

600V 0.053Ω Super Junction Power MOSFET

Description

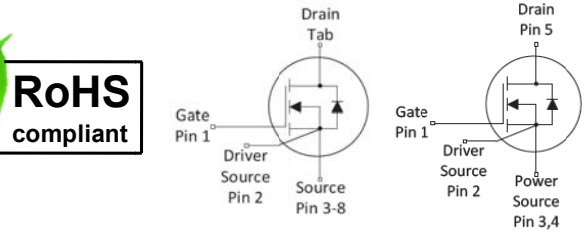
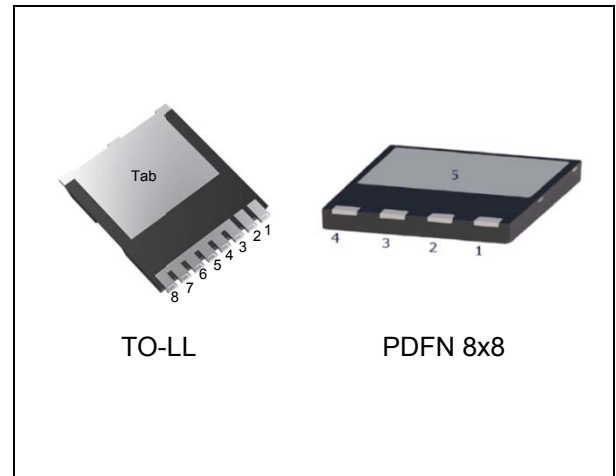
WMOS™ XJ is Wayon's new generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ XJ is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 650V @ T_{j,max}$
- Typ. $R_{DS(on)} = 0.053\Omega$
- Fast body diode
- Pb-free plating, Halogen free

Applications

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



Absolute Maximum Ratings

Parameter	Symbol	WMLL61N60XJ	WMZ61N60XJ	Unit
Drain-source voltage	V_{DS}	600		V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	51		A
($T_C = 100^\circ C$)		26		A
Pulsed drain current ²⁾	I_{DM}	90		A
Gate-source voltage	V_{GS}	± 30		V
Avalanche energy, single pulse ³⁾	E_{AS}	940		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	1.3		mJ
Avalanche current, repetitive ²⁾	I_{AR}	5		A
Power dissipation ($T_C = 25^\circ C$)	P_D	350	278	W
- Derate above $25^\circ C$		2.8	2.3	W/ $^\circ C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		$^\circ C$
Continuous diode forward current ¹⁾	I_S	51		A
Diode pulse current ²⁾	$I_{S,pulse}$	90		A

Thermal Characteristics

Parameter	Symbol	WMLL61N60XJ	WMZ61N60XJ	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.36	0.45	$^\circ C/W$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	62	$^\circ C/W$

Electrical Characteristics $T_c = 25^\circ\text{C}$, 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 =1 mA	600	-	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =0.25mA	2.8	3.8	4.8	V
Drain cut-off current	I _{DSS}	V _{DS} =600 V, V _{GS} =0V, T _J = 25°C T _J = 125°C	- -	- 200	50 -	μA
Gate leakage current, forward	I _{GSSF}	V _{GS} =20V, V _{DS} =0V	-	-	300	nA
Gate leakage current, reverse	I _{GSSR}	V _{GS} =-20V, V _{DS} =0V	-	-	-300	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10 V, I _D =8A T _J = 25°C	- -	 0.053	 0.062	 Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 100V, V _{GS} = 0V, f = 1 MHz	-	3320	-	pF
Output capacitance	C _{oss}		-	115	-	
Reverse transfer capacitance	C _{rss}		-	2.3	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 300V, I _D = 15A R _G = 25Ω, V _{GS} =10V	-	64	-	ns
Rise time	t _r		-	56	-	
Turn-off delay time	t _{d(off)}		-	196	-	
Fall time	t _f		-	28	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =480V, I _D =15A, V _{GS} =0 to 10V	-	18.0	-	nC
Gate to drain charge	Q _{gd}		-	16.2	-	
Gate charge total	Q _g		-	58.0	-	
Gate plateau voltage	V _{plateau}		-	5.5	-	V
Reverse diode characteristics						
Diode forward voltage	V _{SD}	V _{GS} =0 V, I _F =15A	-	-	1.2	V
Reverse recovery time	t _{rr}	V _R =50V, I _F =15A, dI _F /dt=100A/μs	-	163	-	ns
Reverse recovery charge	Q _{rr}		-	1.3	-	μC
Peak reverse recovery current	I _{rrm}		-	15.7	-	A

