Lonten N-channel 40V, 120A, 2.5mΩ 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, $R_{DS(on),max}$ =2.5mΩ@V_{GS} = 10V
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green device available

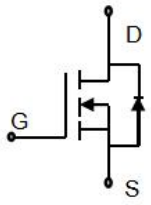
Applications

- Motor Drives
- UPS
- DC-DC Converter

Product Summary

V_{DSS}	40V
$R_{DS(on),max}$@ V_{GS}=10V	2.5mΩ
I_D	120A

Pin Configuration



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
LSGN04R025	PPAK5X6	LSGN04R025
LSGC04R025	TO-220	LSGC04R025

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}=18 V, V_{DS}=0 V	---	---	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-18 V, V_{DS}=0 V	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=50 A	---	---	2.5	mΩ
		V_{GS}=4.5 V, I_D=20 A	---	---	5	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

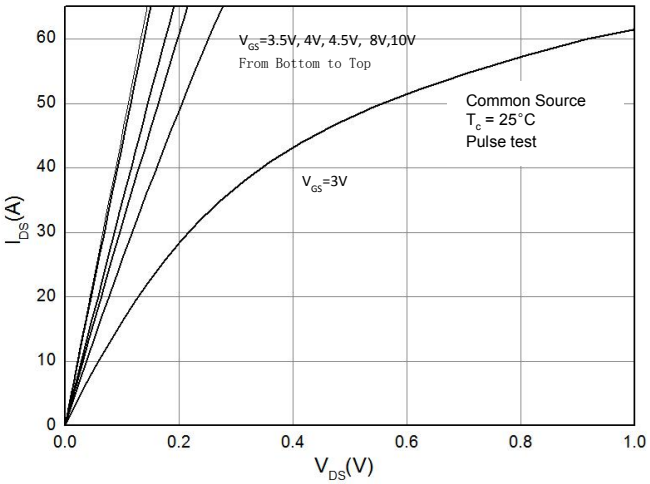


Fig 2: Transfer Characteristics

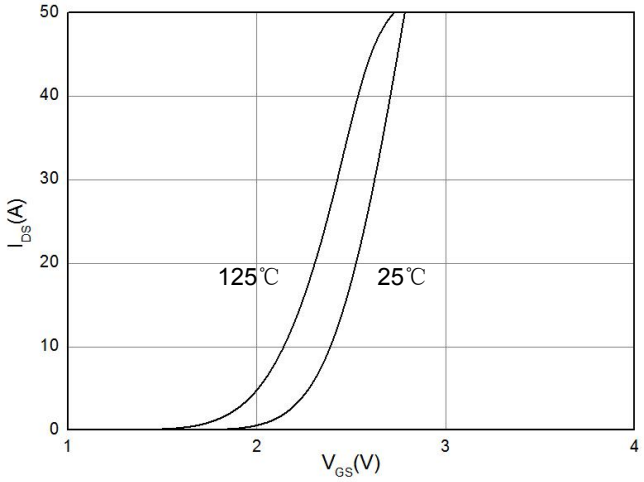


Figure 3. Capacitance Characteristics

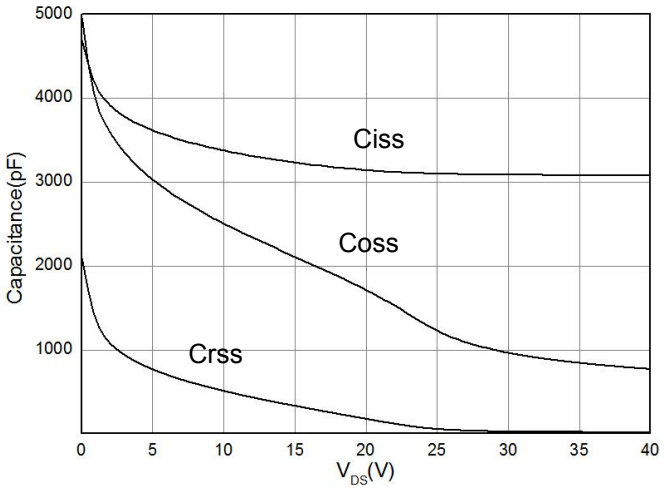


Figure 4. Gate Charge Waveform

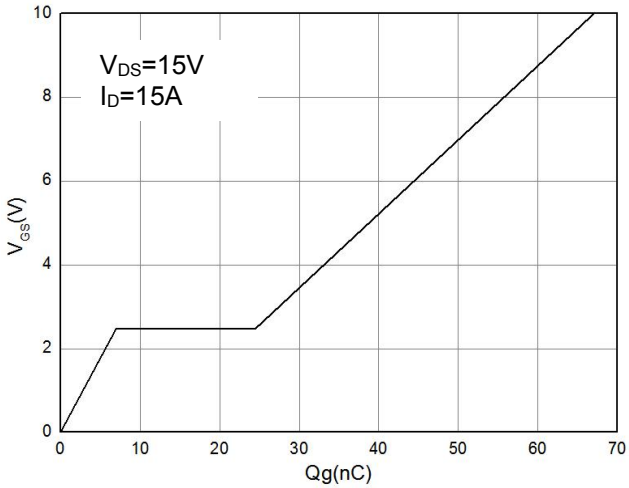


Figure 5. Body-Diode Characteristics

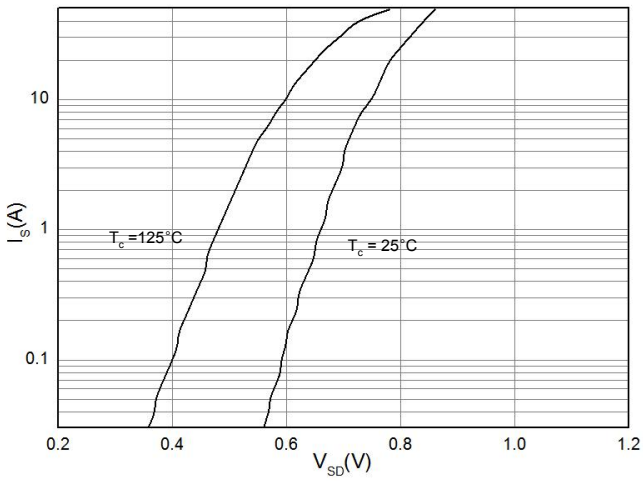


Figure 6. Rdson-Drain Current

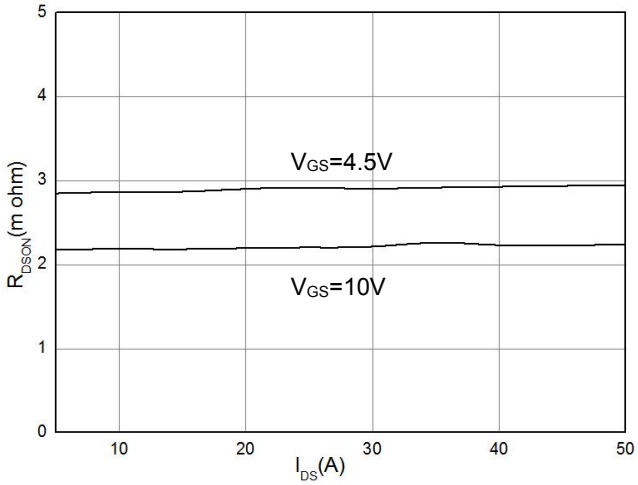


Fig 7: Rds(on) vs Gate Voltage

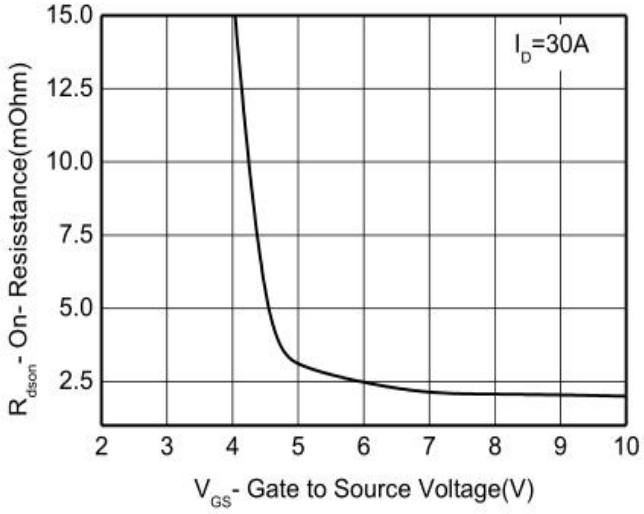


Fig 8: Rdson-Junction Temperature(℃)

