

600V 0.061Ω Super Junction Power MOSFET

Description

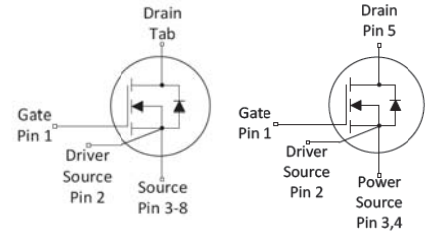
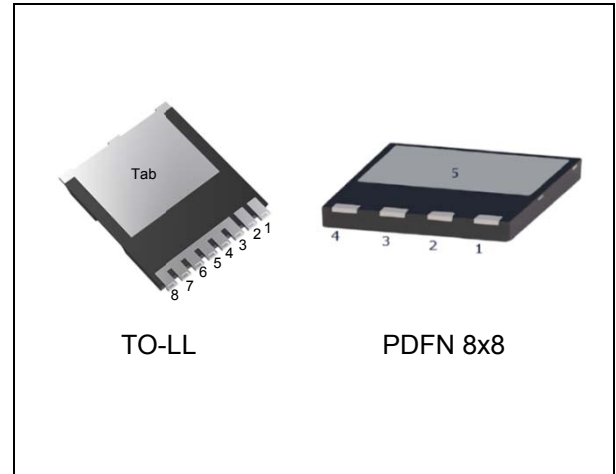
WMOS™ XJ is Wayon's new generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ XJ is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 650V @ T_{j,max}$
- Typ. $R_{DS(on)} = 0.061\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

Applications

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



Absolute Maximum Ratings

Parameter	Symbol	WMLL51N60XJ	WMZ51N60XJ	Unit
Drain-source voltage	V_{DS}	600		V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	50		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}	710		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	1.1		mJ
Avalanche current, repetitive ²⁾	I_{AR}	4.5		A
Power dissipation ($T_C = 25^\circ C$)	P_D	350	266	W
- Derate above $25^\circ C$		2.8	2.1	W/ $^\circ C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		$^\circ C$
Continuous diode forward current ¹⁾	I_S	50		A
Diode pulse current ²⁾	$I_{S,pulse}$	90		A

Thermal Characteristics

Parameter	Symbol	WMLL51N60XJ	WMZ51N60XJ	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.37	0.47	$^\circ C/W$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	62	$^\circ C/W$

Electrical Characteristics T_c = 25°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	2.5	3.5	4.5	V
Drain cut-off current	I _{DSS}	V _{DS} =600 V, V _{GS} =0V, T _J = 25°C T _J = 125°C	- -	- 30	3 -	μA
Gate leakage current, forward	I _{GSSF}	V _{GS} =20V, V _{DS} =0V	-	-	200	nA
Gate leakage current, reverse	I _{GSSR}	V _{GS} =-20V, V _{DS} =0V	-	-	-200	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10 V, I _D =7A T _J = 25°C	- -	 0.061	 0.072	 Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 100V, V _{GS} = 0V, f = 1 MHz	-	2557	-	pF
Output capacitance	C _{OSS}		-	91	-	
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	-	56	-	ns
Rise time	t _r		-	50	-	
Turn-off delay time	t _{d(off)}		-	207	-	
Fall time	t _f		-	33	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =480V, I _D =15A, V _{GS} =0 to 10V	-	16.5	-	nC
Gate to drain charge	Q _{gd}		-	16.9	-	
Gate charge total	Q _g		-	53.8	-	
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	-	289	-	ns
Reverse recovery charge	Q _{rr}		-	4.1	-	μC
Peak reverse recovery current	I _{rrm}		-	27	-	A

Notes:

- Limited by T_{j max}. Maximum duty cycle D=0.5.
- Pulse width limited by maximum junction temperature.
- I_{AS} = 4.5A, V_{DD} = 50V, R_G = 25Ω, starting T_j = 25°C.