Notes:

- Limited by $T_{j\max}$. Maximum duty cycle $D=0.5$.
- Pulse width limited by maximum junction temperature.
- $I_{AS}=5\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, starting $T_j=25^\circ\text{C}$.

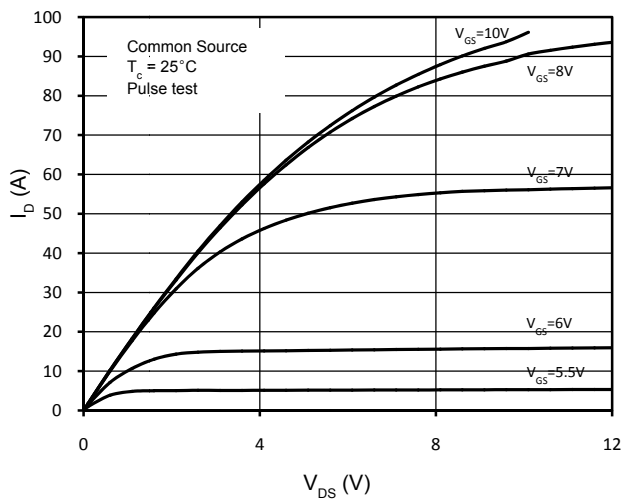


Figure 1. On-Region Characteristics

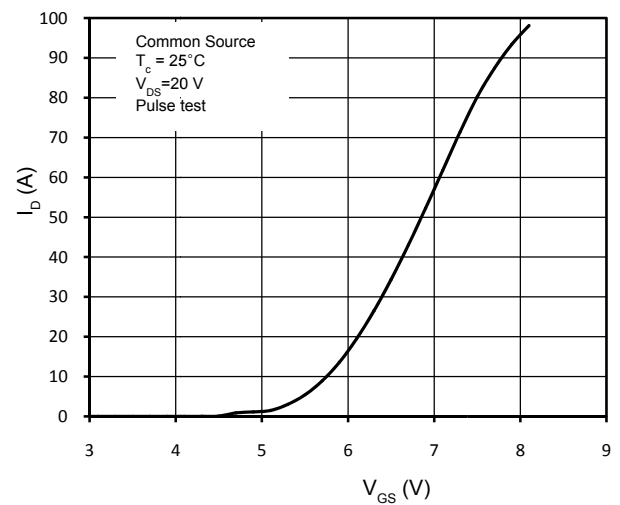


Figure 2. Transfer Characteristics

