

## Lonten N-channel 85 V, 80A, 6.5mΩ Power MOSFET

### Features

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

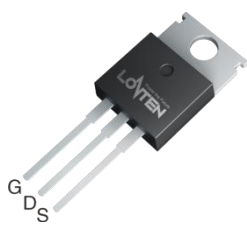
### Product Summary

$V_{DS}$	85V
$R_{DS(on)}$	6.5mΩ
$I_D$	80A

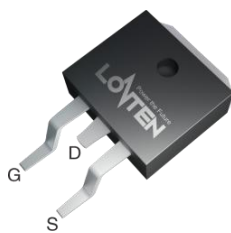
### Applications

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

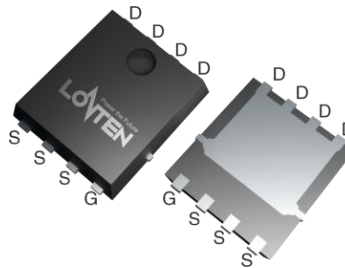
*100% Avalanche Tested*



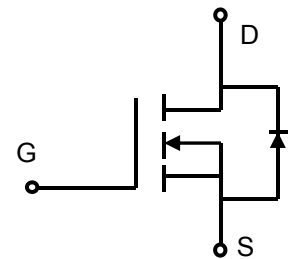
**TO-220**



**TO-263**



**DFN5×6**



### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	85	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	$I_D$	114 80 72	A
Pulsed drain current ( $T_C = 25^\circ\text{C}$ , $t_p$ limited by $T_{jmax}$ )	$I_{D\ pulse}$	320	A
Avalanche energy, single pulse ( $L=0.5\text{mH}$ , $R_g=25\Omega$ )	$E_{AS}(\text{Note 1})$	272	mJ
Gate-Source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation ( $T_C = 25^\circ\text{C}$ )	$P_{tot}$	138	W
Operating junction and storage temperature	$T_j, T_{stg}$	-55...+150	$^\circ\text{C}$

※. Notes: 1.EAS is tested at starting  $T_j = 25^\circ\text{C}$ ,  $L = 0.5\text{mH}$ ,  $I_{AS} = 35\text{A}$ ,  $V_{GS} = 10\text{V}$ .  $E_{AS}(\text{max})=1089\text{mJ}$  under  $I_{AS}(\text{max})=66\text{A}$  and above Conditions;

### Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	$R_{thJC}$	0.90	$^\circ\text{C}/\text{W}$
Thermal resistance, junction – ambient(min. footprint)	$R_{thJA}$	80	

**Package Marking and Ordering Information**

Device	Device Package	Marking
LSGC085R065W3	TO-220	LSGC085R065W3
LSGE085R065W3	TO-263	SGE085R065W3
LSGN085R065W3	DFN5×6	SG085R065W3

**Electrical Characteristic (at T<sub>j</sub> = 25 °C, unless otherwise specified)**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

**Static Characteristic**

Drain-source breakdown voltage	$BV_{DSS}$	85	99	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	0.02	1	$\mu A$	$V_{DS}=85V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=125^\circ C$
Gate-source leakage current	$I_{GSS}$	-	10	100	nA	$V_{GS}=20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	5.7	6.5	m $\Omega$	$V_{GS}=10V, I_D=50A$ TO-220
Transconductance	$g_{fs}$	-	68	-	S	$V_{DS}=5V, I_D=40A$

**Dynamic Characteristic**

Input Capacitance	$C_{iss}$	-	3190	-	pF	$V_{GS}=0V, V_{DS}=42.5V,$ $f=1MHz$
Output Capacitance	$C_{oss}$	-	601	-		
Reverse Transfer Capacitance	$C_{rss}$	-	28	-		
Gate Total Charge	$Q_G$	-	55	-	nC	$V_{GS}=10V, V_{DS}=42.5V,$ $I_D=30A, f=1MHz$
Gate-Source charge	$Q_{gs}$	-	17	-		
Gate-Drain charge	$Q_{gd}$	-	14	-		
Turn-on delay time	$t_{d(on)}$	-	22	-	ns	$V_{ds}=42.5V$ $I_d=30A R_g=5\Omega$ $V_{gs}=10V;$ (Note 2,3)
Rise time	$t_r$	-	30	-		
Turn-off delay time	$t_{d(off)}$	-	84	-		
Fall time	$t_f$	-	32	-		
Gate resistance	$R_G$	-	2.5	-	$\Omega$	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$

**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	$t_{rr}$	-	78	-	ns	$I_S=30A, V_{GS}=0V, dI_F/dt=100A/us;$
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	44	-	nC	

※. Notes

2.Pulse Test : Pulse Width  $\leq 300us$ , duty cycle  $\leq 2\%$ .

