

## 600V 0.083Ω Super Junction Power MOSFET

### Description

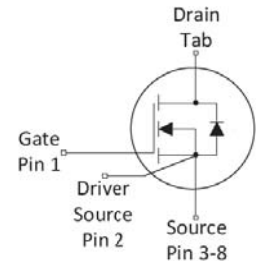
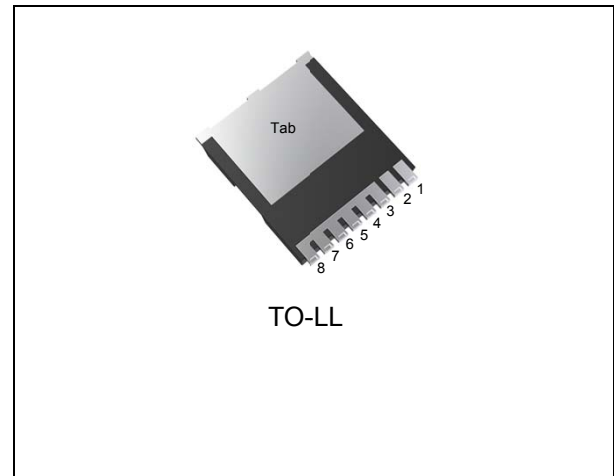
WMOS™ C4 is Wayon's 4<sup>th</sup> generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ C4 is suitable for applications which require superior power density and outstanding efficiency.

### Features

- $V_{DS} = 650V @ T_{j,max}$
- Typ.  $R_{DS(on)} = 0.083\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

### Applications

LED Lighting, Charger, Adapter, PC, LCD TV, Server



### Absolute Maximum Ratings

Parameter	Symbol	WMLL36N60C4	Unit
Drain-source voltage	$V_{DSS}$	600	V
Continuous drain current <sup>1)</sup> ( $T_C = 25^\circ C$ )	$I_D$	36	A
( $T_C = 100^\circ C$ )		20	A
Pulsed drain current <sup>2)</sup>	$I_{DM}$	100	A
Gate-source voltage	$V_{GS}$	$\pm 30$	V
Avalanche energy, single pulse <sup>3)</sup>	$E_{AS}$	550	mJ
Avalanche energy, repetitive <sup>2)</sup>	$E_{AR}$	0.8	mJ
Avalanche current, repetitive <sup>2)</sup>	$I_{AR}$	4	A
Power dissipation ( $T_C = 25^\circ C$ )	$P_D$	277	W
- Derate above $25^\circ C$		2.22	W/°C
Operating and storage temperature range	$T_j, T_{stg}$	-55 to +150	°C
Continuous diode forward current	$I_S$	36	A
Diode pulse current	$I_{S,pulse}$	100	A

### Thermal Characteristics

Parameter	Symbol	WMLL36N60C4	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.45	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	°C/W

**Electrical Characteristics**  $T_c = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25\text{mA}$	2.2	3.2	4.2	V
Drain cut-off current	$I_{DSS}$	$V_{DS}=600\text{ V}, V_{GS}=0\text{V},$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	-	-	1	$\mu\text{A}$
Gate leakage current, forward	$I_{GSSF}$	$V_{GS}=20\text{V}, V_{DS}=0\text{V}$	-	-	100	nA
Gate leakage current, reverse	$I_{GSSR}$	$V_{GS}=-20\text{V}, V_{DS}=0\text{V}$	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=6\text{ A}$ $T_j = 25^\circ\text{C}$	-	0.083	0.105	$\Omega$
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=100\text{V}, V_{GS}=0\text{V},$	-	2250	-	pF
Output capacitance	$C_{oss}$	$f = 1\text{ MHz}$	-	78	-	
Reverse transfer capacitance	$C_{rss}$		-	2.8	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 300\text{V}, I_D = 15\text{A}$	-	37	-	ns
Rise time	$t_r$	$R_G = 25\Omega, V_{GS}=10\text{V}$	-	39	-	
Turn-off delay time	$t_{d(off)}$		-	270	-	
Fall time	$t_f$		-	57	-	
<b>Gate charge characteristics</b>						
Gate to source charge	$Q_{gs}$	$V_{DD}=480\text{V}, I_D=15\text{A},$	-	8.7	-	nC
Gate to drain charge	$Q_{gd}$	$V_{GS}=0\text{ to }10\text{V}$	-	14.2	-	
Gate charge total	$Q_g$		-	46.0	-	
Gate plateau voltage	$V_{plateau}$		-	5.0	-	V
<b>Reverse diode characteristics</b>						
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=8\text{A}$	-	-	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=50\text{V}, I_F=15\text{A},$	-	261	-	ns
Reverse recovery charge	$Q_{rr}$	$di_f/dt=100\text{A}/\mu\text{s}$	-	3.6	-	$\mu\text{C}$
Peak reverse recovery current	$I_{rrm}$		-	27.2	-	A