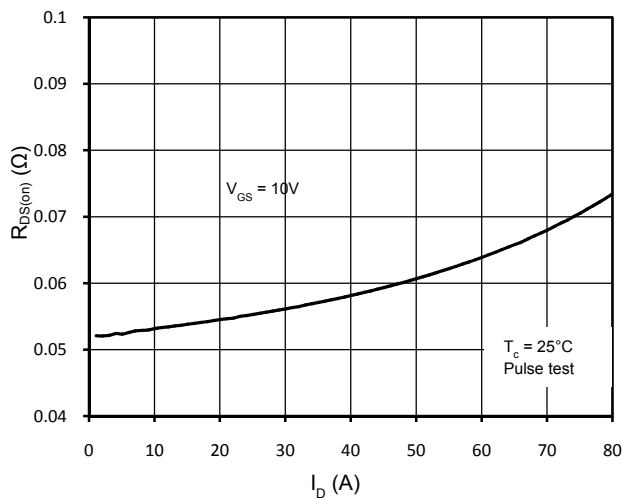


Figure 3. Static Drain-Source On Resistance

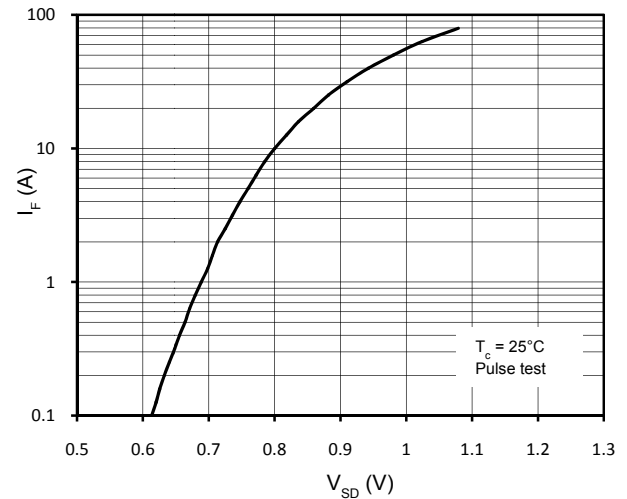
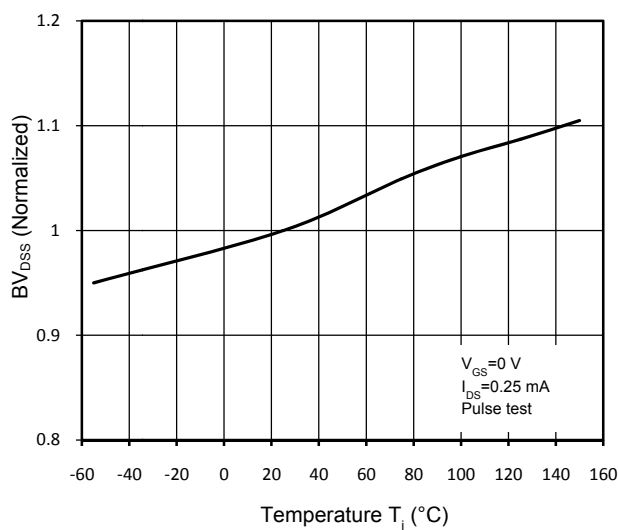
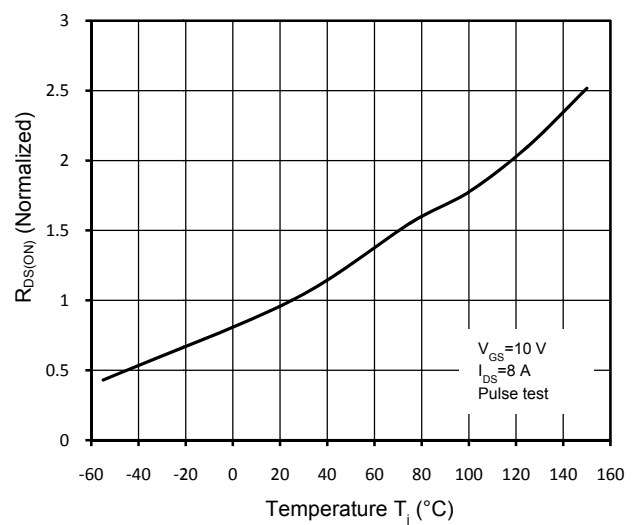


Figure 4. Body-Diode Forward Characteristics

Figure 5. Normalized BV_{DS} vs. TemperatureFigure 6. Normalized $R_{DS(on)}$ vs. Temperature