3.Essentially independent of operating temperature.

Typical Performance Characteristics

Fig 1: Output Characteristics

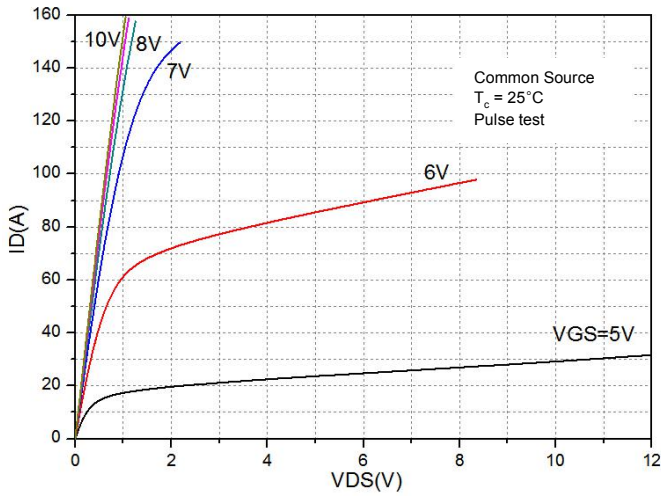


Fig 2: Transfer Characteristics

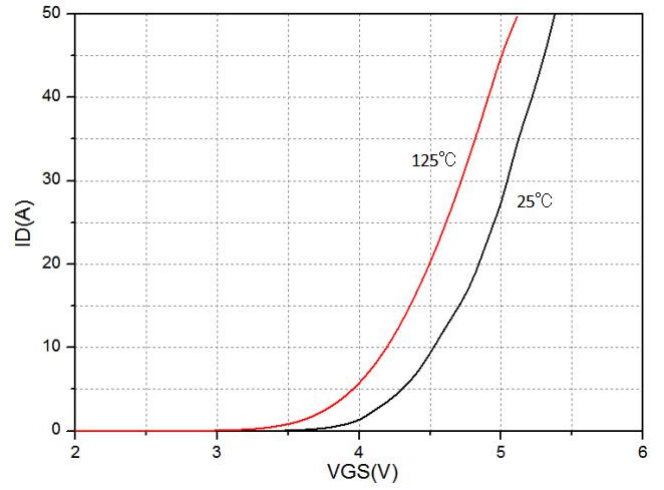


Figure 3. Capacitance Characteristics

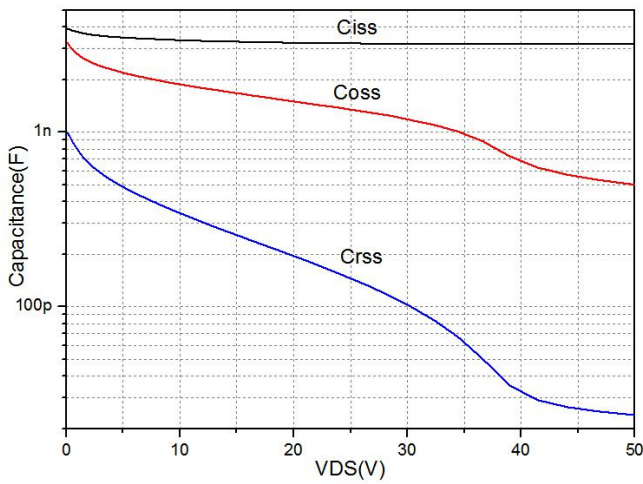


Figure 4. Gate Charge Waveform

