Lonten N-channel 85 V, 120A, 4.1mΩ Power MOSFET

Features

- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g x R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Product Summary

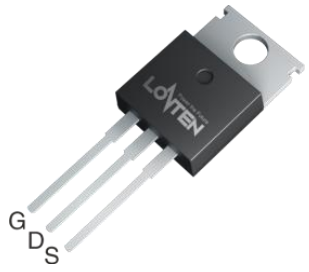
V_{DS}	85V
$R_{DS(on)}$	3.4mΩ
I_D	120A

Applications

- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)

100% Avalanche Tested

TO-220



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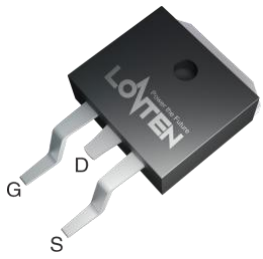
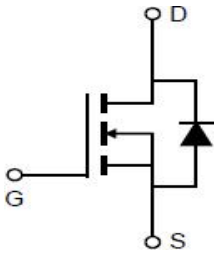




Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	85	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 172 120 109	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	480	A
Avalanche energy, single pulse (L=0.5mH, Rg=25Ω)	$E_{AS(Note\ 1)}$	272	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	208	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

※. Notes:1.EAS is tested at starting Tj = 25℃, L = 0.5mH, IAS = 33A, VGS = 10V. EAS(max)=1089mJ under IAS(max)=66A and above Conditions;

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.60	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	53	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	85	97	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	0.05 -	1 5	μA	V_{DS}=80V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	-	10	100	nA	V_{GS}=20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	3.4	4.1	mΩ	V_{GS}=10V, I_D=50A TO-220
Transconductance	g_{fs}	-	113	-	S	V_{DS}=5V,I_D=40A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	6050	-	pF	V_{GS}=0V, V_{DS}=42.5V, f=1MHz
Output Capacitance	C_{oss}	-	1480	-		
Reverse Transfer Capacitance	C_{rss}	-	35	-		
Gate Total Charge	Q_G	-	74	-	nC	V_{GS}=10V, V_{DS}=42.5V, I_D=50A, f=1MHz
Gate-Source charge	Q_{gs}	-	23	-		
Gate-Drain charge	Q_{gd}	-	21	-		
Turn-on delay time	$t_{d(on)}$	-	32	-	ns	Vds=42.5V Id=10A Rg=3.5Ω Vgs=10V; (Note 2,3)
Rise time	t_r	-	53	-		
Turn-off delay time	$t_{d(off)}$	-	59	-		
Fall time	t_f	-	34	-		
Gate resistance	R_G	-	3.3	-	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.9	1.4	V	V_{GS}=0V,I_{SD}=50A
Body Diode Reverse Recovery Time	t_{rr}	-	76	-	ns	IS=30A, VGS=0V, dIF/dt=100A/us;
Body Diode Reverse Recovery Charge	Q_{rr}	-	97	-	nC	

※. Notes

2.Pulse Test : Pulse Width ≤ 300us, duty cycle ≤ 2%.

3.Essentially independent of operating temperature.