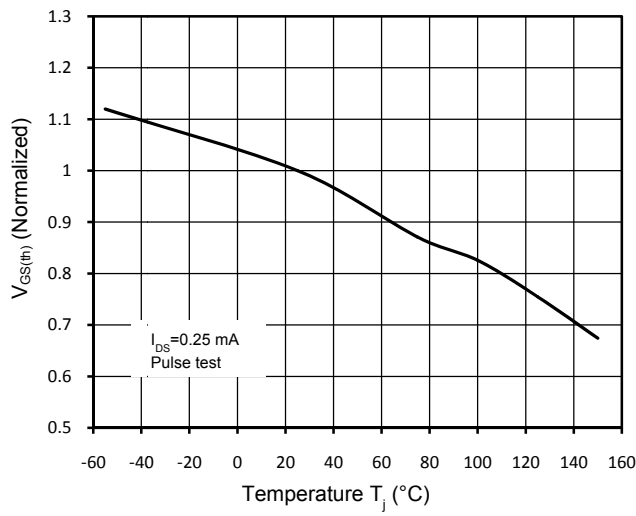


Figure 7. Threshold Voltage vs. Temperature

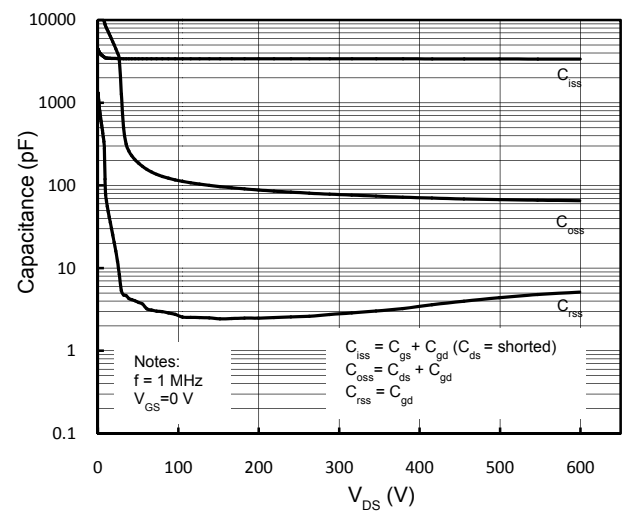


Figure 8. Capacitance Characteristics

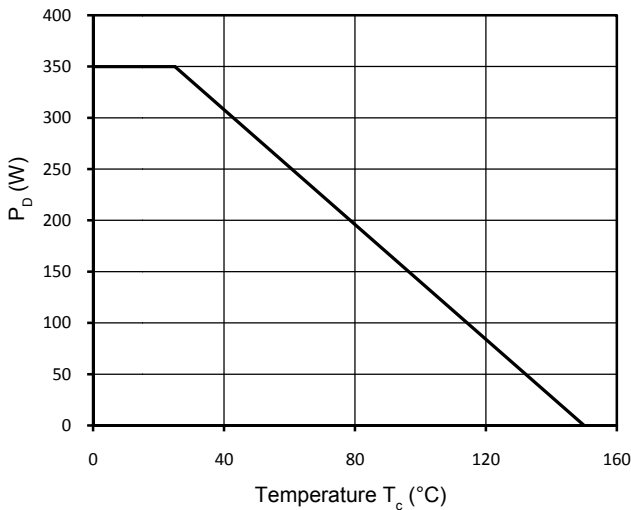


Figure 9. Power Dissipation (WMLL)

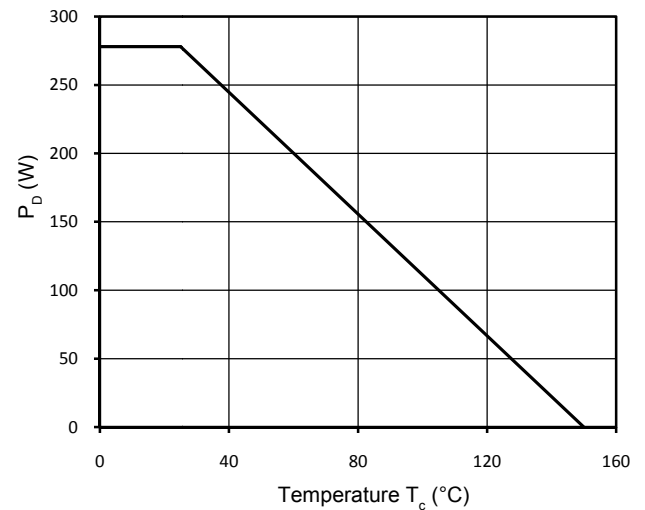


Figure 10. Power Dissipation (WMZ)

