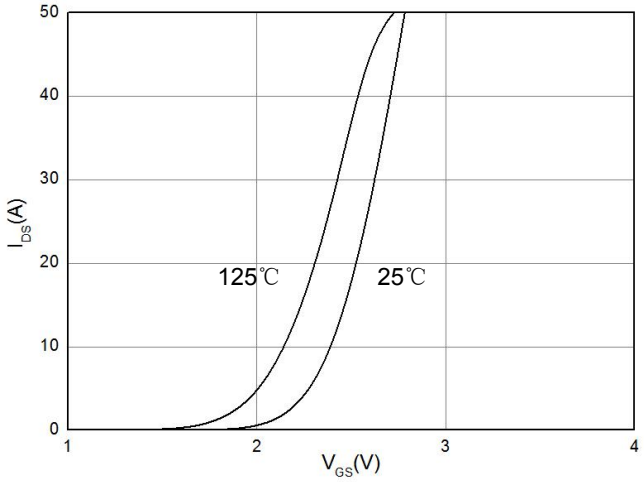


Figure 3. Capacitance Characteristics

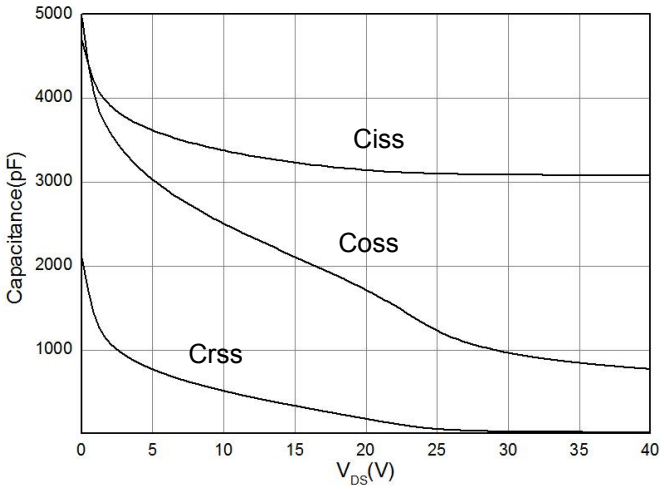


Figure 4. Gate Charge Waveform

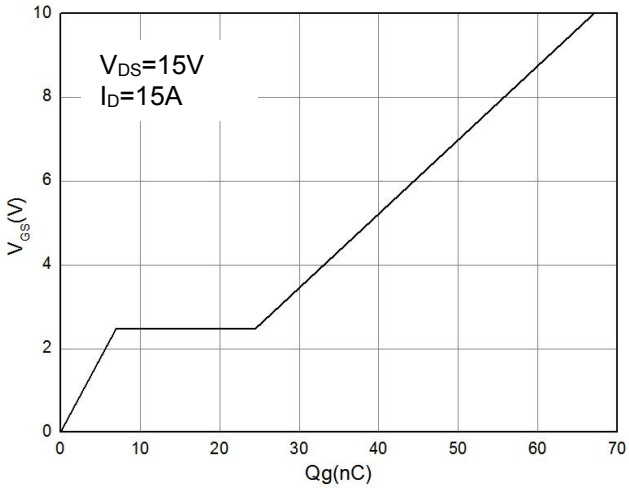


Figure 5. Body-Diode Characteristics