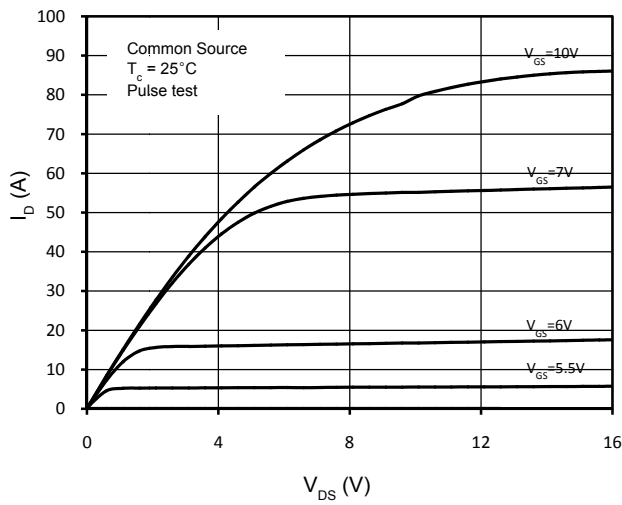


Figure 1. On-Region Characteristics

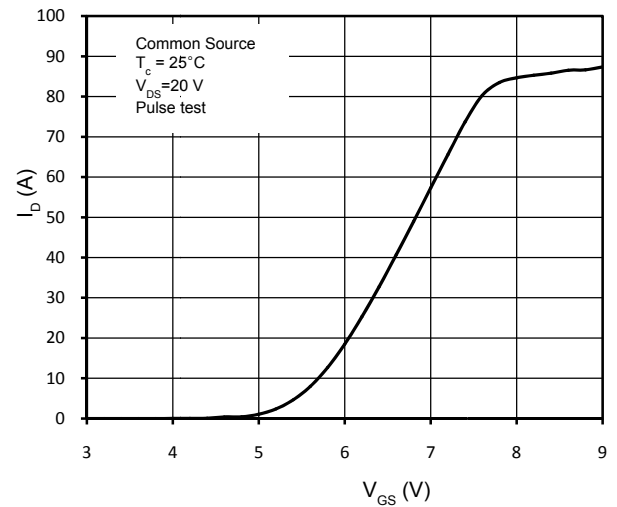


Figure 2. Transfer Characteristics

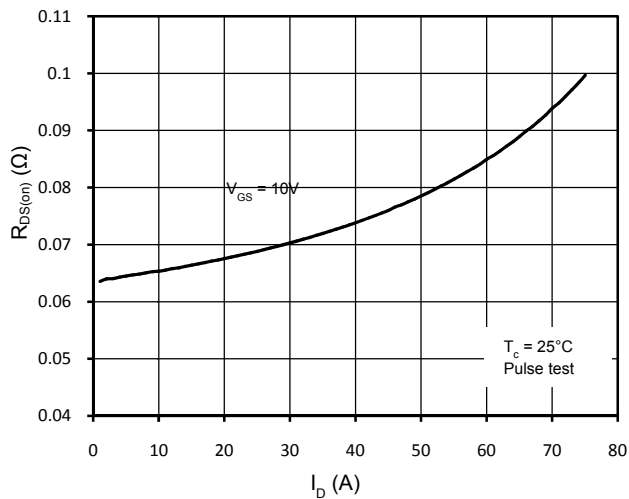


Figure 3. Static Drain-Source On Resistance

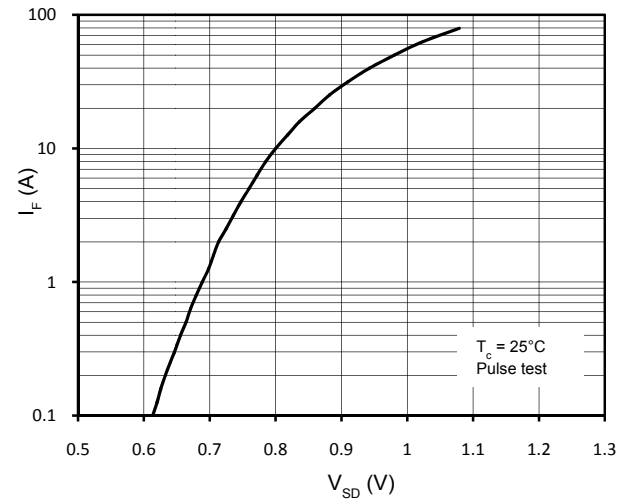
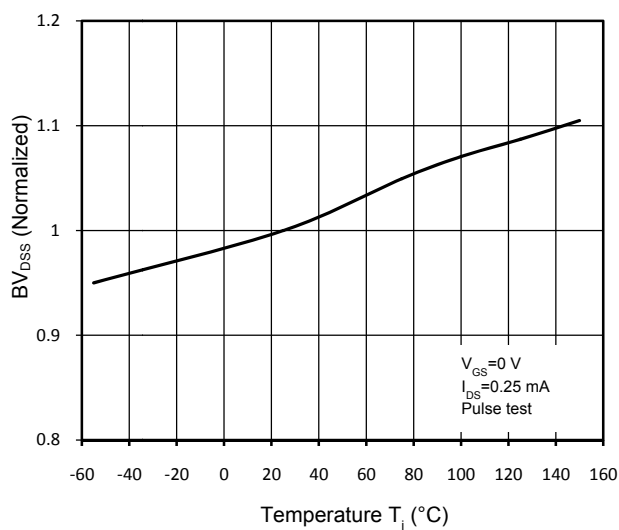
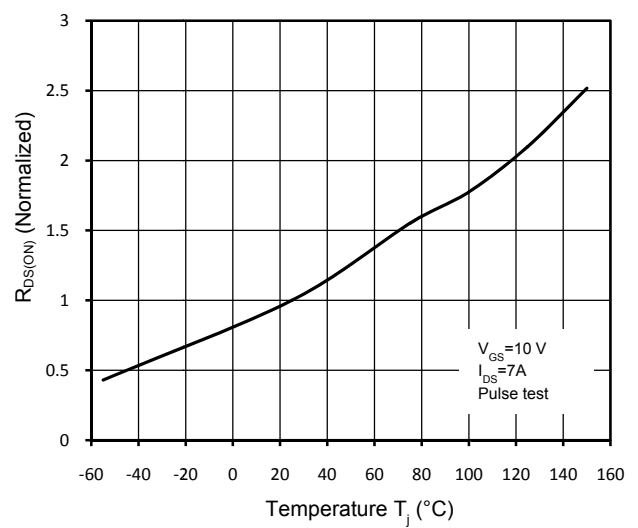