## Notes:

- Limited by  $T_{j\text{max}}$ . Maximum duty cycle  $D=0.5$ .
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS} = 4\text{ A}, V_{DD} = 50\text{V}, R_G = 25\Omega$ , starting  $T_j = 25^\circ\text{C}$ .

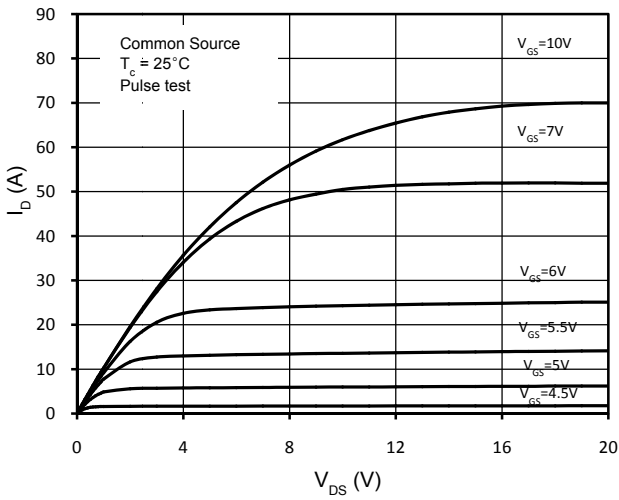


Figure 1. On-Region Characteristics