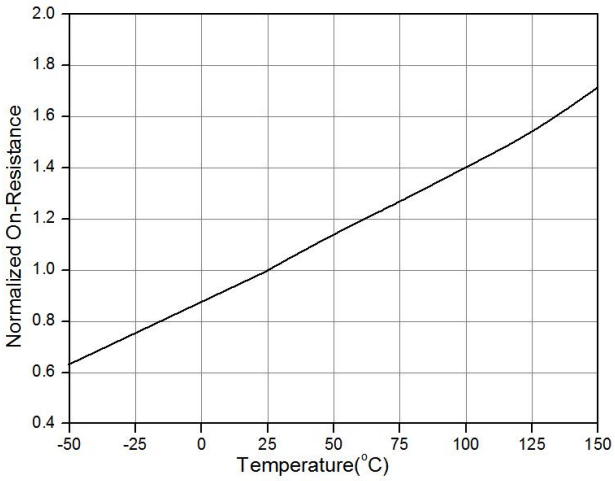


Figure 9. BVdss vs. Junction temperature

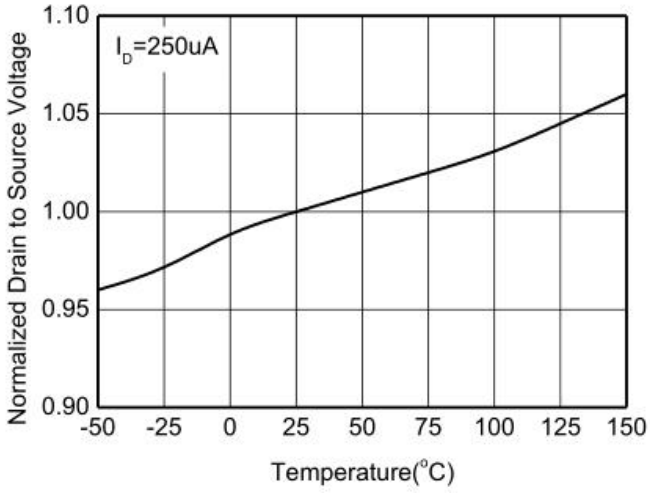


Figure 10. Maximum Safe Operating Area

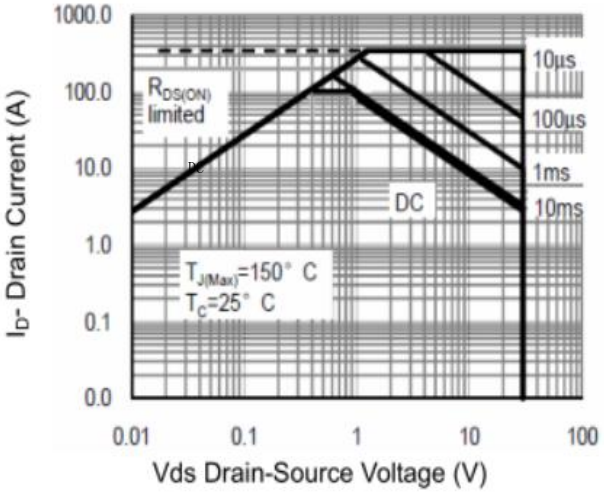
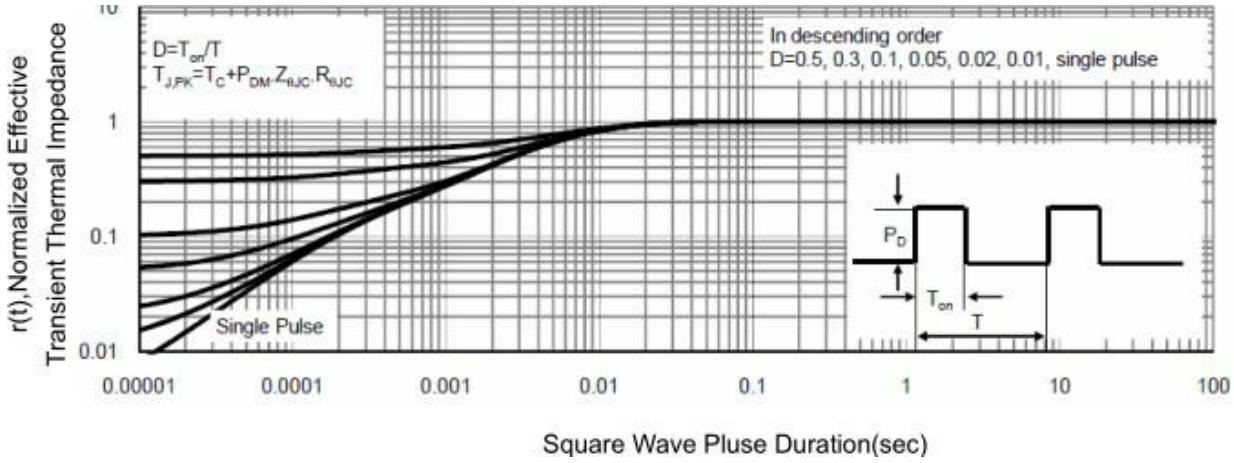