Figure 4. Body-Diode Forward Characteristics

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

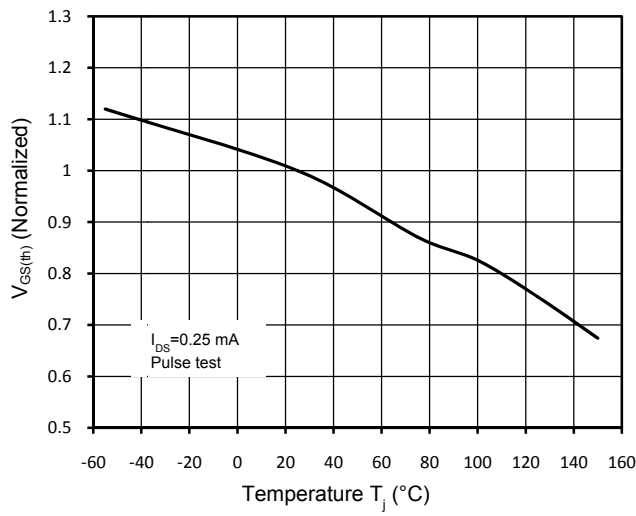


Figure 7. Threshold Voltage vs. Temperature

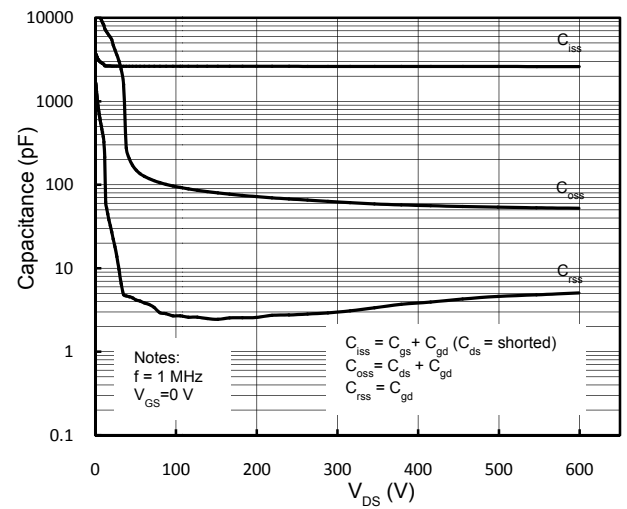


Figure 8. Capacitance Characteristics

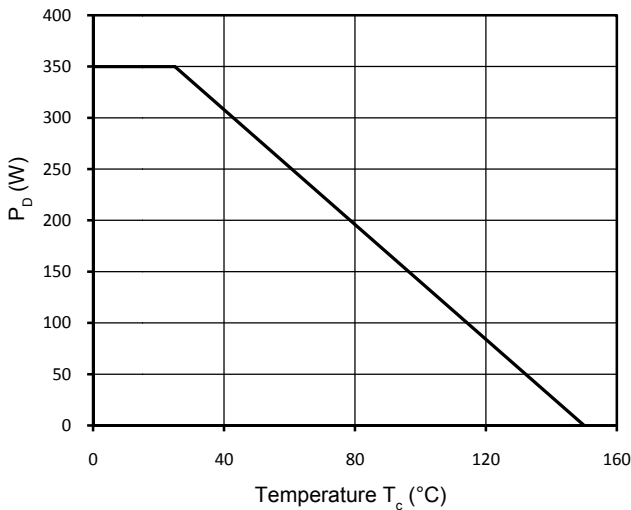