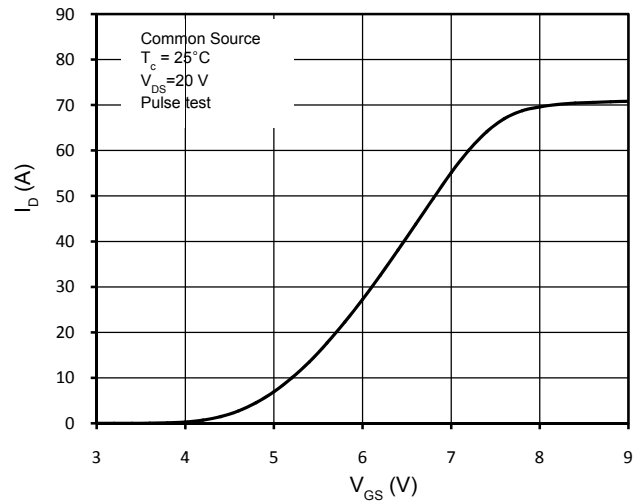


Figure 2. Transfer Characteristics

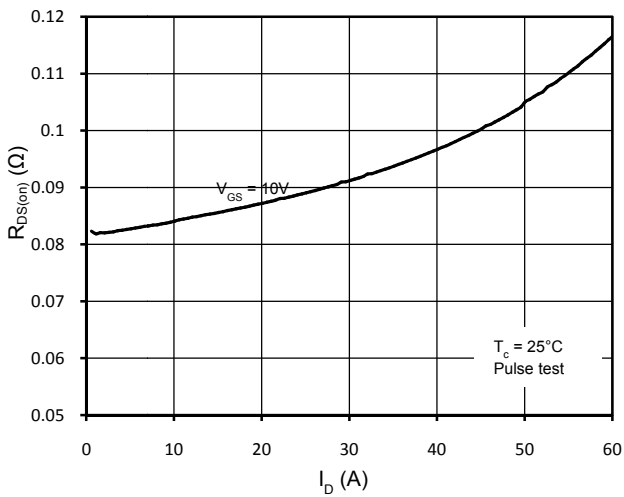


Figure 3. Static Drain-Source On Resistance

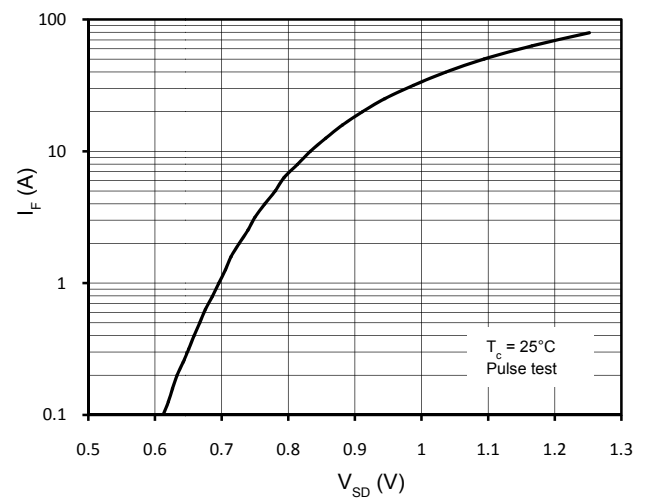


Figure 4. Body-Diode Forward Characteristics

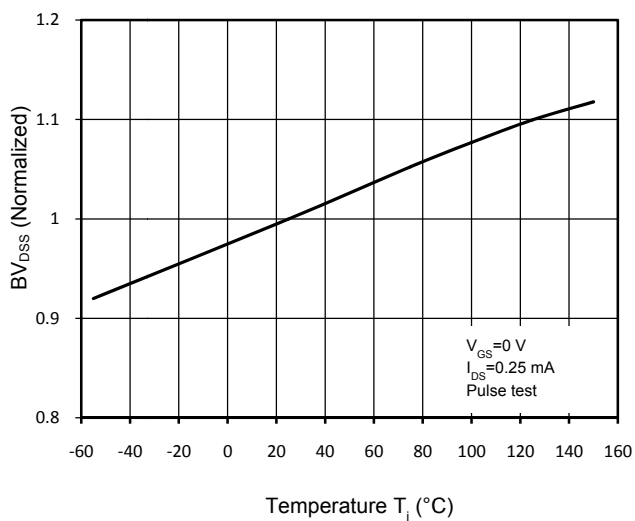


Figure 5. Normalized  $BV_{DS}$  vs. Temperature

