

Lonten N-channel 60 V, 80 A, 3.4mΩ Power MOSFET

Features

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

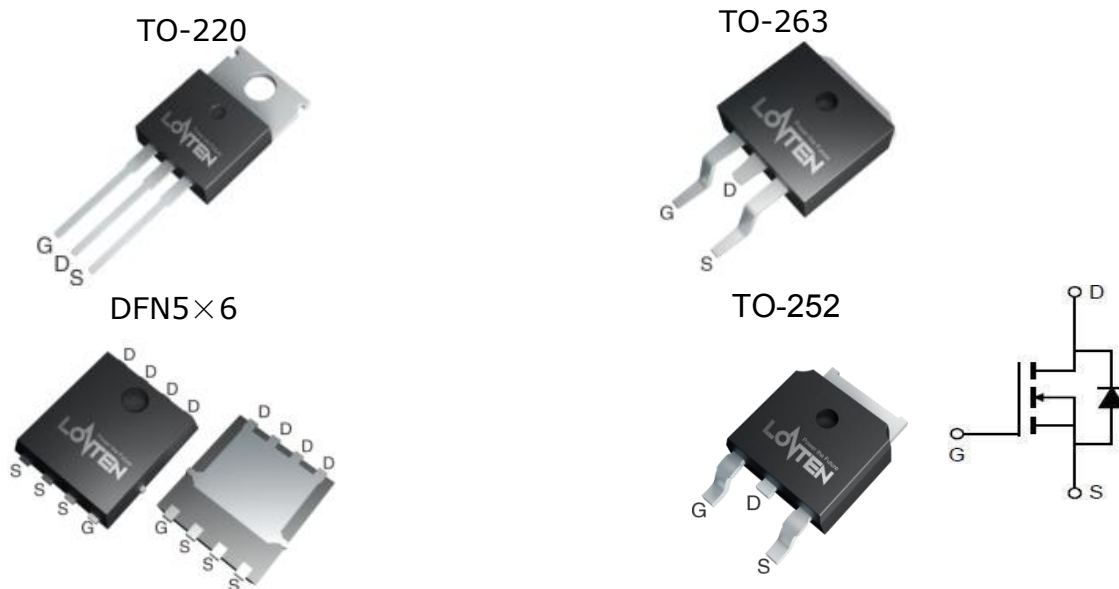
Product Summary

V_{DS}	60V
$R_{DS(on)}@10V$ typ	2.8mΩ
$R_{DS(on)}@4.5V$ typ	3.6mΩ
I_D	80A

Applications

- Synchronous Rectification for AC/DC QuickCharger
- Battery management
- UPS (Uninterruptible Power Supplies)

100% Avalanche Tested



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Continuous drain current	I_D	80	A
$T_C = 25^\circ\text{C}$ (Package limit)		117	
$T_C = 25^\circ\text{C}$ (Silicon limit)		74	
$T_C = 100^\circ\text{C}$ (Silicon limit)			
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	320	A
Avalanche energy, single pulse ($L=0.3\text{mH}$, $R_g=25\Omega$)	E_{AS}	135	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	79.1	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	1.58	°C/W
Thermal resistance, junction – ambient	R_{thJA}	47.0	

Package Marking and Ordering Information

Device	Device Package	Marking
LSGC06R034W3	TO-220	LSGC06R034W3
LSGE06R034W3	TO-263	LSGE06R034W3
LSGN06R034W3	DFN5×6	SGN06R034W3
LSGG06R034W3	TO-252	SGG06R034W3

Electrical Characteristic (at $T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

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

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	60	66	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	1.2	1.7	2.2	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	0.02	1	μA	$V_{DS}=60V, V_{GS}=0V$ $T_j=25^{\circ}\text{C}$
		-	-	10		$T_j=125^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	2.8	3.4	m Ω	$V_{GS}=10V, I_D=20A$
		-	3.6	4.4		$V_{GS}=4.5V, I_D=20A$
Transconductance	g_{fs}	-	102	-	S	$V_{DS}=5V, I_D=20A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	3224	-	pF	$V_{GS}=0V, V_{DS}=30V,$ $f=1\text{MHz}$
Output Capacitance	C_{oss}	-	1050	-		
Reverse Transfer Capacitance	C_{rss}	-	34	-		
Gate Total Charge	Q_G	-	54.2	-	nC	$V_{GS}=10V, V_{DS}=30V,$ $I_D=20A, f=1\text{MHz}$
Gate-Source charge	Q_{gs}	-	10.2	-		
Gate-Drain charge	Q_{gd}	-	7.8	-		