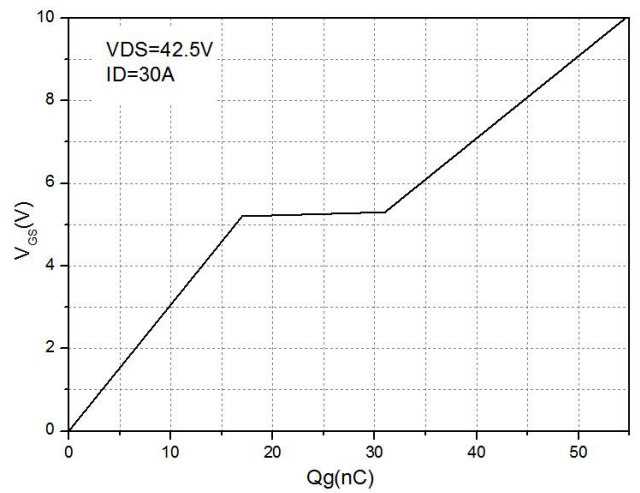


Figure 5. Body-Diode Characteristics

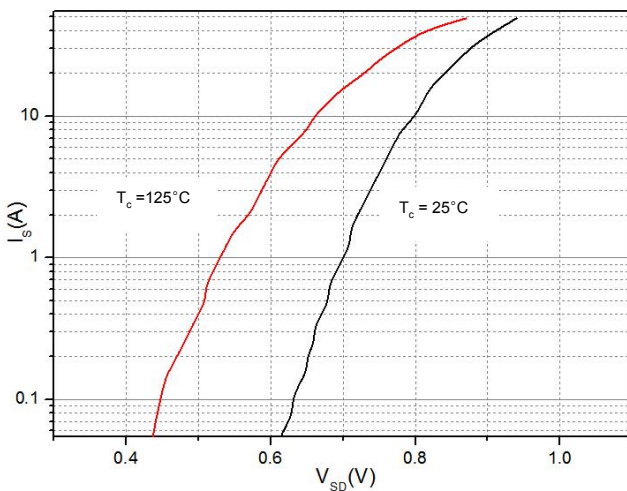


Figure 6. Rds(on)-Drain Current

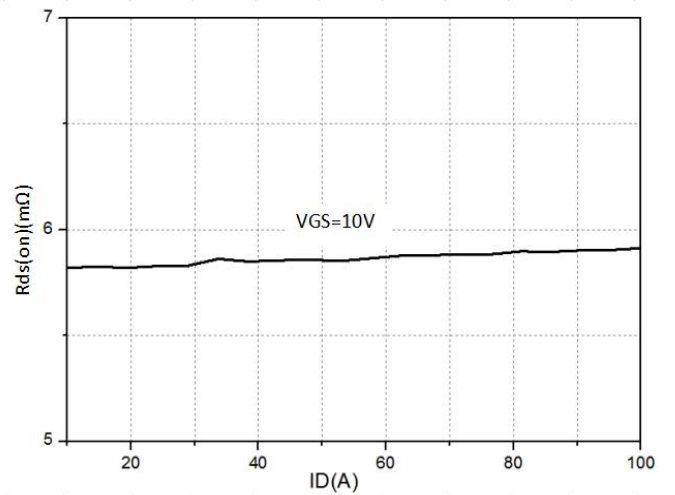


Fig 7: Rds(on) vs Gate Voltage

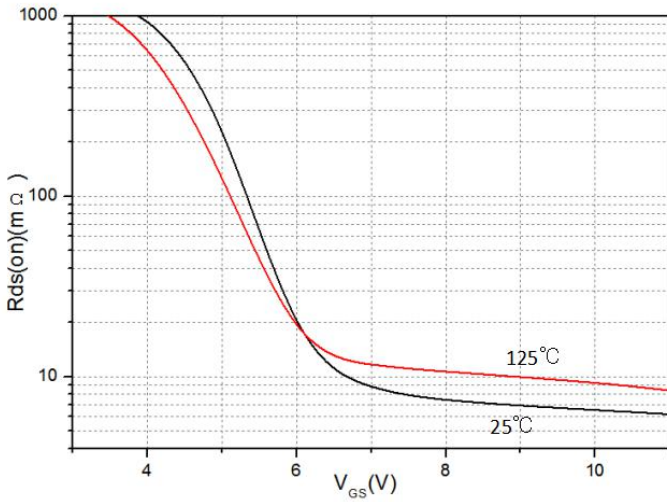


Fig 8: Rds(on)-Junction Temperature( $^\circ\text{C}$ )