Figure 9. Power Dissipation(WMLL)

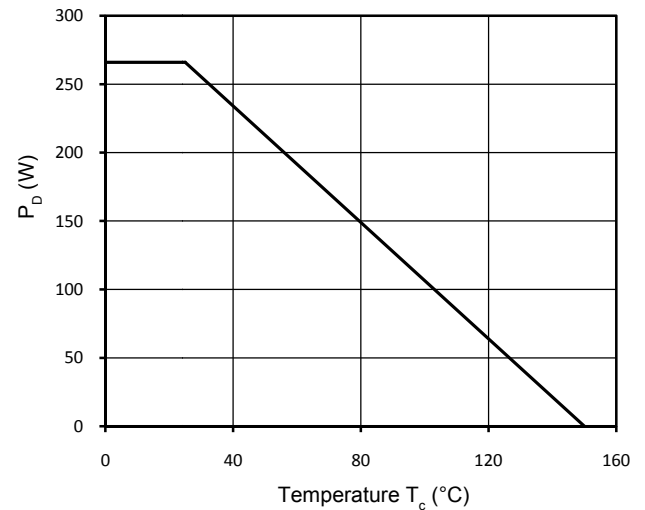


Figure 10. Power Dissipation (WMZ)

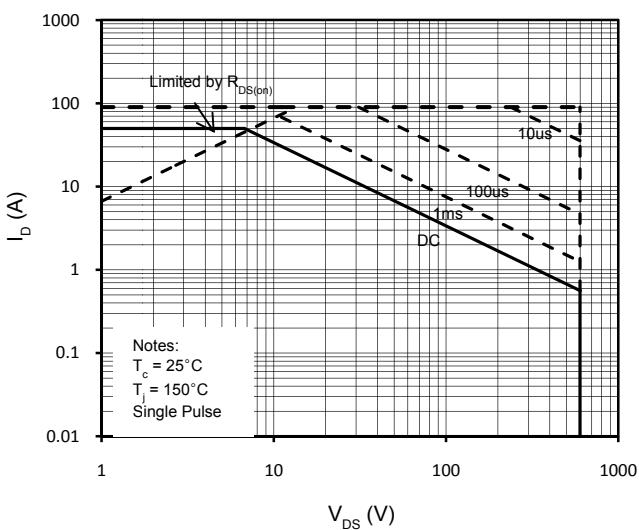


Figure 11. Maximum Safe Operating Area (WMLL)

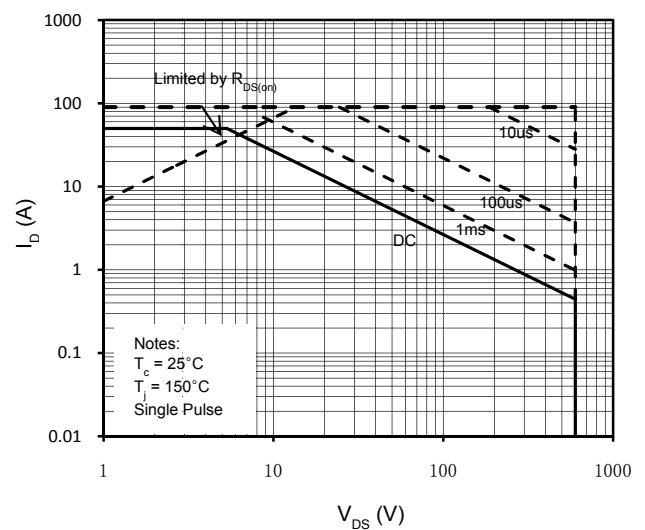


Figure 12. Maximum Safe Operating Area(WMZ)