Typical Performance Characteristics

Fig 1: Output Characteristics

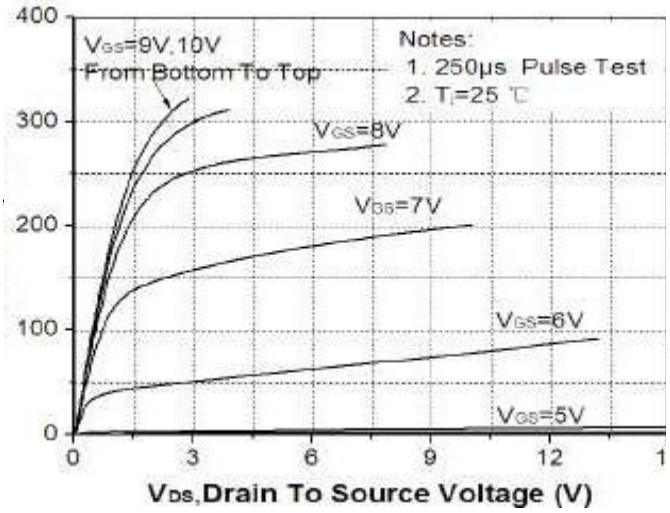


Fig 2: Transfer Characteristics

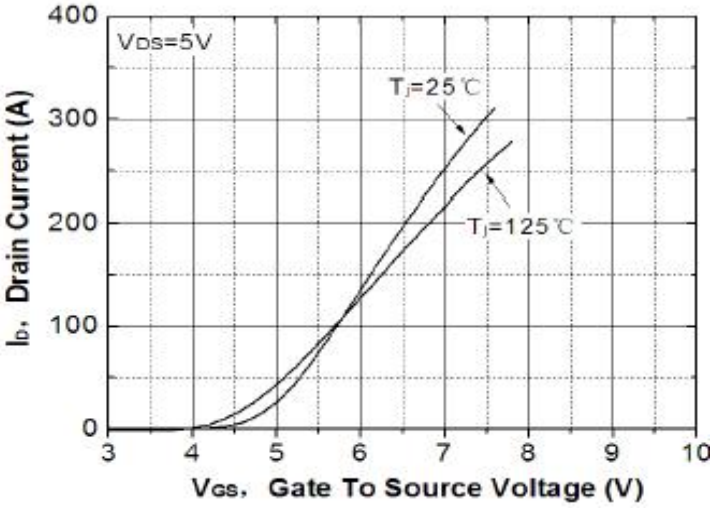


Fig 3: Rds(on) vs Drain Current and Gate Voltage

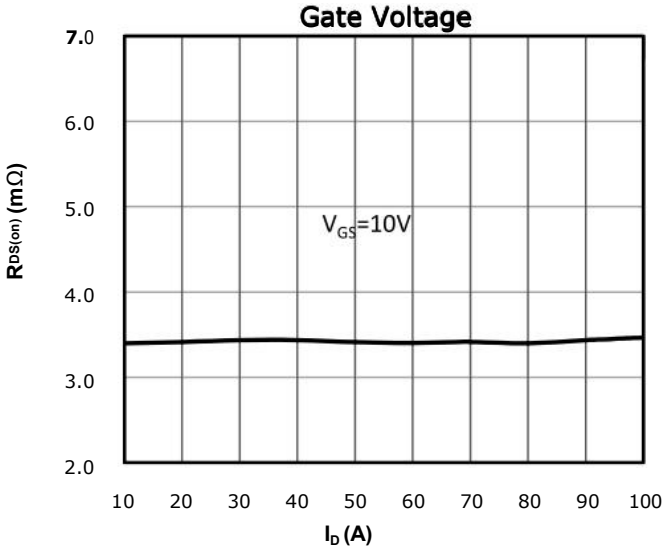