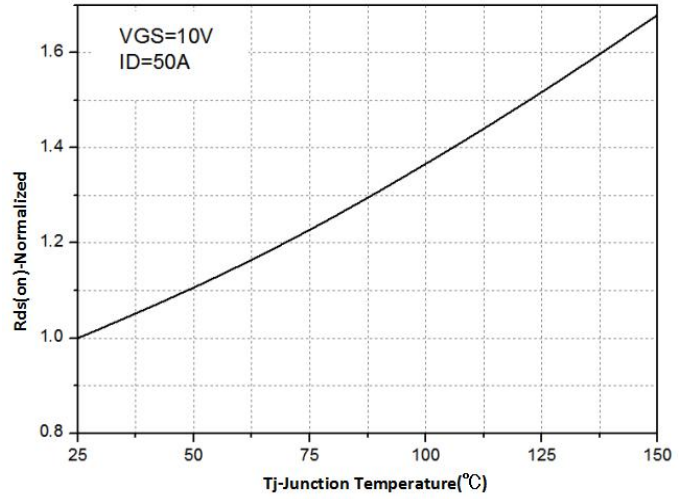


Figure 9. Maximum Safe Operating Area

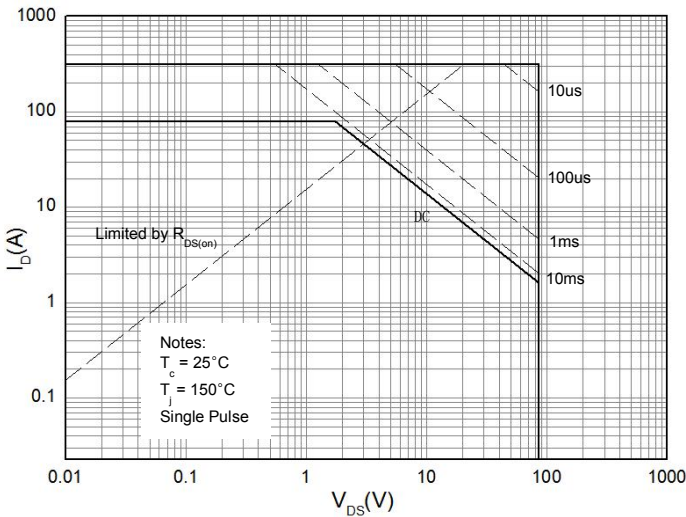
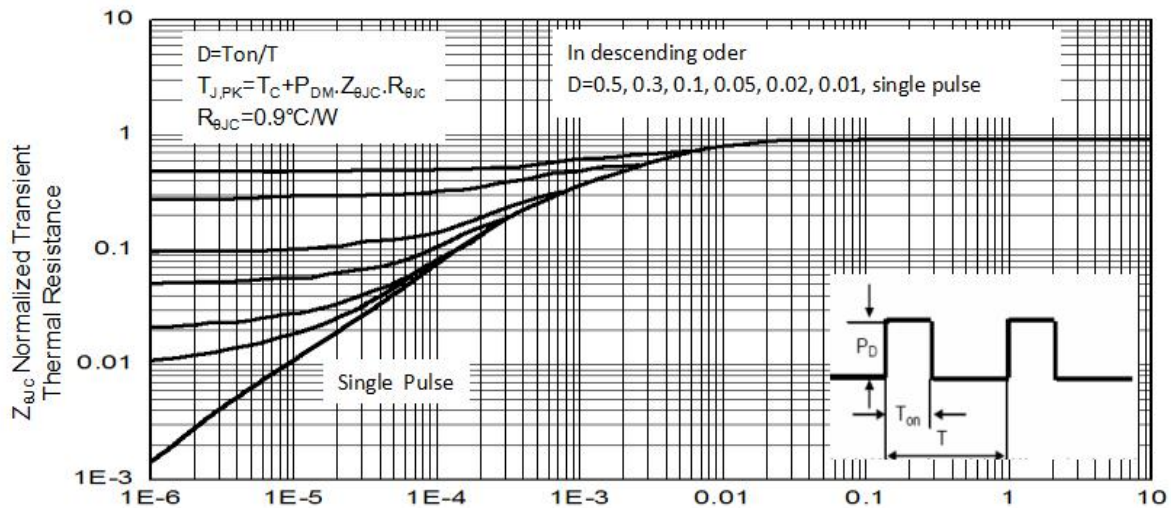
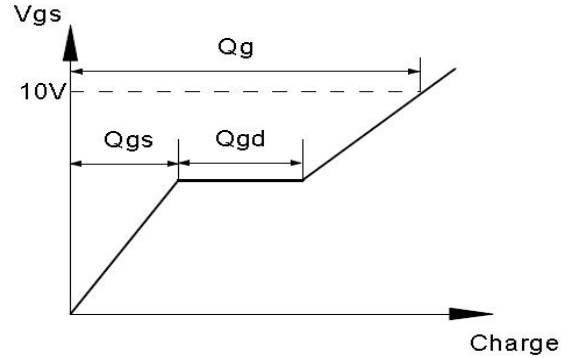
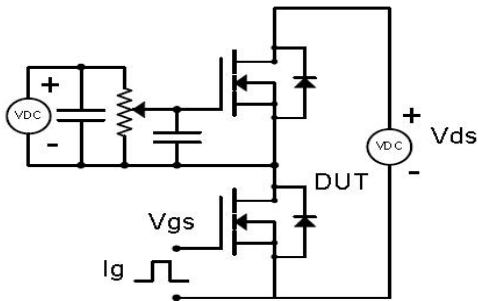