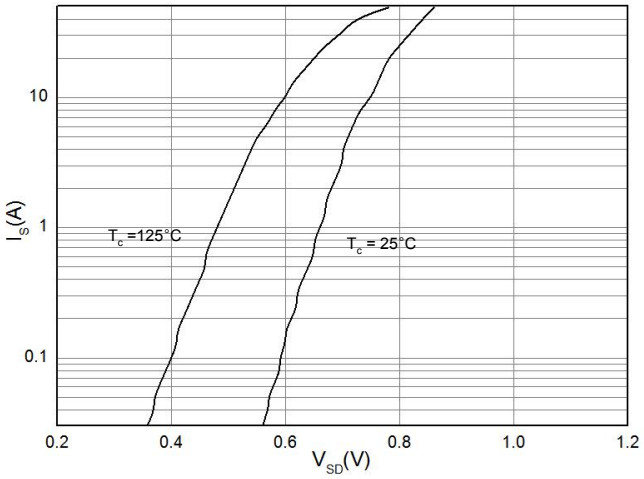


Figure 6. Rdson-Drain Current

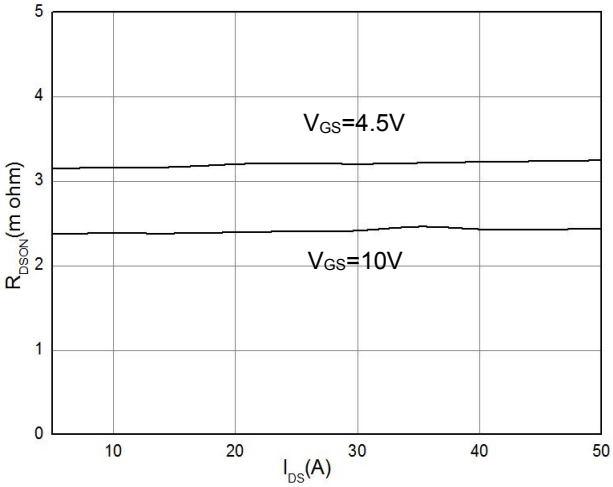


Fig 7: Rds(on) vs Gate Voltage

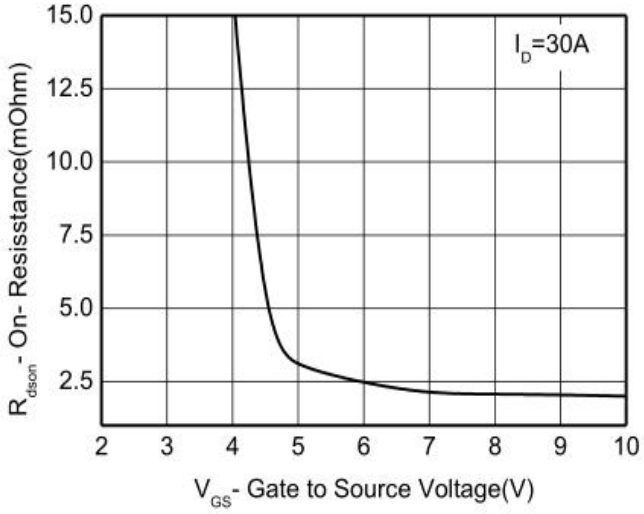


Fig 8: Rdson-Junction Temperature(℃)