Turn-on delay time	$t_{d(on)}$	-	11.6	-	ns	$V_{GS}=10V, V_{DD}=30V,$ $R_{G_ext}=2.7\Omega$
Rise time	t_r	-	46.5	-		
Turn-off delay time	$t_{d(off)}$	-	47	-		
Fall time	t_f	-	58	-		
Gate resistance	R_G	-	2.2	-	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}	-	0.66	0.8	V	$V_{GS}=0V, I_{SD}=1A$
Body Diode Reverse Recovery Time	t_{rr}	-	34	-	ns	$I_F=20A, dI/dt=400A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	100	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

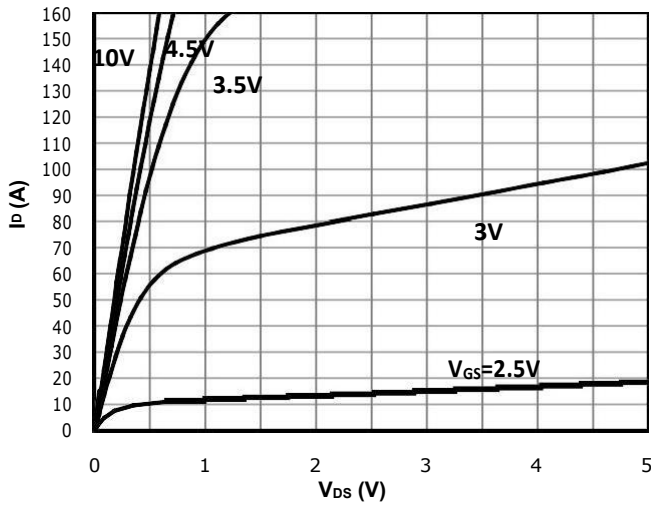


Fig 2: Transfer Characteristics

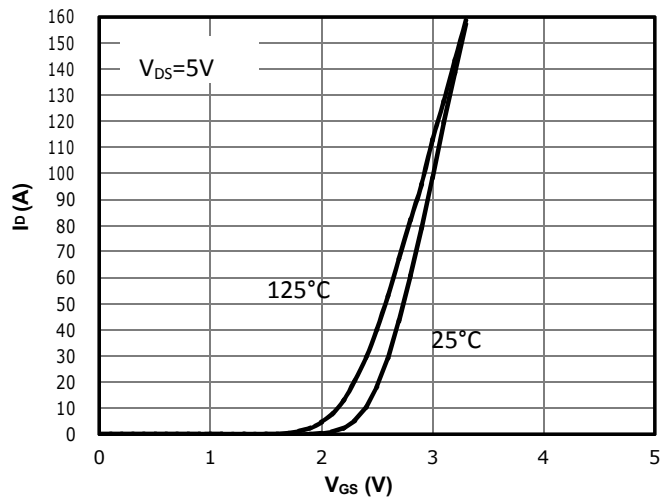


Fig3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

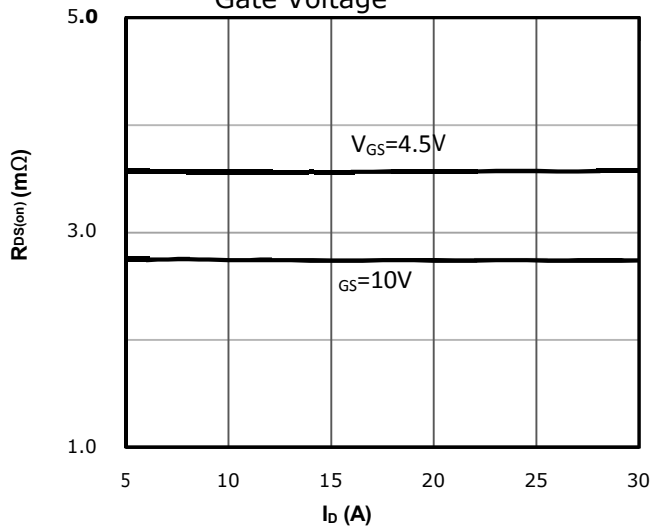


Fig 4: $R_{DS(on)}$ vs Gate Voltage

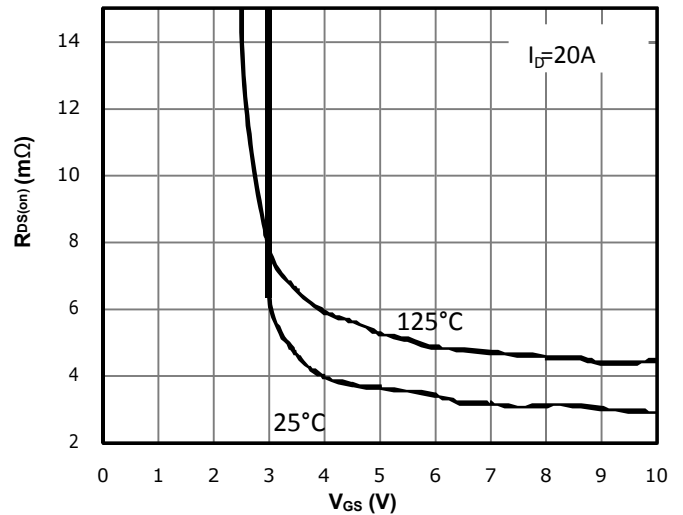