Figure 11. Normalized Maximum Transient Thermal Impedance (RthJC)



Test Circuit & Waveform

Figure 12. Gate Charge Test Circuit & Waveform

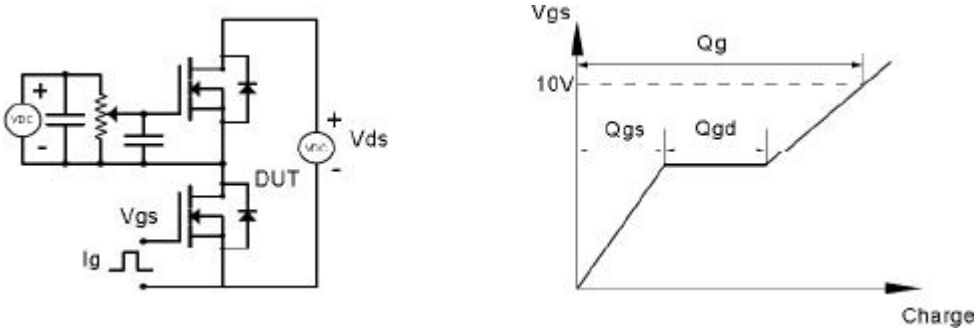


Figure 13. Resistive Switching Test Circuit & Waveforms