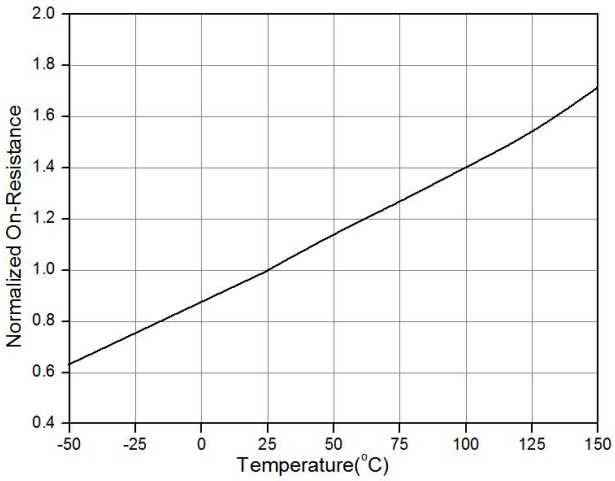


Figure 9. BVdss vs. Junction temperature

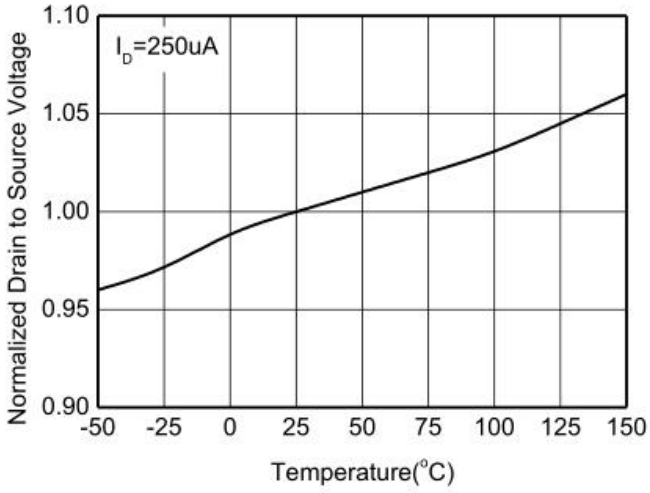


Figure 10. Maximum Safe Operating Area

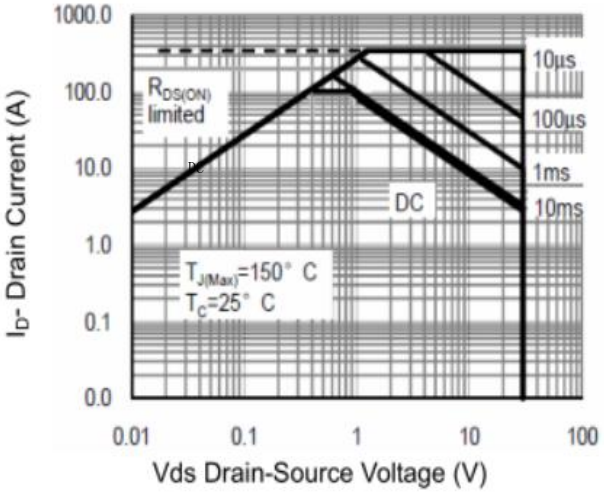
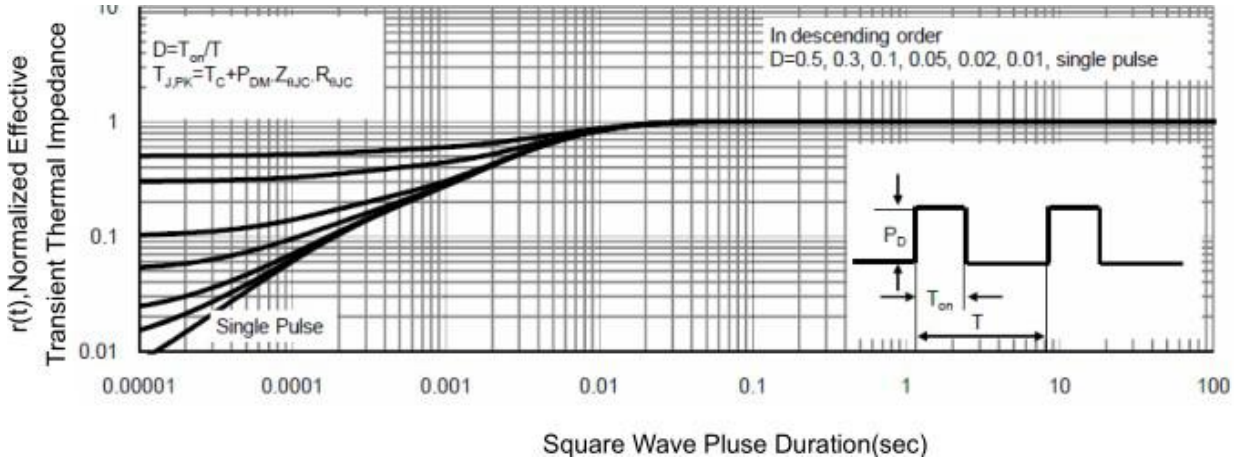