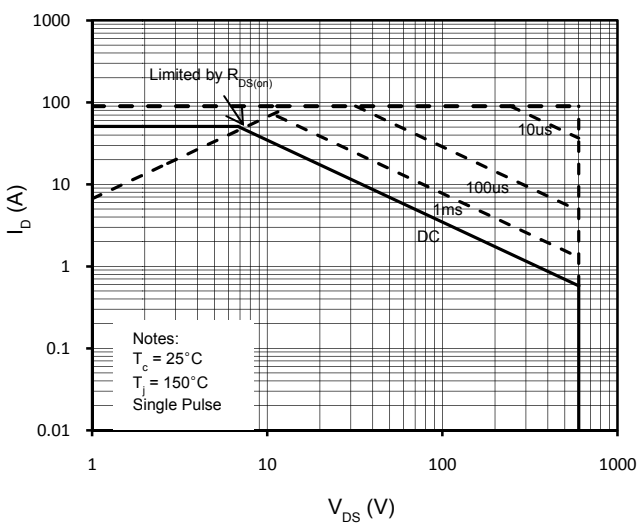


Figure 11. Maximum Safe Operating Area(WMLL)

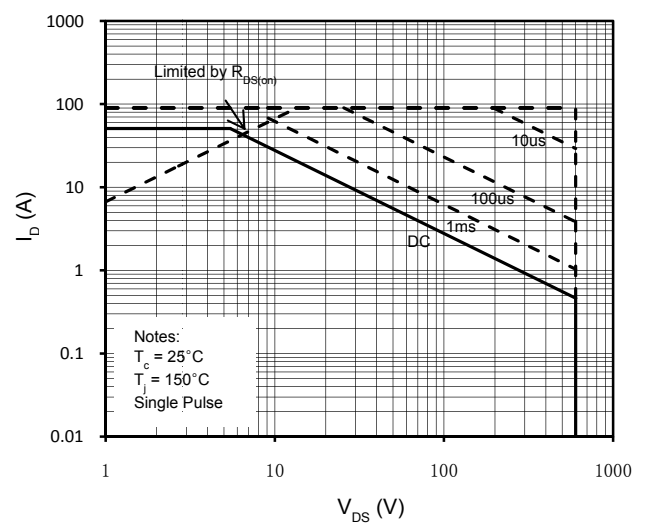


Figure 12. Maximum Safe Operating Area(WMZ)

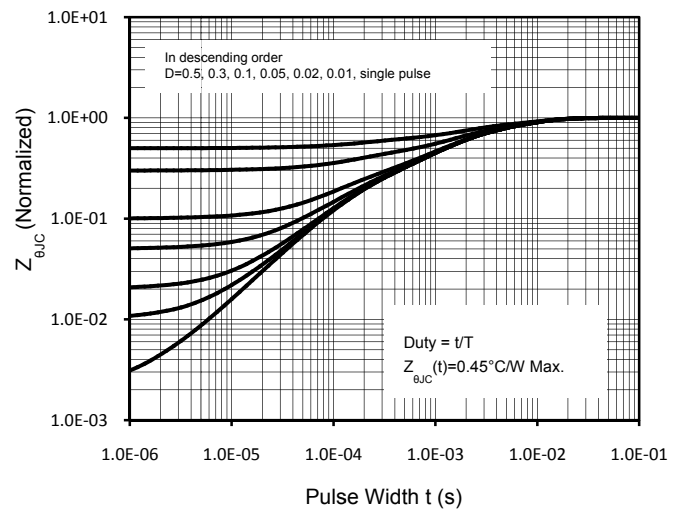
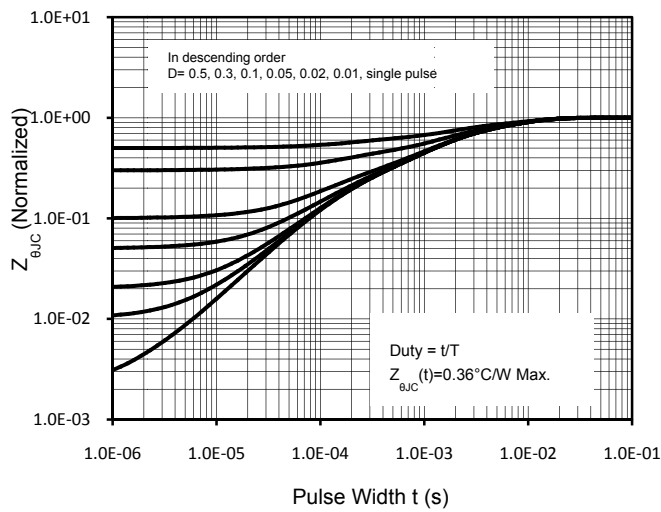