Figure 10. Normalized Maximum Transient Thermal Impedance ( $R_{thJC}$ )

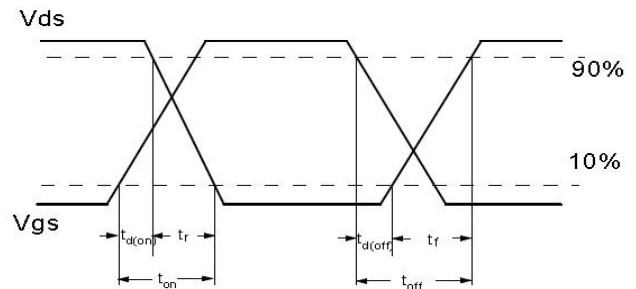
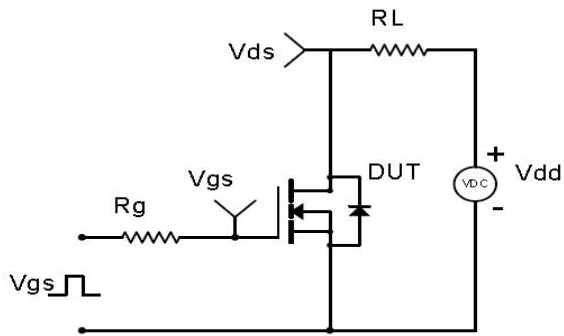


## Test Circuit & Waveform

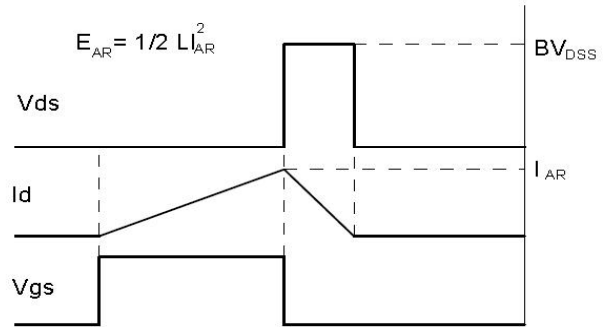
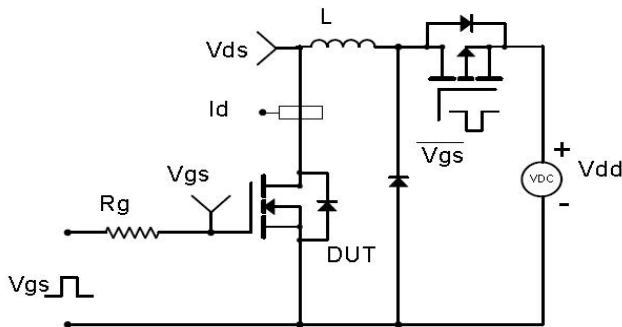
### Gate Charge Test Circuit & Waveform