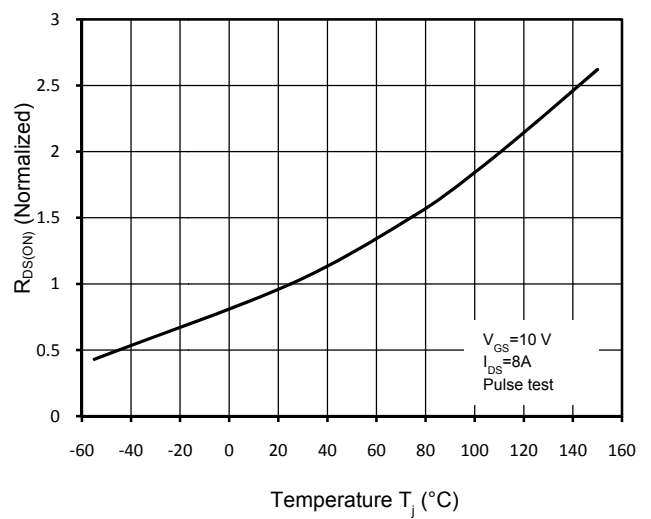


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

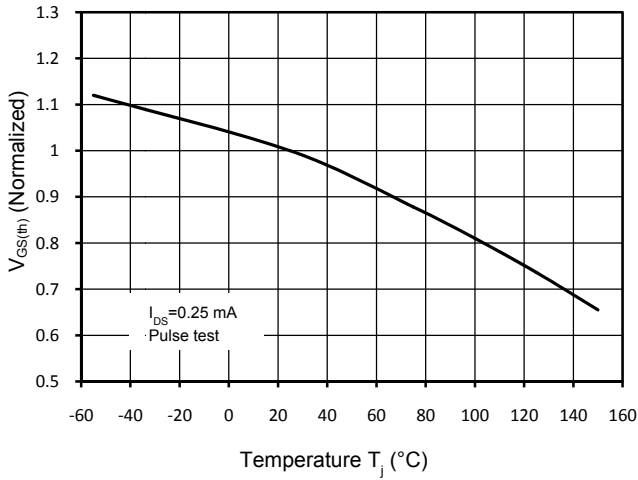


Figure 7. Threshold Voltage vs. Temperature

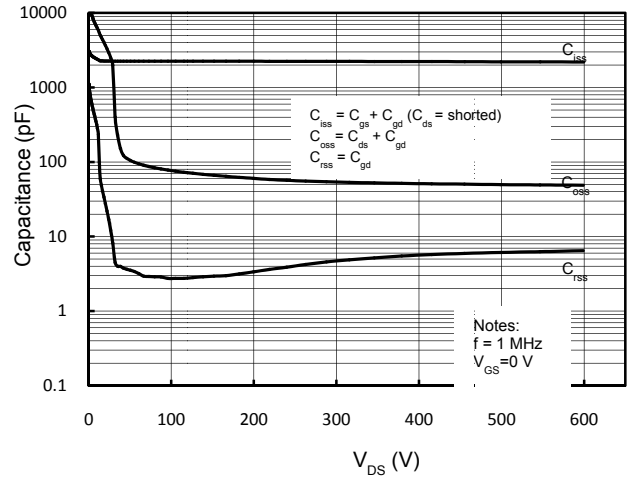


Figure 8. Capacitance Characteristics

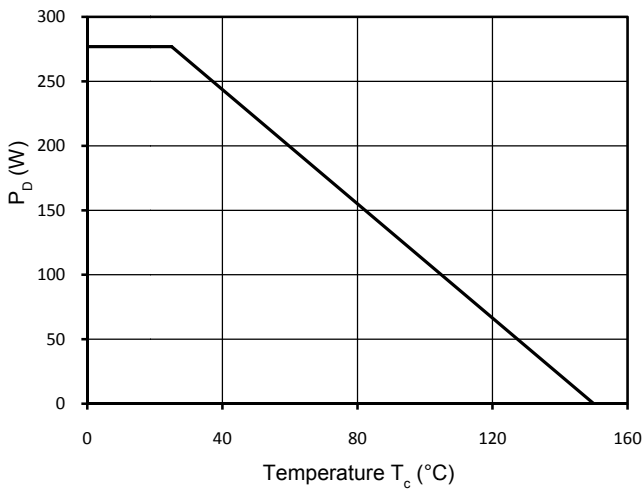