Fig 4: Rds(on) vs GateVoltage

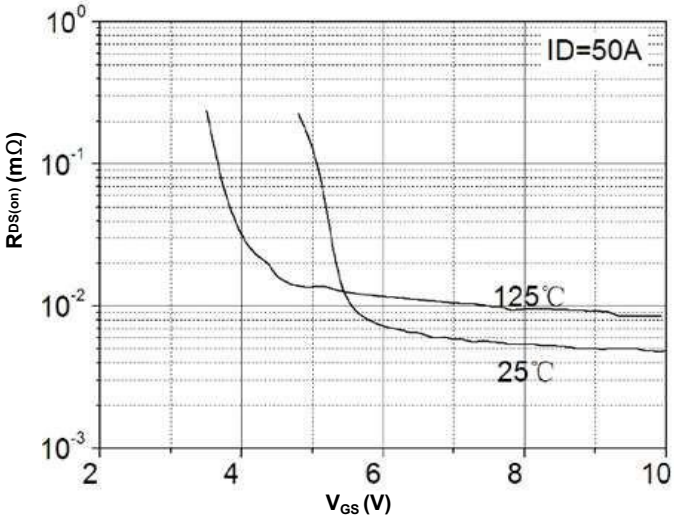


Fig 5: Rds(on) vs. Temperature

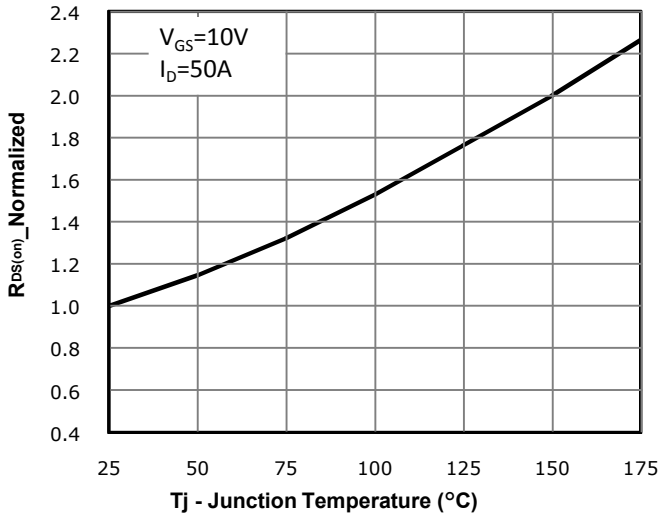


Fig 6: Capacitance Characteristics

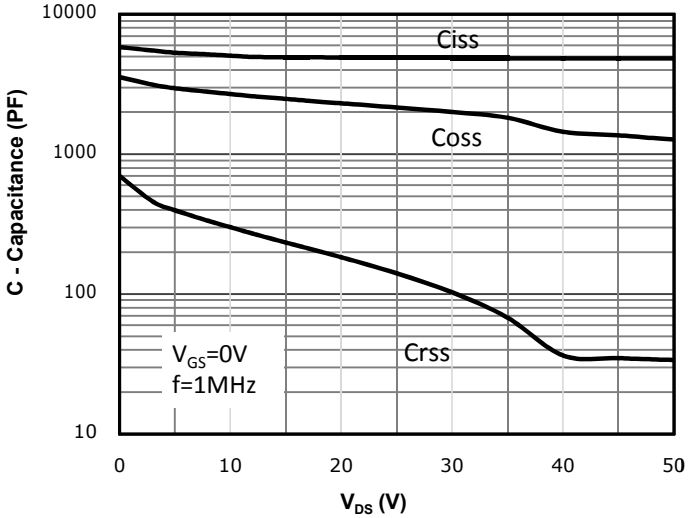


Fig 7: Gate Charge Characteristics