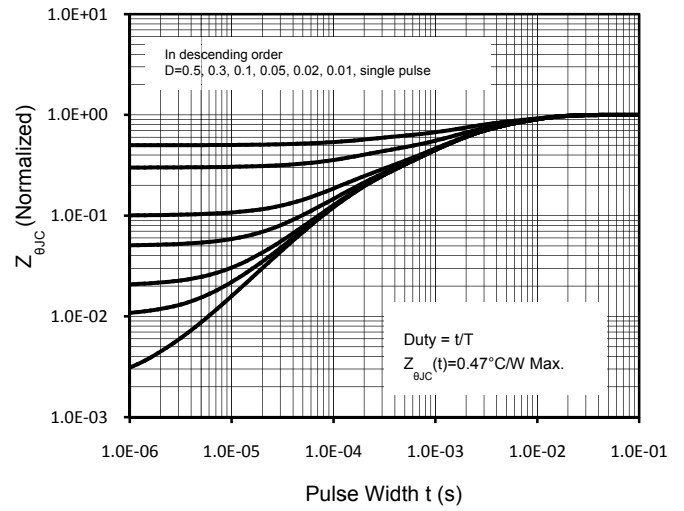
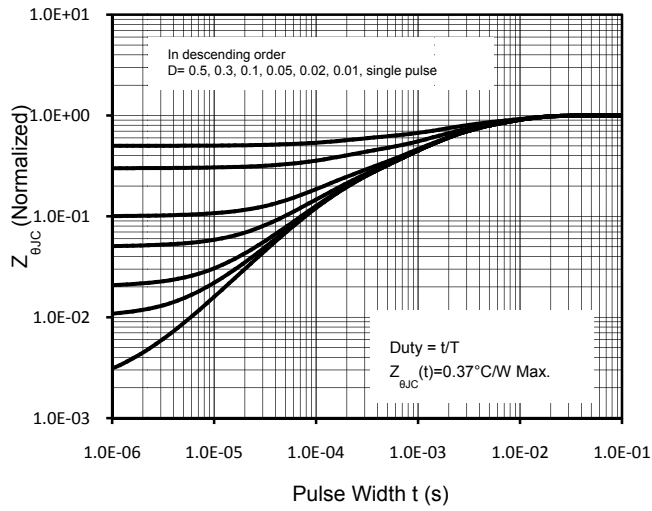


Figure 13. Transient Thermal Response Curve (WMLL) Figure 14. Transient Thermal Response Curve (WMZ)