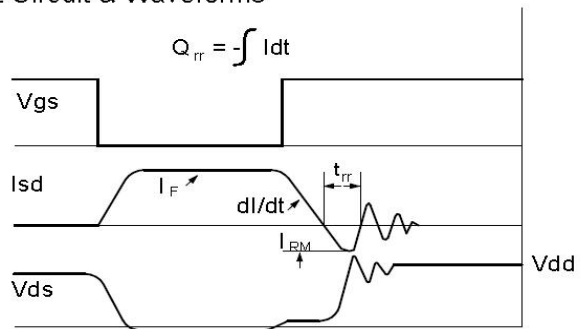
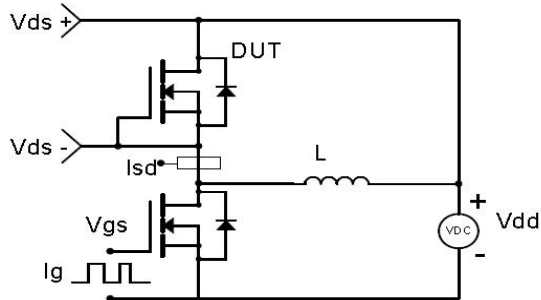
### Resistive Switching Test Circuit & Waveforms



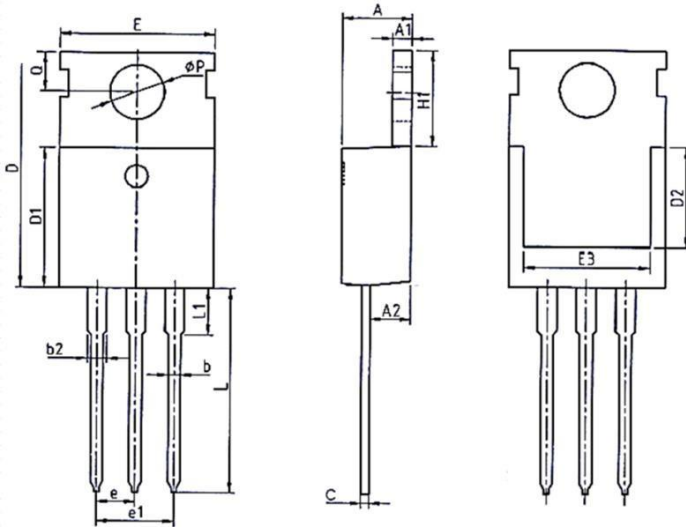
### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