Figure 13. Transient Thermal Response Curve (WMLL) Figure 14. Transient Thermal Response Curve (WMZ)

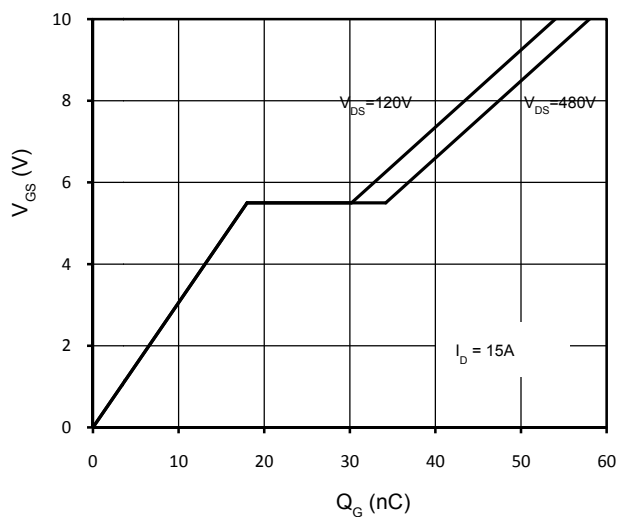
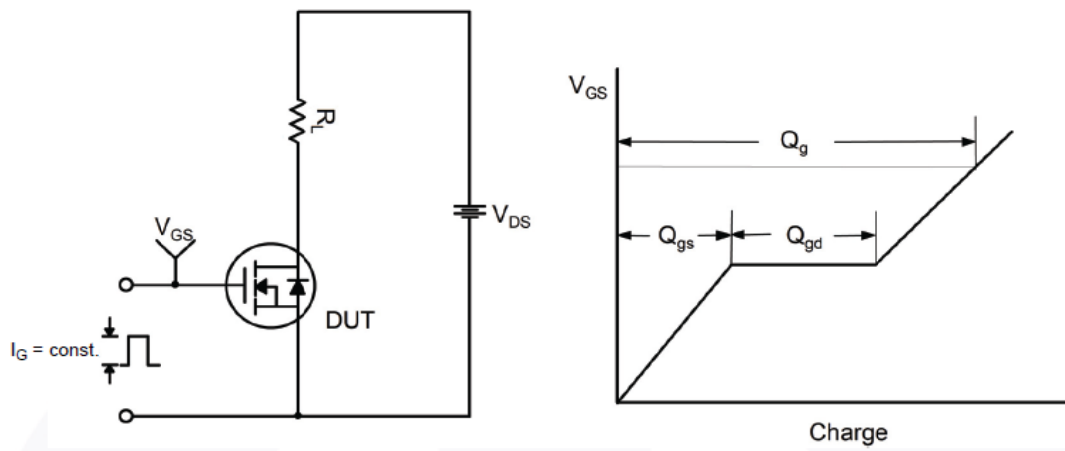
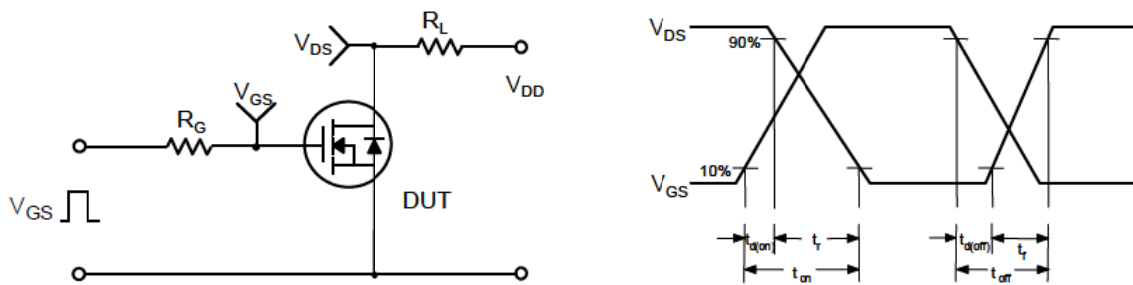