Figure 9. Power Dissipation

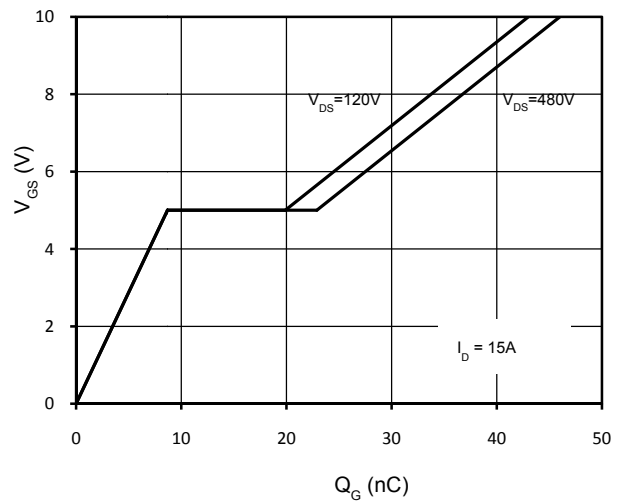


Figure 10. Gate Charge Characteristics

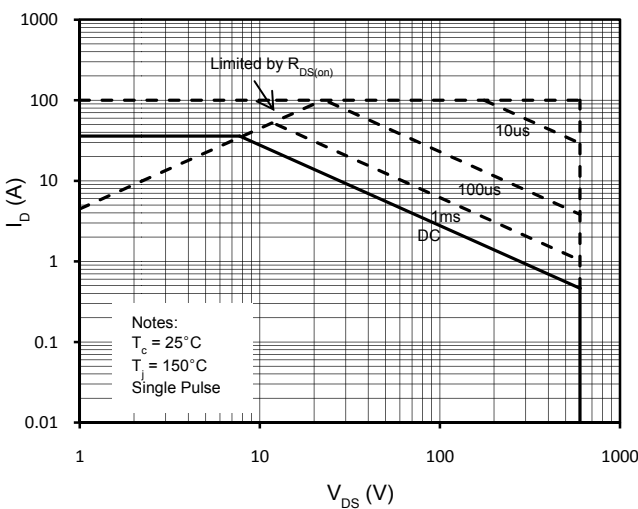


Figure 11. Maximum Safe Operating Area

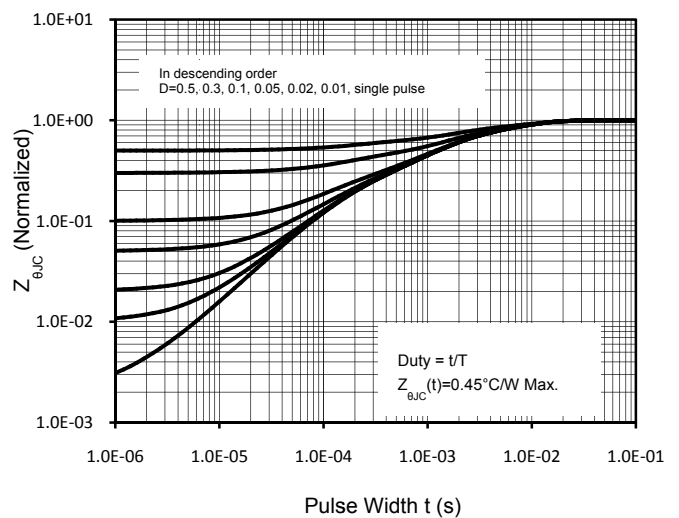
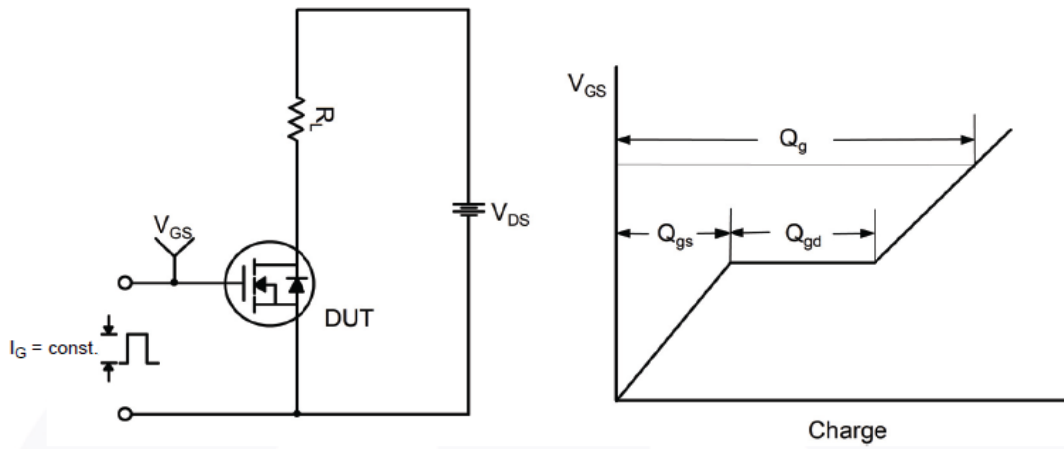
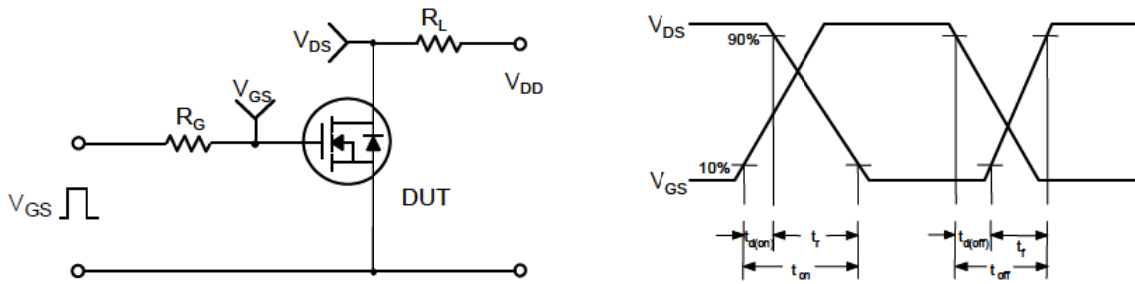