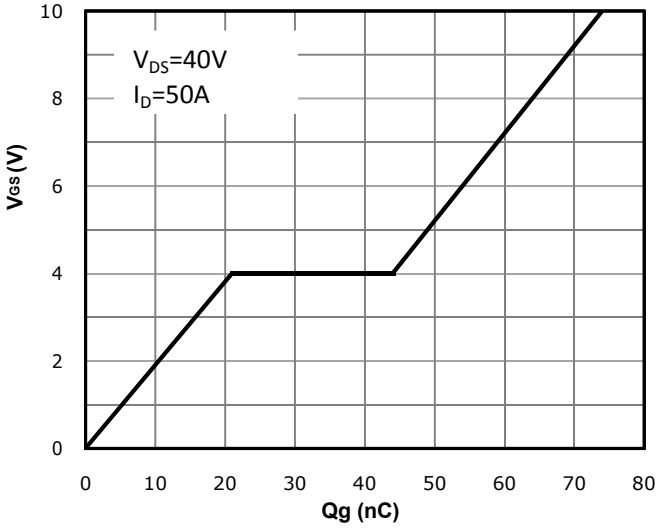


Fig 8: Body-diode Forward Characteristics

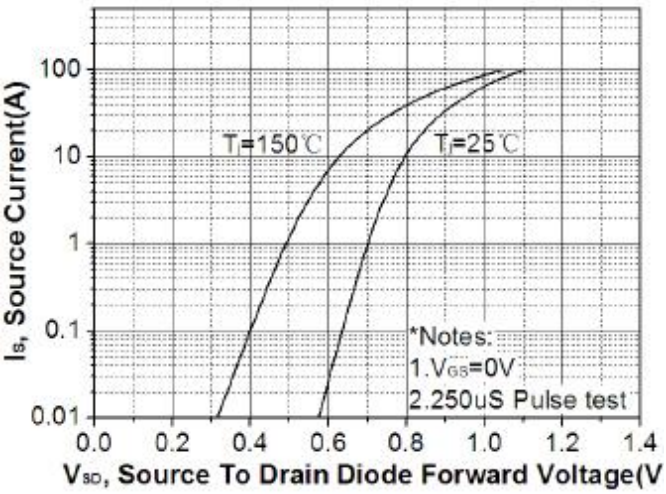


Fig 9: Power Dissipation

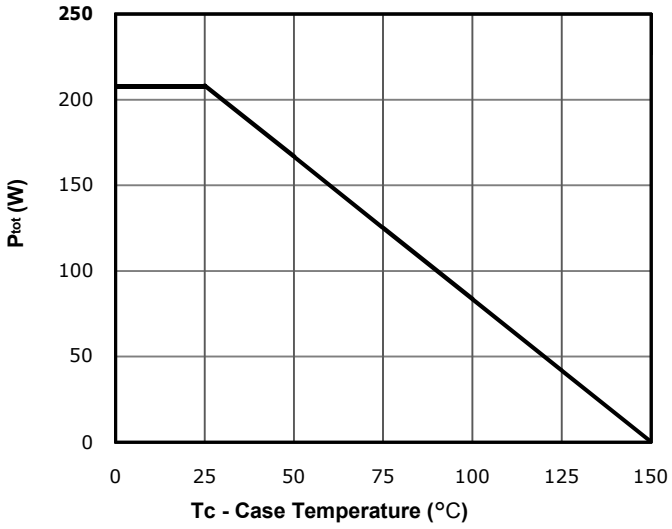


Fig **10:** Dr**ai**n Cur**rent** De**rati**n**g**