Figure 11. Normalized Maximum Transient Thermal Impedance (RthJC)



Test Circuit & Waveform

Figure 12. Gate Charge Test Circuit & Waveform

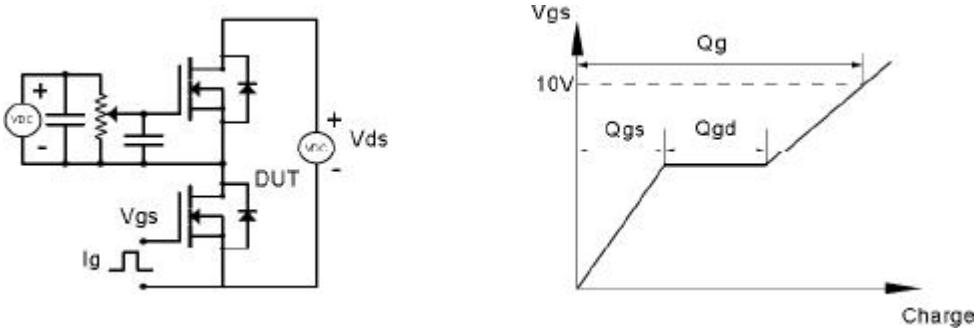


Figure 13. Resistive Switching Test Circuit & Waveforms