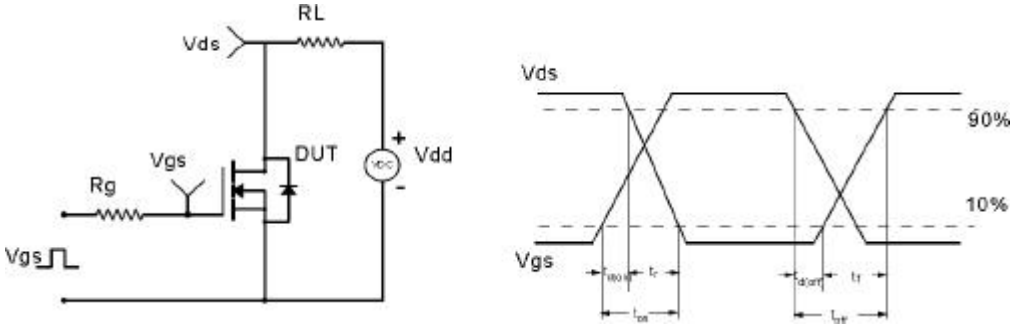


Figure 14. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

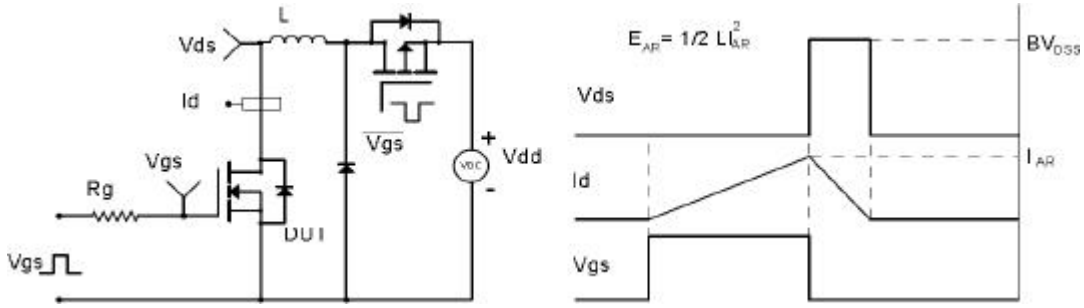
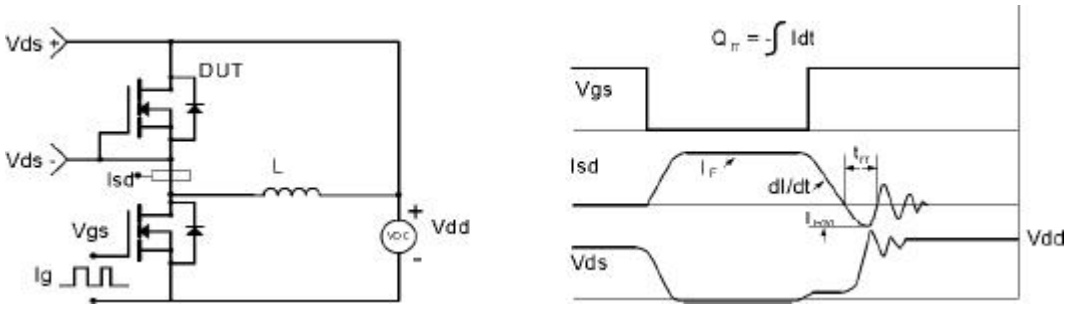
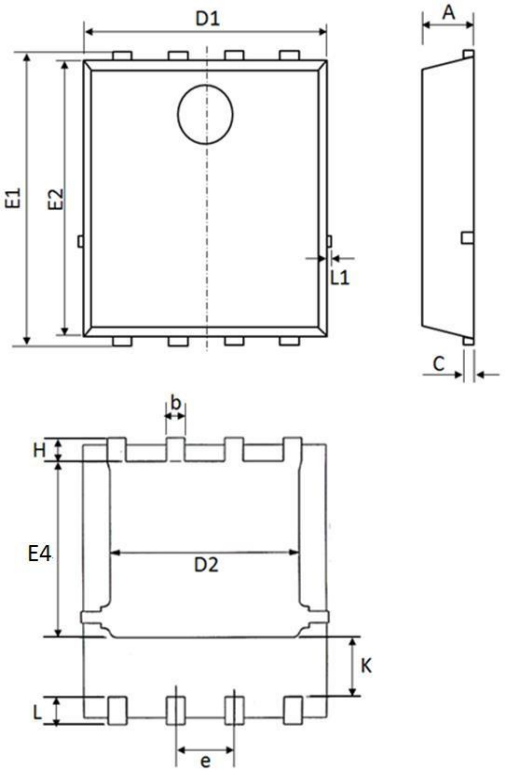