### Diode Recovery Test Circuit & Waveforms

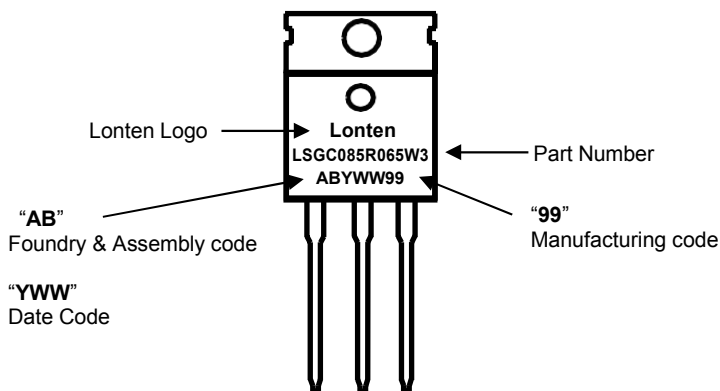


**Mechanical Dimensions for TO-220**



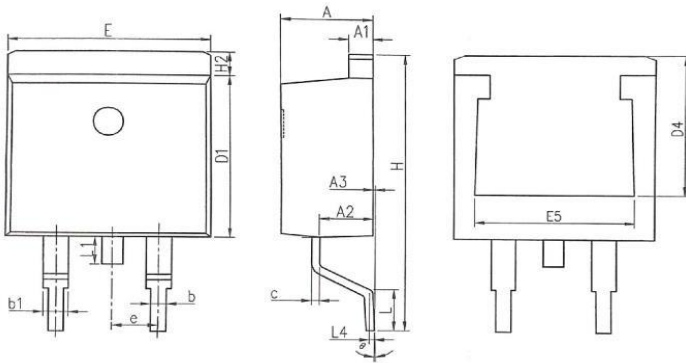
COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.37	4.57	4.70	0.172	0.180	0.185
A1	1.25	1.30	1.40	0.049	0.051	0.055
A2	2.20	2.40	2.60	0.087	0.094	0.102
b	0.70	0.80	0.95	0.028	0.031	0.037
b2	1.17	1.27	1.47	0.046	0.050	0.058
c	0.45	0.50	0.60	0.018	0.020	0.024
D	15.10	15.60	16.10	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**



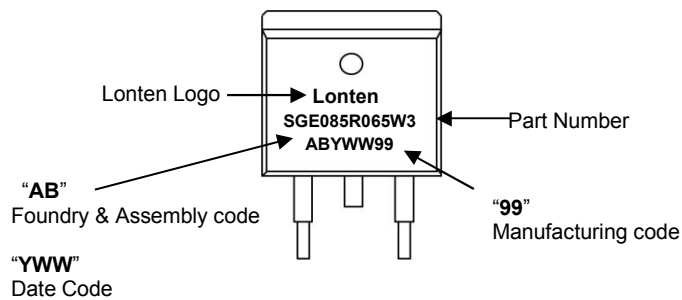
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2019	H	Workweek 02	02
2020	I	Workweek 03	03
2021	J	Workweek 04	04
2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M	.....	.....

**Mechanical Dimensions for TO-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°

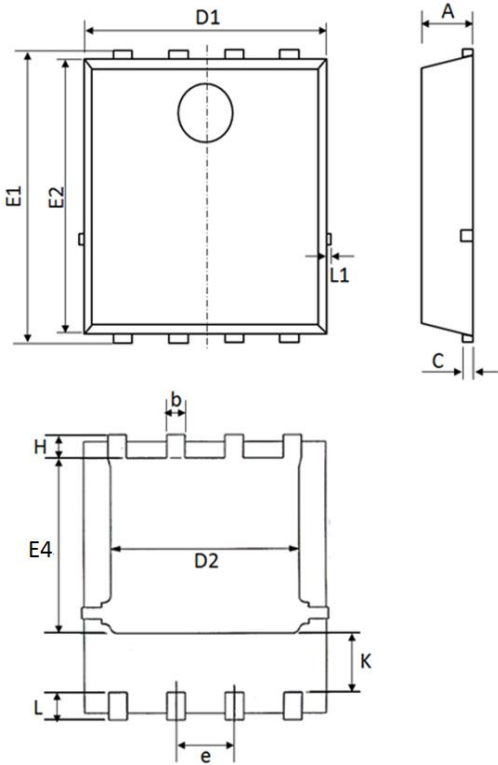
**TO-263 Part Marking Information**



Calendar Year	Year Code	Calendar Week	Week Code
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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	.....	.....

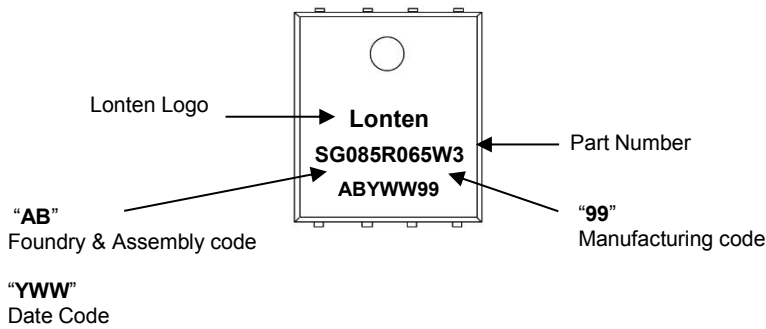


**Mechanical Dimensions for DFN5×6**



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

**DFN5×6 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	.....	.....

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