Figure 15. Gate Charge Characteristics

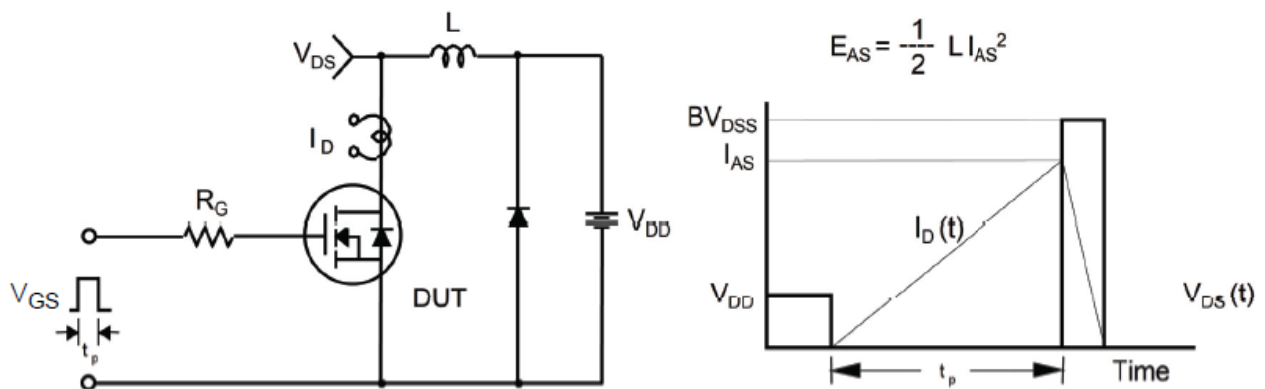
Gate Charge Test Circuit & Waveform



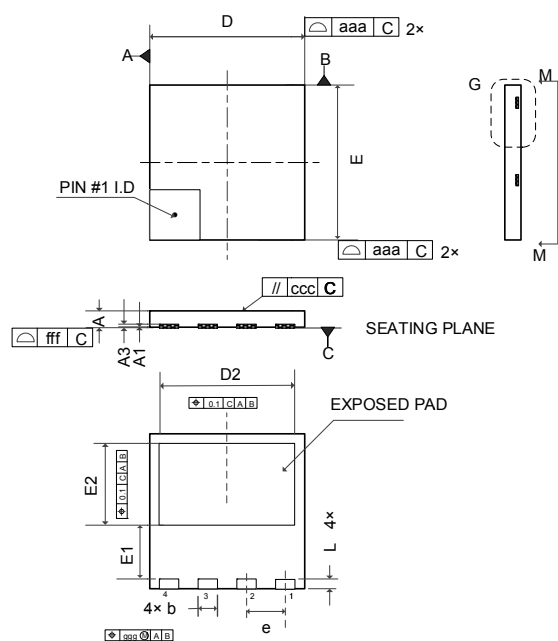
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