Fig5: $R_{DS(on)}$ vs. Temperature

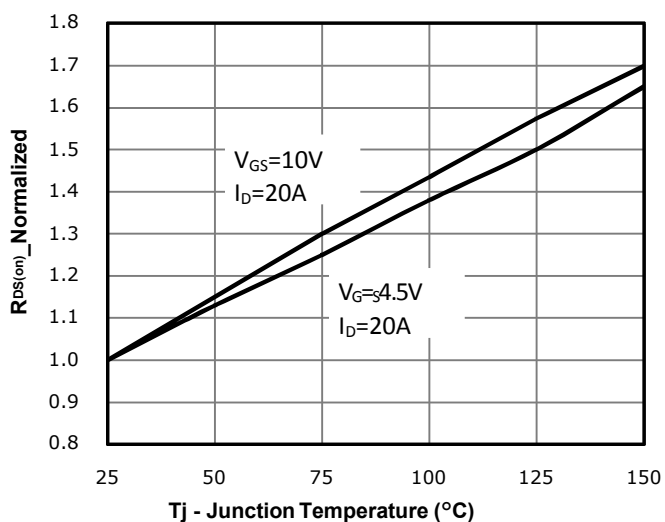


Fig 6: Capacitance Characteristics

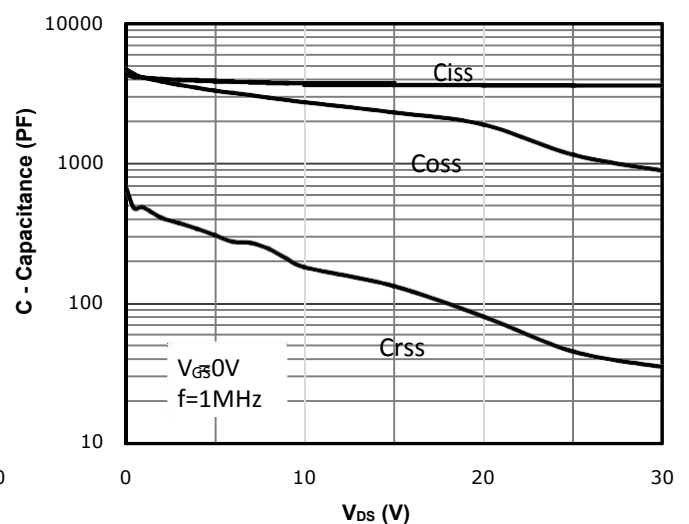


Fig 7: Gate Charge Characteristics

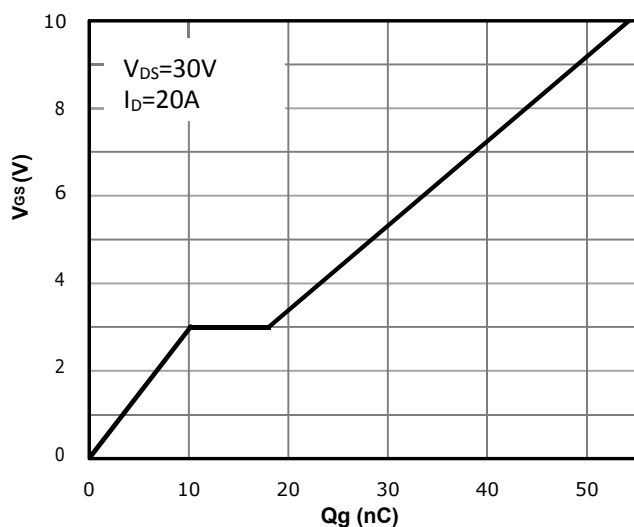


Fig 8: Body-diode Forward Characteristics

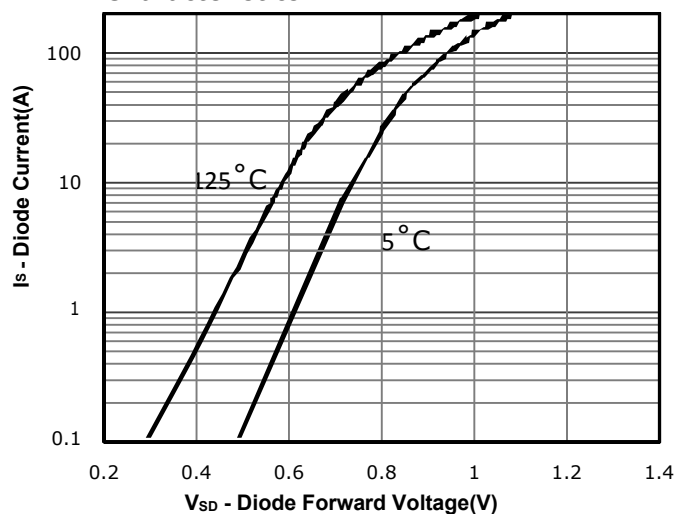


Fig 9: Power Dissipation

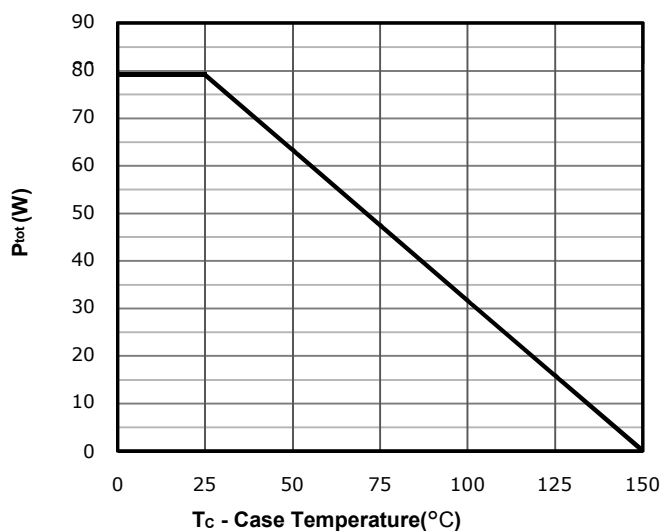