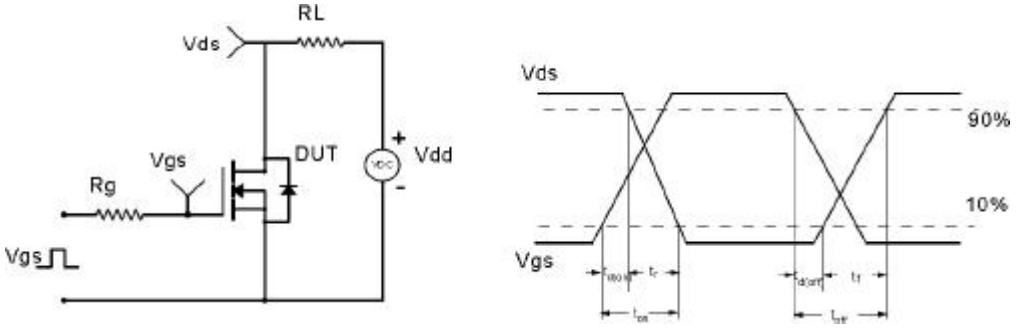


Figure 14. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

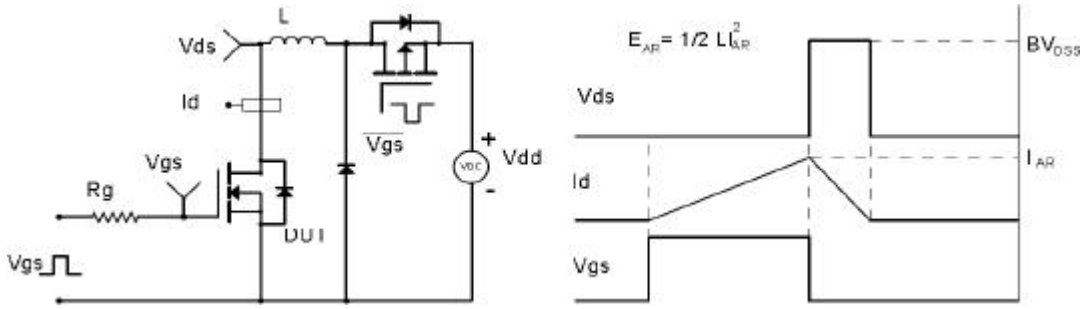
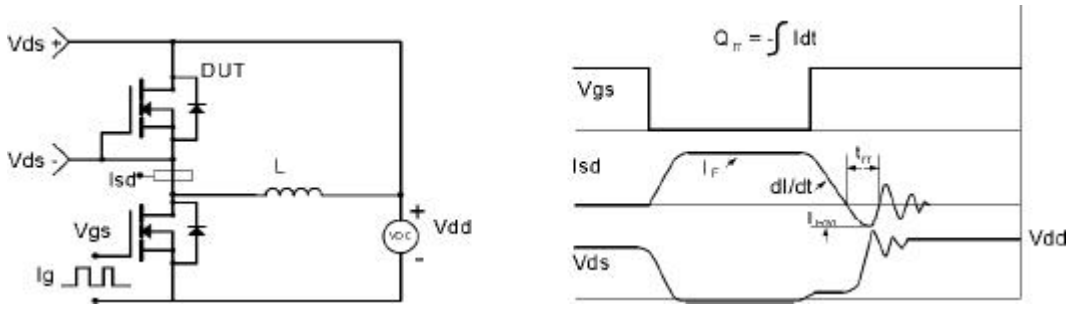
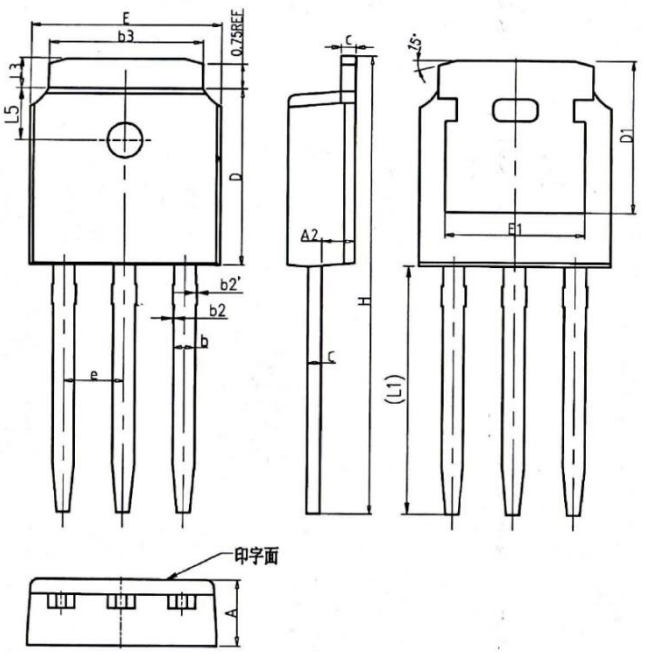