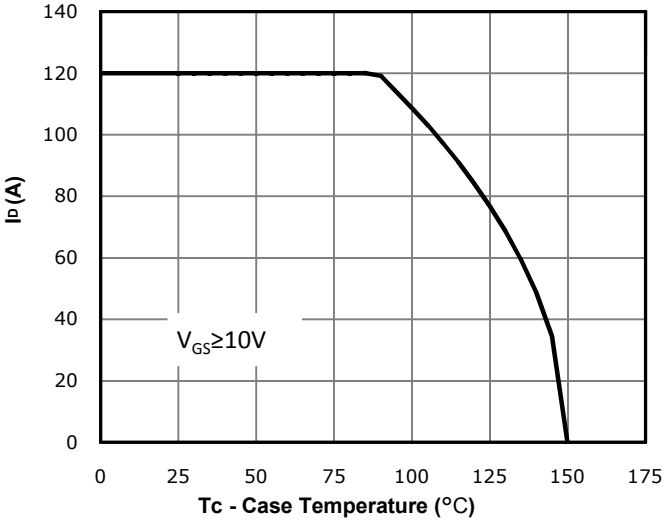


Fig 11: Safe Operating Area

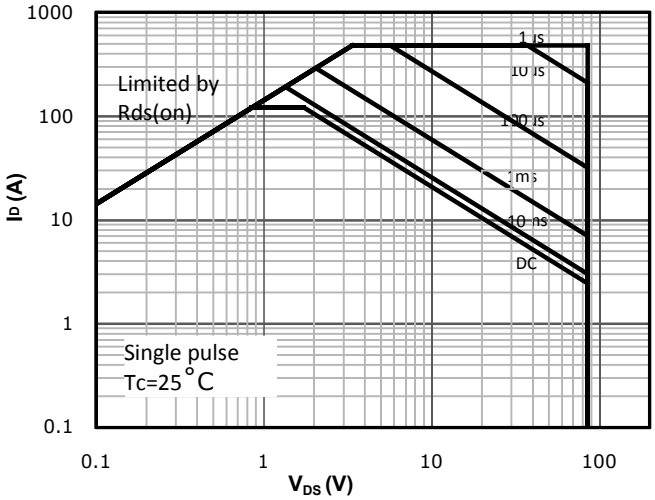
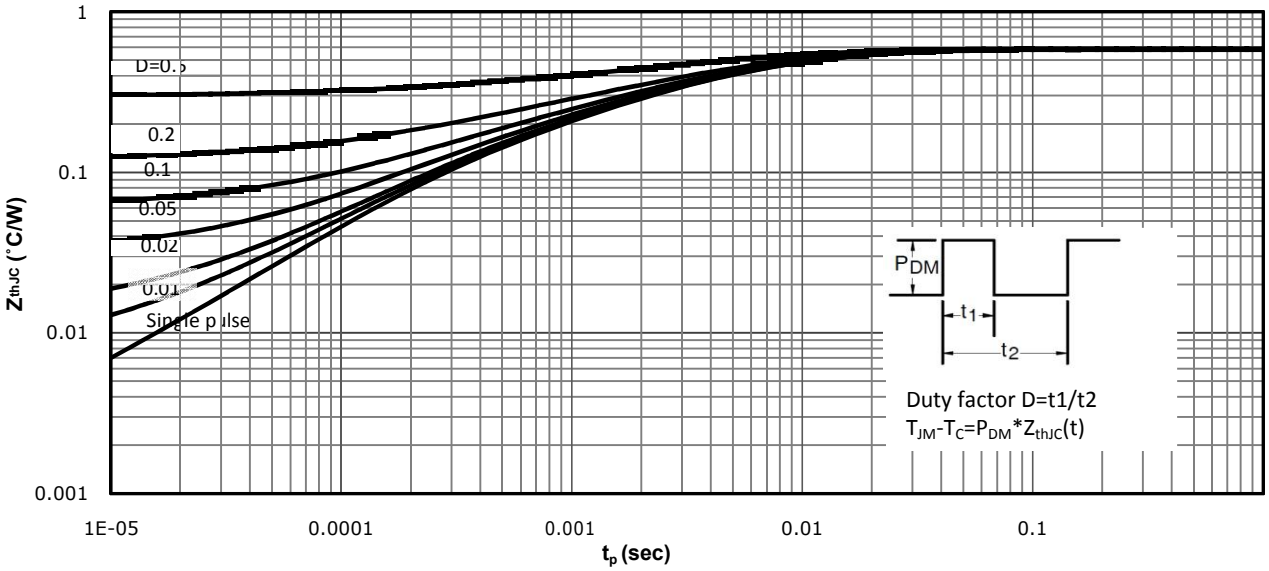
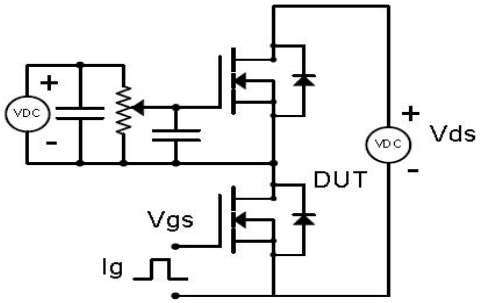


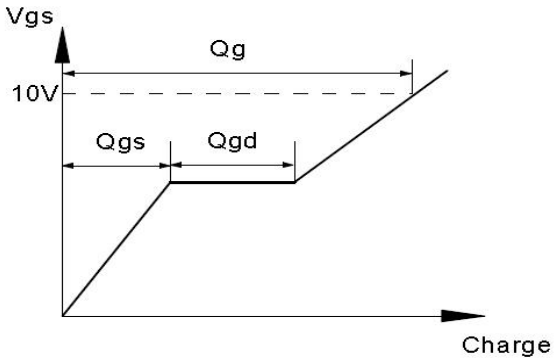
Fig 12: Max. Transient Thermal Impedance