Fig 10: Drain Current Derating

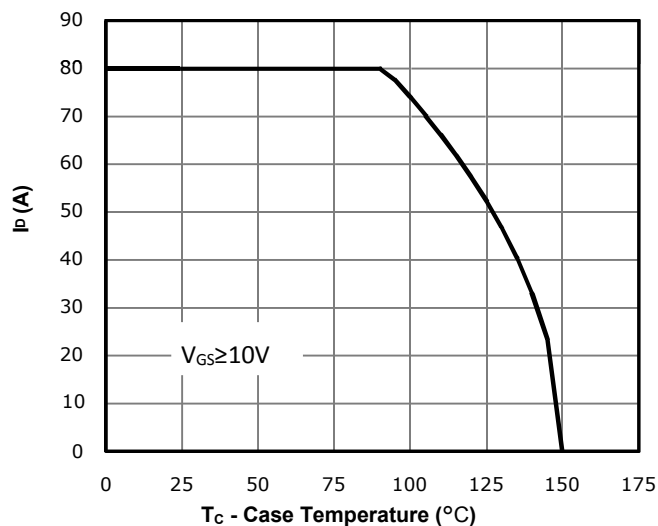


Fig11: Safe Operating Area

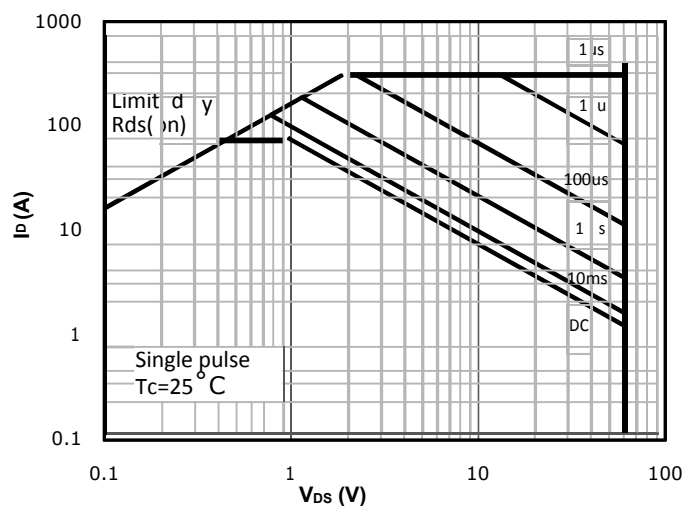
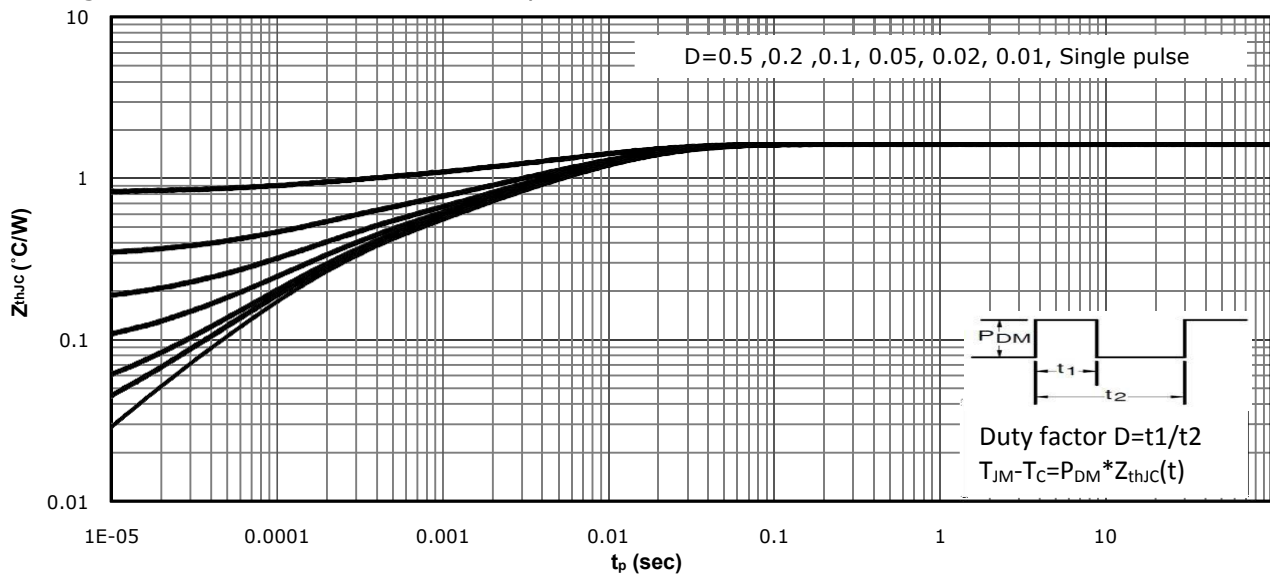
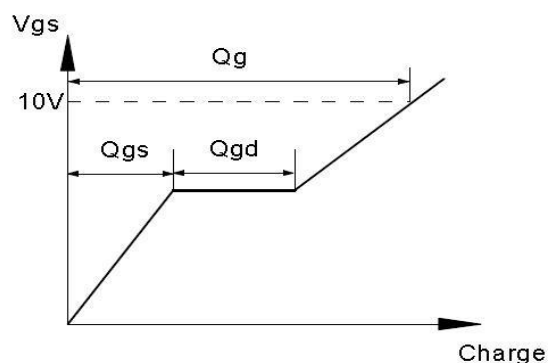
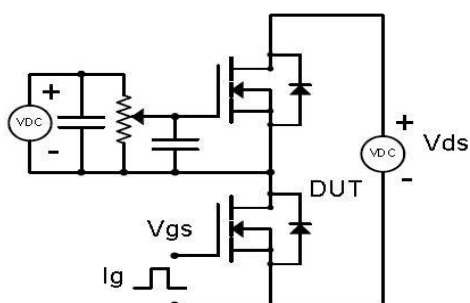


Fig 12: Max. Transient Thermal Impedance

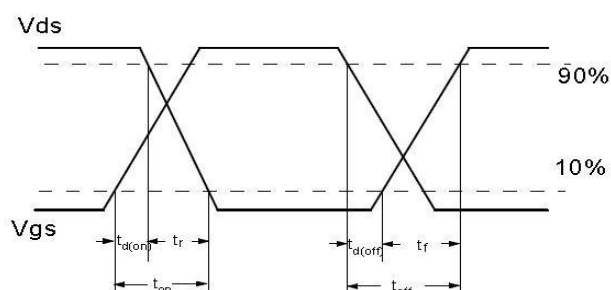
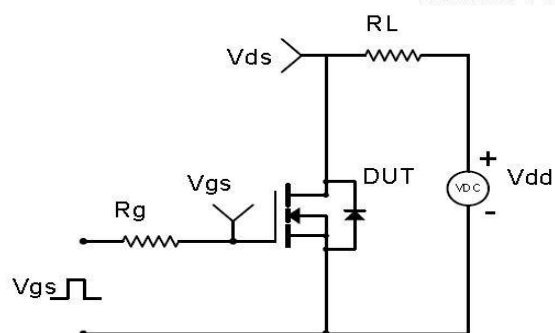