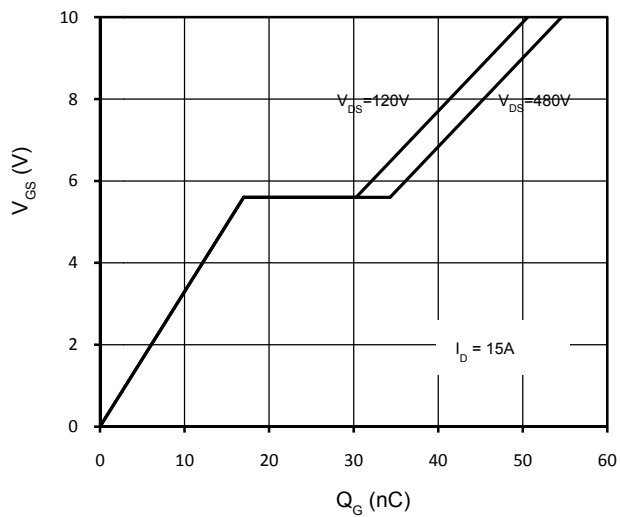
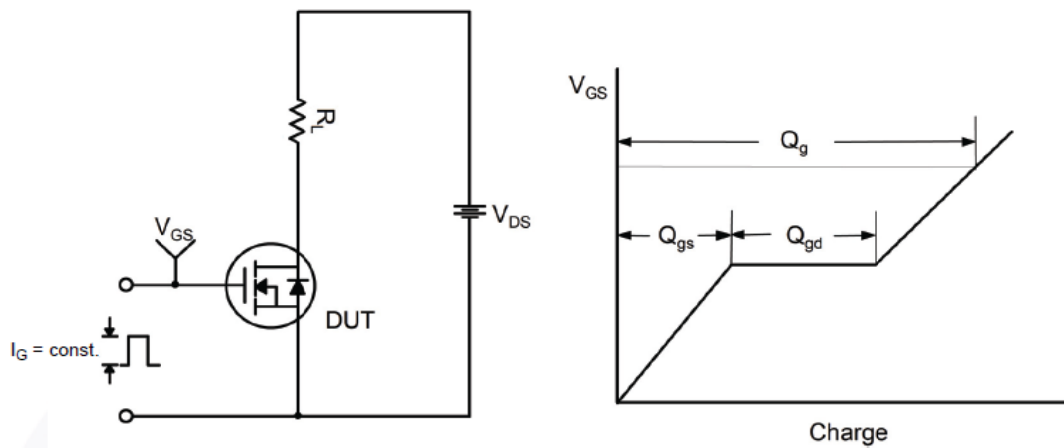
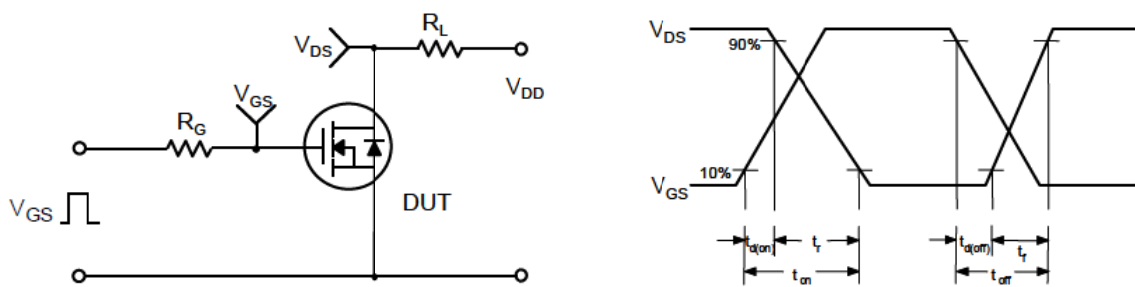


Figure 15. Gate Charge Characteristics

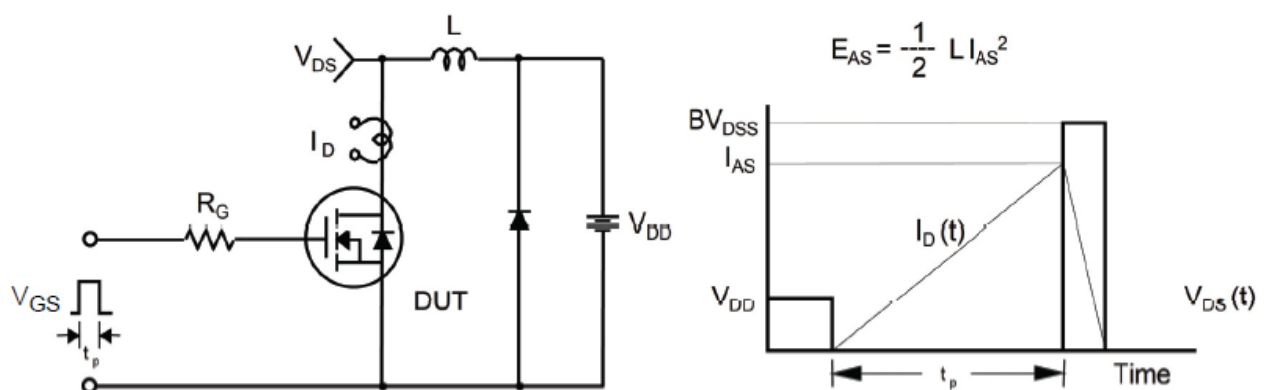
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