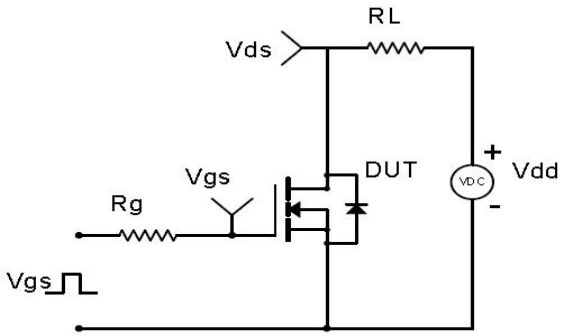
Test Circuit & Waveform

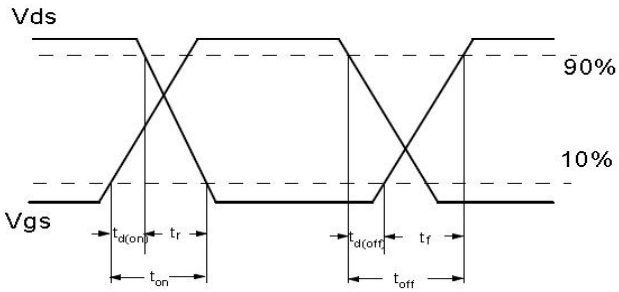
Gate Charge Test Circuit & Waveform



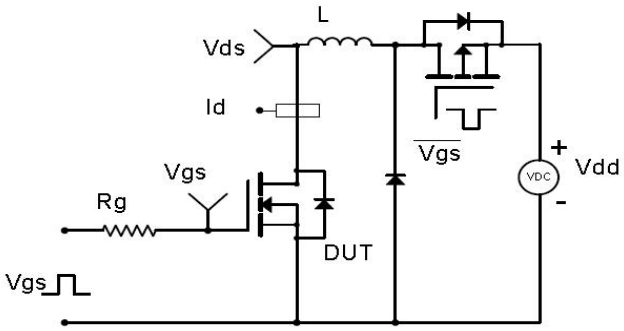


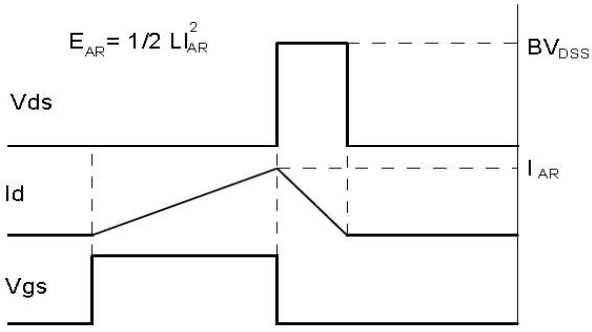
Resistive Switching Test Circuit & Waveforms



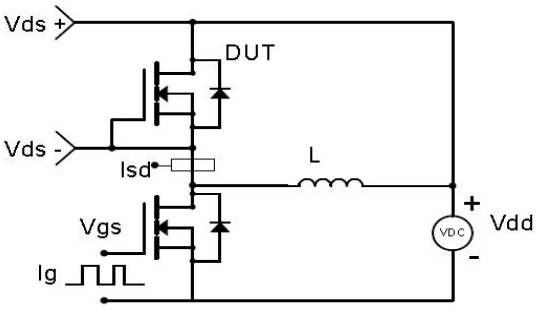


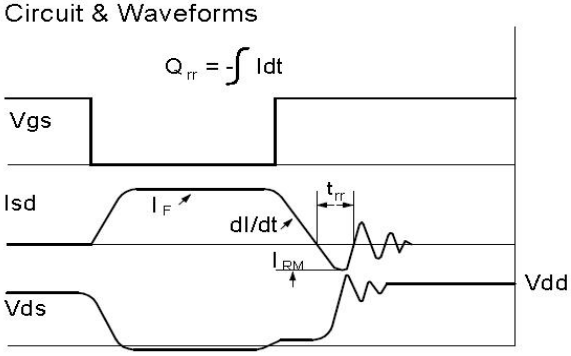
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