Test Circuit & Waveform

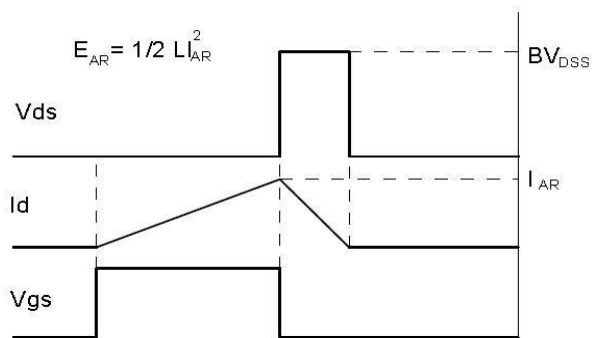
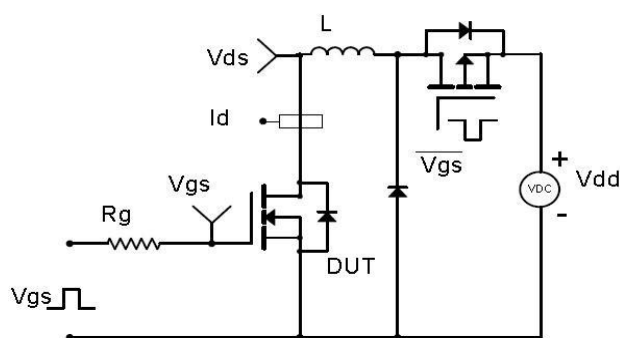
Gate Charge Test Circuit & Waveform



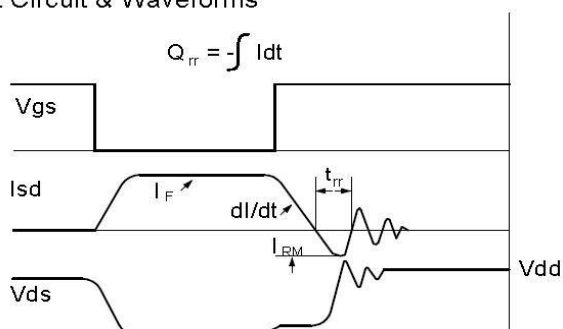
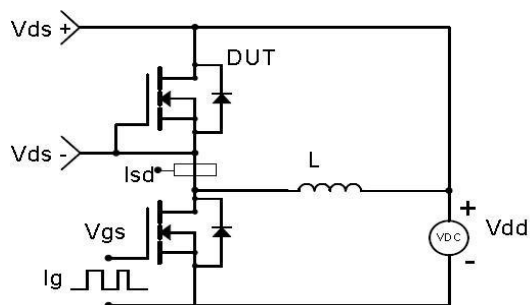
Resistive Switching Test Circuit & Waveforms



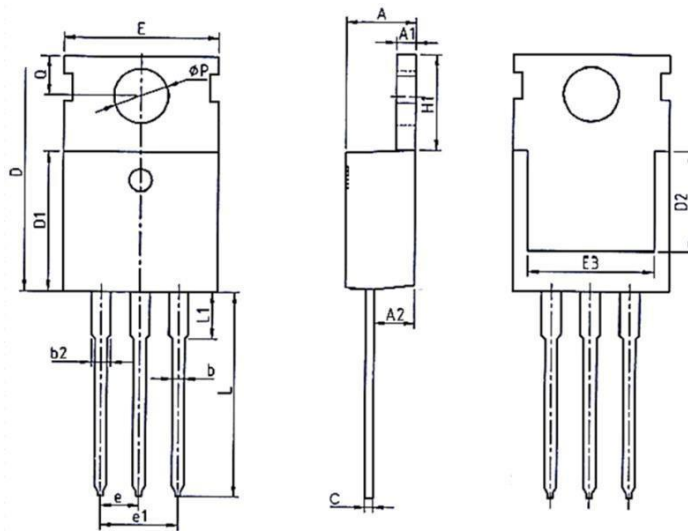
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