Figure 12. Transient Thermal Response Curve

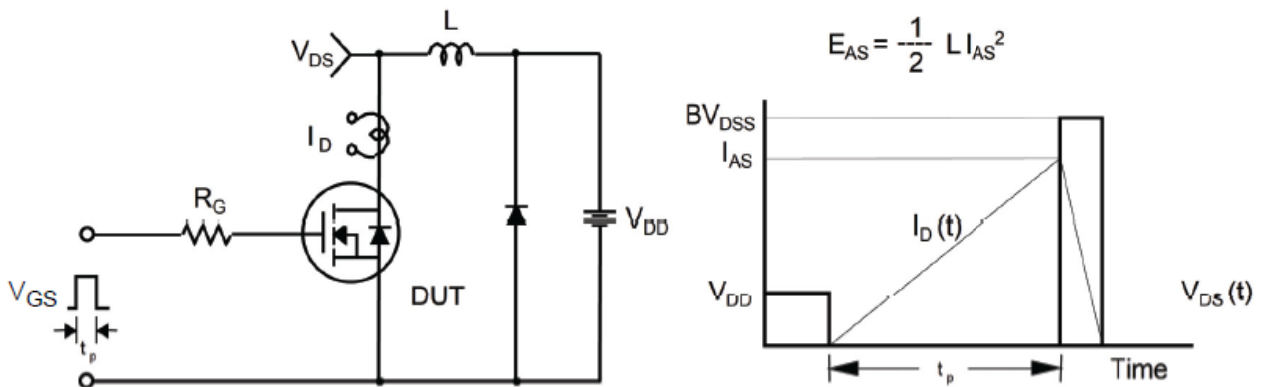
**Gate Charge Test Circuit & Waveform**



**Switching Test Circuit & Waveforms**

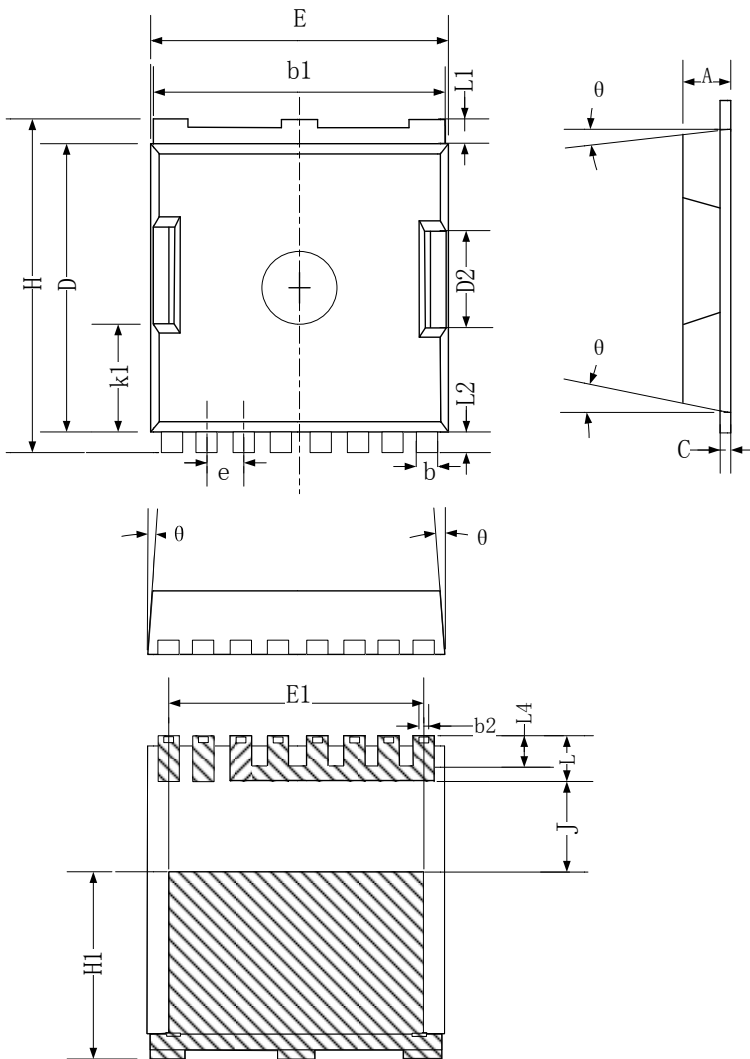


**Unclamped Inductive Switching Test Circuit & Waveforms**



Mechanical Dimensions for TO-LL

COMMON DIMENSIONS

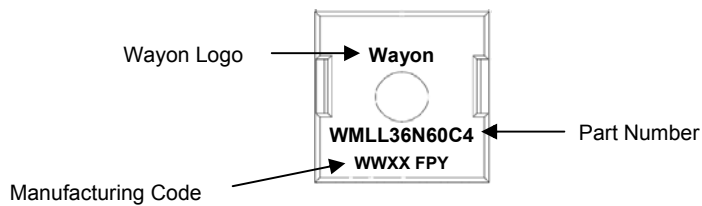


SYMBOL	mm		
	MIN	NOM	MAX
A	2.2	2.3	2.4
b	0.7	0.8	0.9
b1	9.6	9.75	9.9
b2	0.38	-	0.5
c	0.4	0.5	0.6
D	10.1	10.4	10.6
D2	3.10	3.30	3.50
E	9.60	9.90	10.10
E1	7.90	8.20	8.50
e	1.20BSC		
H	11.38	11.60	11.88
H1	6.65	6.85	7.15
N	8		
J	2.95	3.15	3.30
K1	3.8	4.1	4.4
L	1.40	1.60	1.80
L1	0.50	0.65	0.80
L2	0.50	0.65	0.80
L4	1.00	1.15	1.30
θ	4°	7°	10°

## Ordering Information

Part	Package	Marking	Packing method
WMLL36N60C4	TO-LL	WMLL36N60C4	Tape and Reel

## Marking Information




## Contact Information

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