Figure 15. Diode Recovery Circuit & Waveform

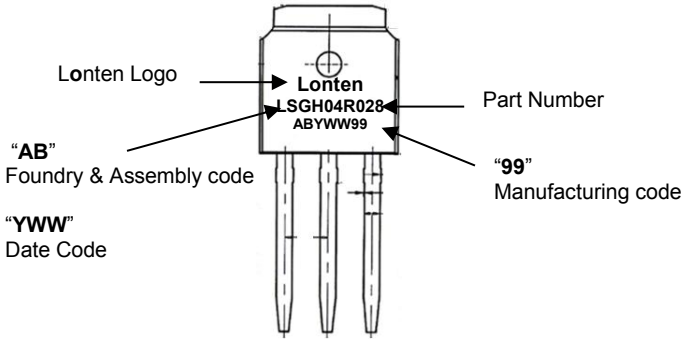


Mechanical Dimensions for TO-251



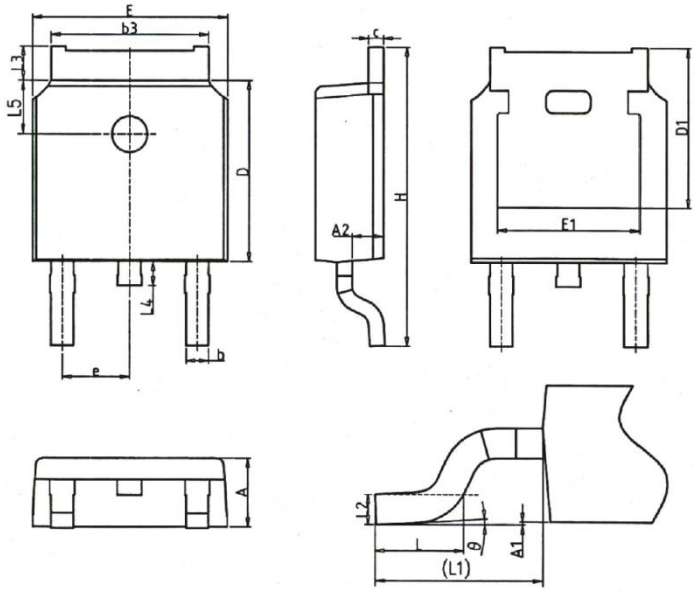
COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.20	2.30	2.38	0.087	0.091	0.094
A2	0.97	1.07	1.17	0.038	0.042	0.046
b	0.68	0.78	0.90	0.027	0.031	0.035
b2	0.00	0.04	0.10	0.000	0.002	0.004
b2'	0.00	0.04	0.10	0.000	0.002	0.004
b3	5.20	5.33	5.46	0.205	0.210	0.215
c	0.43	0.53	0.61	0.017	0.021	0.024
D	5.98	6.10	6.22	0.235	0.240	0.245
D1	5.30REF			0.209REF		
E	6.40	6.60	6.73	0.252	0.260	0.265
E1	4.63	-	-	0.182	-	-
e	2.286BSC			0.090BSC		
H	16.22	16.52	16.82	0.639	0.650	0.662
L1	9.15	9.40	9.65	0.360	0.370	0.380
L3	0.88	1.02	1.28	0.035	0.040	0.050
L5	1.65	1.80	1.95	0.065	0.071	0.077

TO-251 Part Marking Information



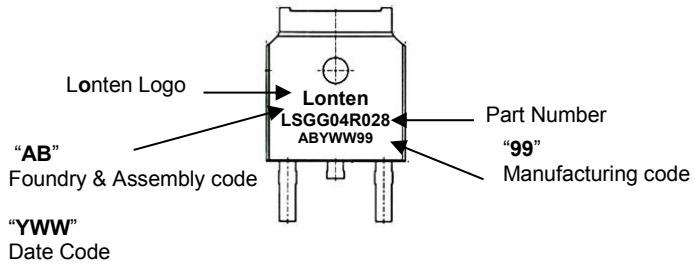
Calendar Year	Year Code	Calendar Week	Week Code
2018	G	Workweek 01	01
2019	H	Workweek 02	02
2020	I	Workweek 03	03
2021	J	Workweek 04	04
2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M	…..	…..

Mechanical Dimensions for TO-252



COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.20	2.30	2.38	0.087	0.091	0.094
A1	0.00	-	0.20	0.000	-	0.008
A2	0.97	1.07	1.17	0.038	0.042	0.046
b	0.68	0.78	0.90	0.027	0.031	0.035
b3	5.20	5.33	5.46	0.205	0.210	0.215
c	0.43	0.53	0.61	0.017	0.021	0.024
D	5.98	6.10	6.22	0.235	0.240	0.245
D1	5.30REF			0.209REF		
E	6.40	6.60	6.73	0.252	0.260	0.265
E1	4.63	-	-	0.182	-	-
e	2.286BSC			0.090BSC		
H	9.40	10.10	10.50	0.370	0.398	0.413
L	1.38	1.50	1.75	0.054	0.059	0.069
L1	2.90REF			0.114REF		
L2	0.51BSC			0.020BSC		
L3	0.88	-	1.28	0.035	-	0.050
L4	0.50	-	1.00	0.020	-	0.039
L5	1.65	1.80	1.95	0.065	0.071	0.077
θ	0°	-	8°	0°	-	8°

TO-252 Part Marking Information



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2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M	…..	…..

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