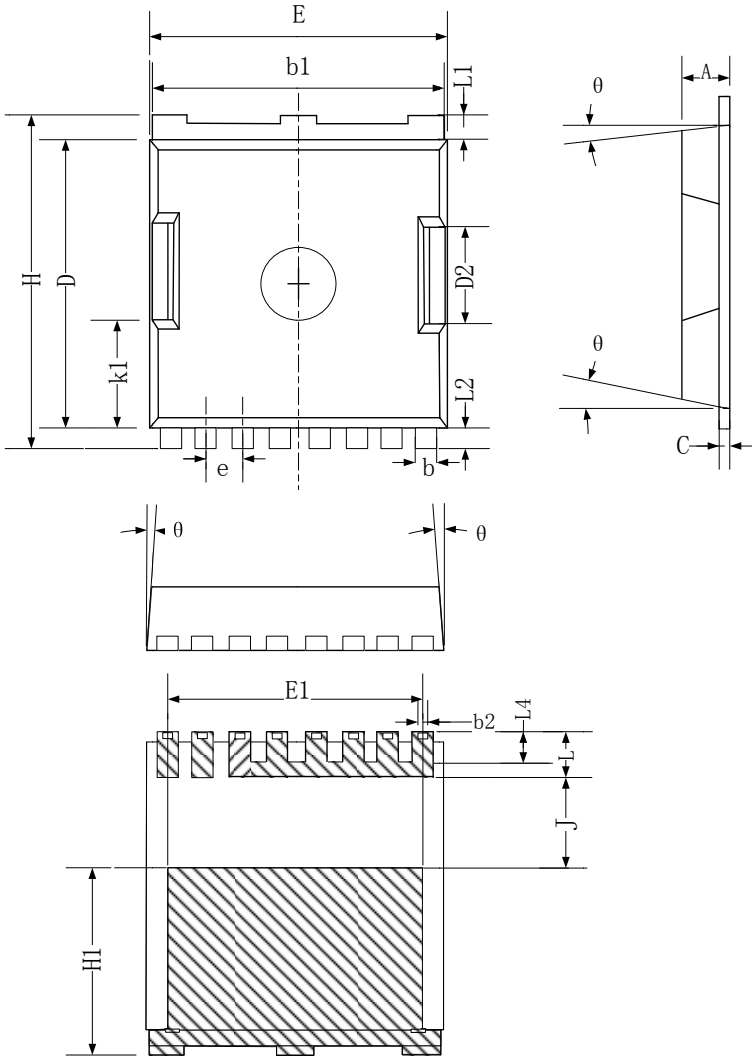
COMMON DIMENSIONS



SYMBOL	mm		
	MIN	NOM	MAX
A	0.75	0.85	0.95
A1	0.00	-	0.05
A3	0.10	0.20	0.30
b	0.90	1.00	1.10
D	7.90	8.00	8.10
E	7.90	8.00	8.10
D2	7.10	7.20	7.30
E1	2.65	2.75	2.85
E2	4.25	4.35	4.45
e	2.00 BSC		
L	0.40	0.50	0.60
aaa	0.10		
ggg	0.05		
ccc	0.05		
fff	0.05		

Mechanical Dimensions for TO-LL

COMMON DIMENSIONS

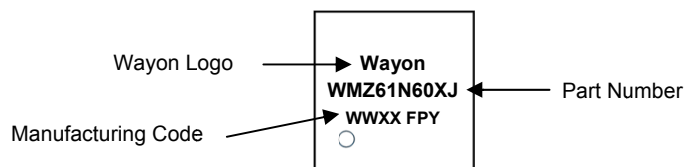


SYMBOL	mm		
	MIN	NOM	MAX
A	2.2	2.3	2.4
b	0.7	0.8	0.9
b1	9.6	9.75	9.9
b2	0.38	-	0.5
c	0.4	0.5	0.6
D	10.1	10.4	10.6
D2	3.10	3.30	3.50
E	9.60	9.90	10.10
E1	7.90	8.20	8.50
e	1.20BSC		
H	11.38	11.60	11.88
H1	6.65	6.85	7.15
N	8		
J	2.95	3.15	3.30
K1	3.8	4.1	4.4
L	1.40	1.60	1.80
L1	0.50	0.65	0.80
L2	0.50	0.65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

Ordering Information

Part	Package	Marking	Packing method
WMZ61N60XJ	PDFN 8x8	WMZ61N60XJ	Tape and Reel
WMLL61N60XJ	TO-LL	WMLL61N60XJ	Tape and Reel

Marking Information



Contact Information

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For additional information, please contact your local Sales Representative.

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