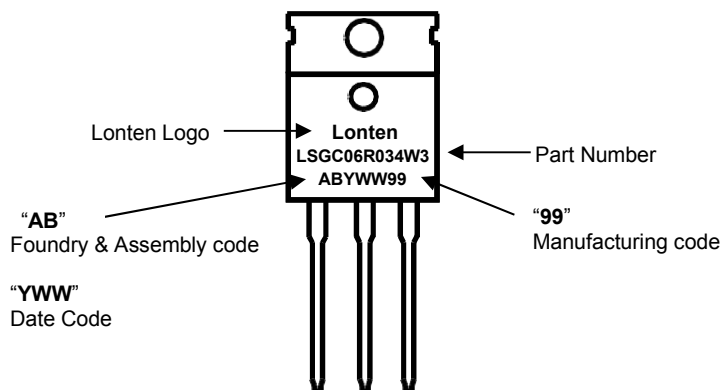


Mechanical Dimensions for TO-220



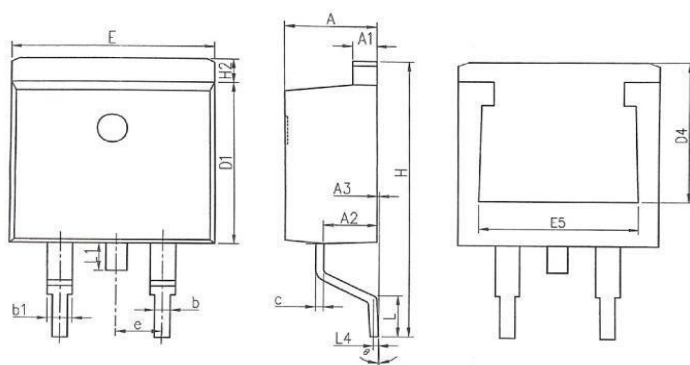
SYMBOL	COMMON DIMENSIONS					
	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.37	4.57	4.70	0.172	0.180	0.185
A1	1.25	1.30	1.40	0.049	0.051	0.055
A2	2.20	2.40	2.60	0.087	0.094	0.102
b	0.70	0.80	0.95	0.028	0.031	0.037
b2	1.17	1.27	1.47	0.046	0.050	0.058
c	0.45	0.50	0.60	0.018	0.020	0.024
D	15.10	15.60	16.10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



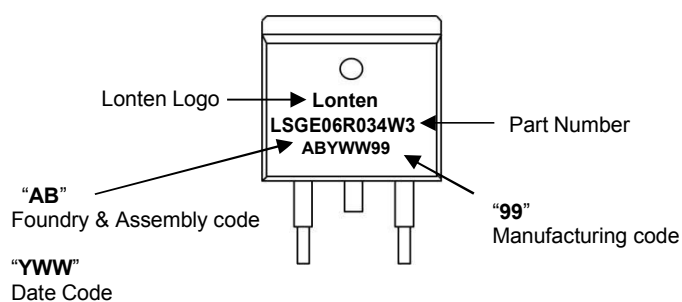
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2020	I	Workweek 03	03
2021	J	Workweek 04	04
2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M		

Mechanical Dimensions for TO-263



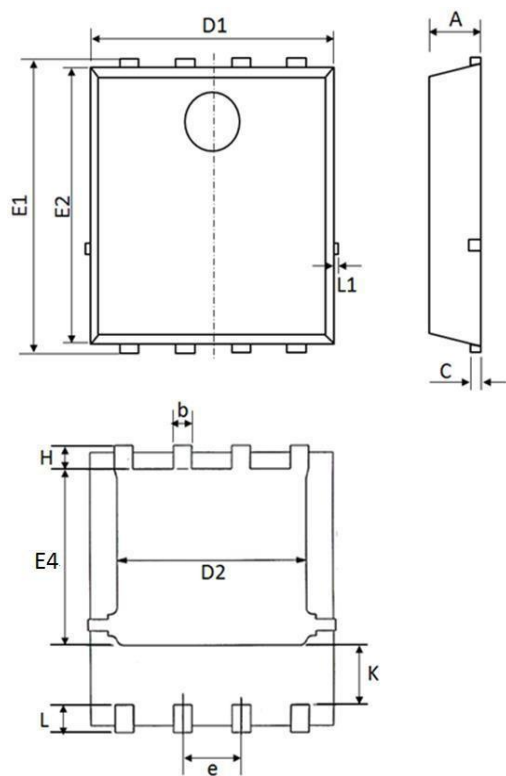
SYMBOL	COMMON DIMENSIONS					
	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.37	4.57	4.77	0.172	0.180	0.188
A1	1.22	1.27	1.42	0.048	0.050	0.056
A2	2.49	2.69	2.89	0.098	0.106	0.114
A3	0.00	0.13	0.25	0.000	0.005	0.010
b	0.70	0.81	0.96	0.028	0.032	0.038
b1	1.17	1.27	1.47	0.046	0.050	0.058
c	0.30	0.38	0.53	0.012	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