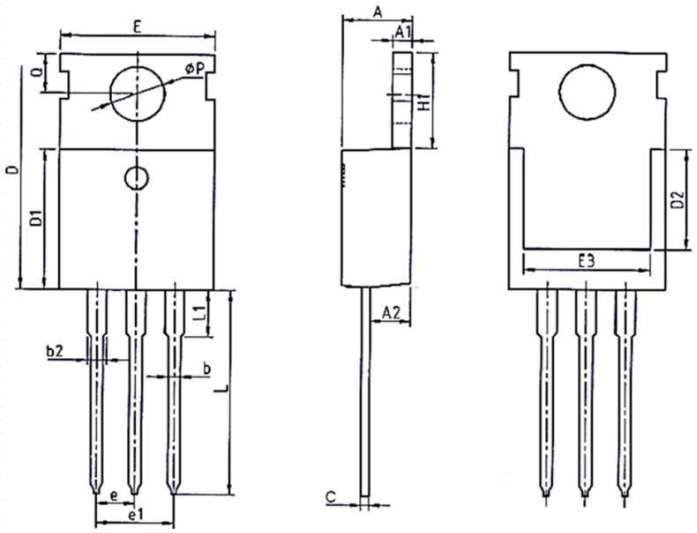


Diode Recovery Test Circuit & Waveforms



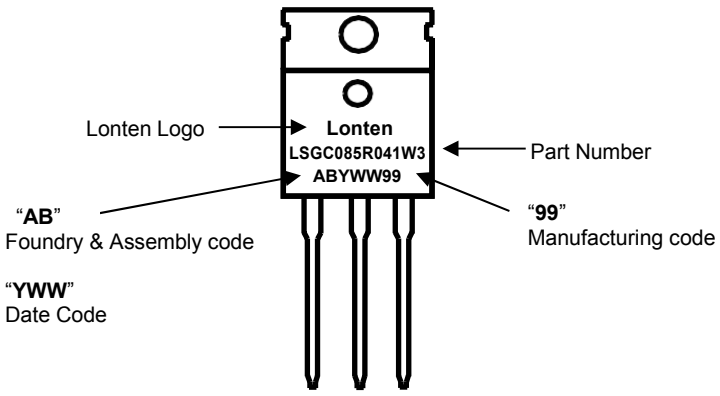


Mechanical Dimensions for TO-220



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	2.54BCS			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



Calendar Year	Year Code	Calendar Week	Week Code
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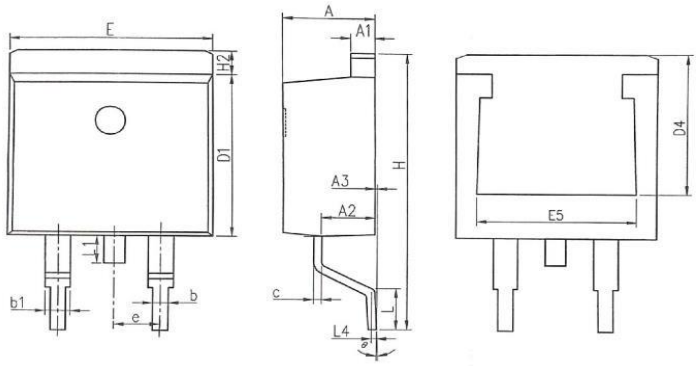
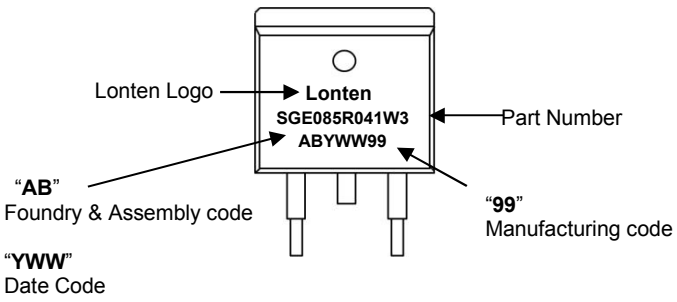
2020	I	Workweek 03	03
2021	J	Workweek 04	04
2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M	…..	…..

Mechanical Dimensions for TO-263



COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.37	4.57	4.77	0.172	0.180	0.188
A1	1.22	1.27	1.42	0.048	0.050	0.056
A2	2.49	2.69	2.89	0.098	0.106	0.114
A3	0.00	0.13	0.25	0.000	0.005	0.010
b	0.70	0.81	0.96	0.028	0.032	0.038
b1	1.17	1.27	1.47	0.046	0.050	0.058
c	0.30	0.38	0.53	0.012	0.015	0.021
D1	8.50	8.70	8.90	0.335	0.343	0.350
D4	6.60	—	—	0.260	—	—
E	9.86	10.16	10.36	0.388	0.400	0.408
E5	7.06	—	—	0.278	—	—
e	2.54 BSC			0.100 BSC		
H	14.70	15.10	15.50	0.579	0.594	0.610
H2	1.07	1.27	1.47	0.042	0.050	0.058
L	2.00	2.30	2.60	0.079	0.091	0.102
L1	1.40	1.55	1.70	0.055	0.061	0.067
L4	0.25 BSC			0.010 BSC		
θ	0°	5°	9°	0°	5°	9°

TO-263 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	…..	…..

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