Figure 15. Diode Recovery Circuit & Waveform

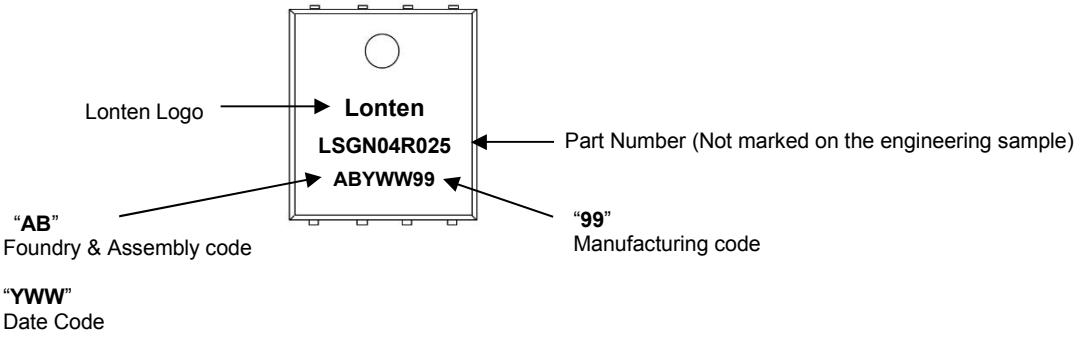


Mechanical Dimensions for PPAK5×6



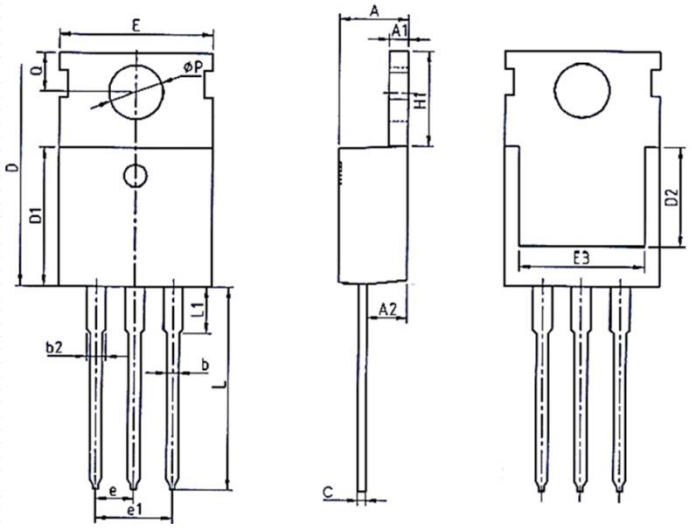
COMMON DIMENSIONS						
SYMBOL	MILLIMETERS			INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1	1.1	1.2	0.039	0.043	0.047
b	0.3	0.4	0.5	0.012	0.016	0.020
C	0.154	0.254	0.354	0.006	0.010	0.014
D1	5	5.2	5.4	0.197	0.205	0.213
D2	3.8	4.1	4.25	0.150	0.161	0.167
E1	5.95	6.15	6.35	0.234	0.242	0.250
E2	5.66	5.86	6.06	0.223	0.231	0.239
E4	3.52	3.72	3.92	0.139	0.146	0.154
e	1.27 BSC			0.050 BSC		
H	0.4	0.5	0.6	0.016	0.020	0.024
L	0.5	0.6	0.7	0.020	0.024	0.028
L1	-	-	0.12	-	-	0.005
K	1.14	1.29	1.44	0.045	0.051	0.057

PPAK5×6 Part Marking Information



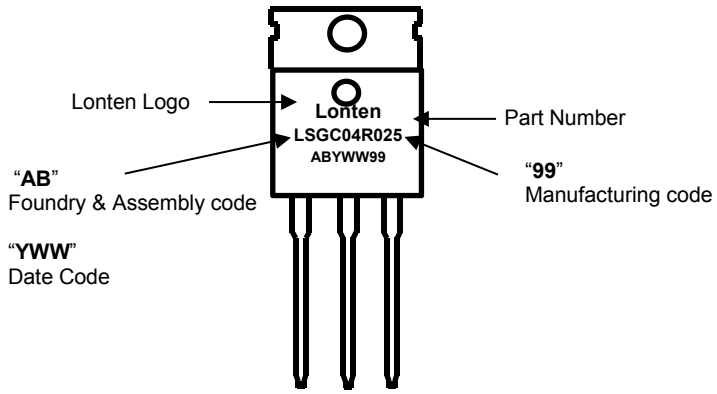
Calendar Year	Year Code	Calendar Week	Week Code
2018	G	Workweek 01	01
2019	H	Workweek 02	02
2020	I	Workweek 03	03
2021	J	Workweek 04	04
2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M	…..	…..

TO-220 PACKAGE INFORMATION



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	2.54BCS			0.1BSC		
e1	5.08BCS			0.2REF		
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



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

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