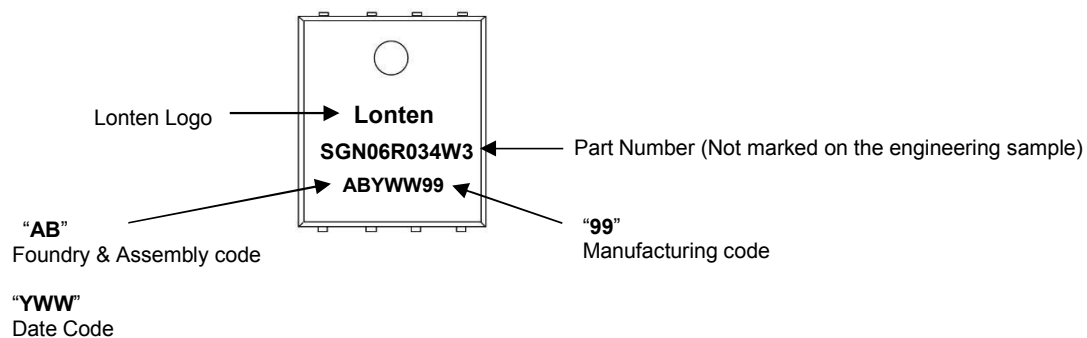
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2021	J	Workweek 04	04
2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M		

Mechanical Dimensions for DFN5×6



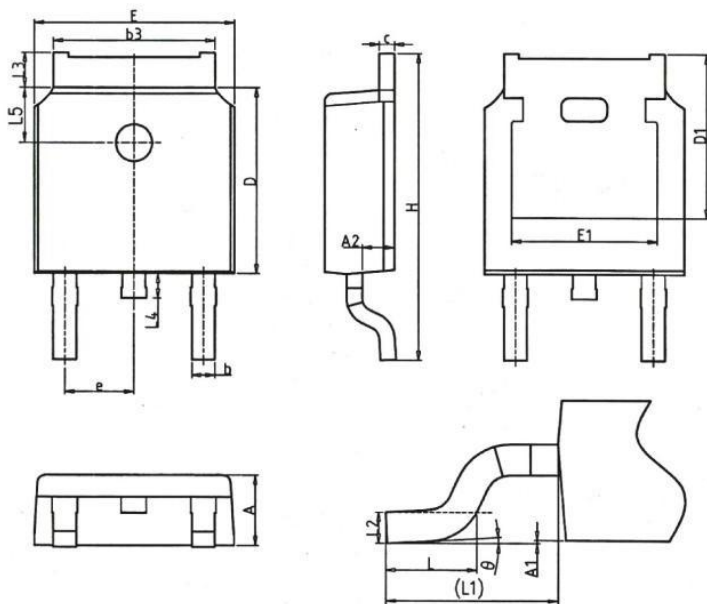
SYMBOL	COMMON DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1	1.1	1.2	0.039	0.043	0.047
b	0.3	0.4	0.5	0.012	0.016	0.020
C	0.154	0.254	0.354	0.006	0.010	0.014
D1	5	5.2	5.4	0.197	0.205	0.213
D2	3.8	4.1	4.25	0.150	0.161	0.167
E1	5.95	6.15	6.35	0.234	0.242	0.250
E2	5.66	5.86	6.06	0.223	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



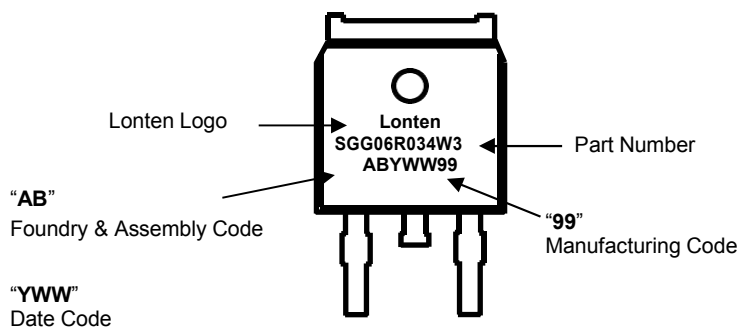
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2020	I	Workweek 03	03
2021	J	Workweek 04	04
2022	K	Workweek 05	05
2023	L	Workweek 06	06
2024	M		

Mechanical Dimensions for TO-252



SYMBOL	COMMON DIMENSIONS		
	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



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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