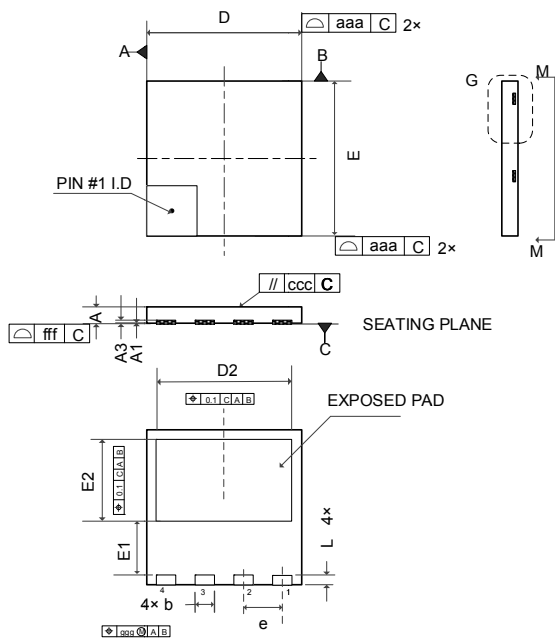


Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for PDFN 8x8

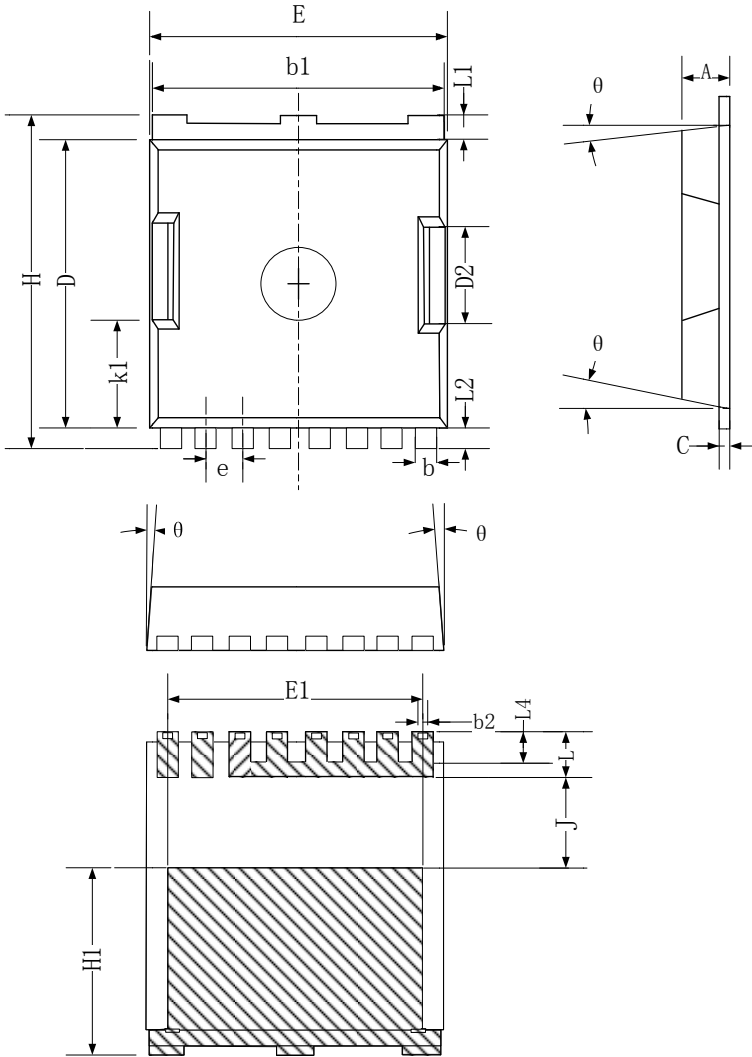
COMMON DIMENSIONS



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

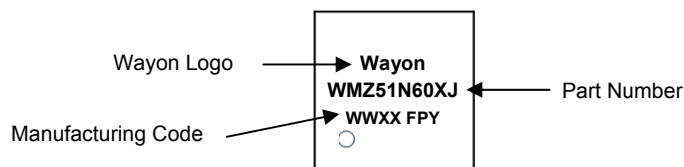


SYMBOL	mm		
	MIN	NOM	MAX
A	2.2	2.3	2.4
b	0.7	0.8	0.9
b1	9.6	9.75	9.9
b2	0.38	-	0.5
c	0.4	0.5	0.6
D	10.1	10.4	10.6
D2	3.10	3.30	3.50
E	9.60	9.90	10.10
E1	7.90	8.20	8.50
e	1.20BSC		
H	11.38	11.60	11.88
H1	6.65	6.85	7.15
N	8		
J	2.95	3.15	3.30
K1	3.8	4.1	4.4
L	1.40	1.60	1.80
L1	0.50	0.65	0.80
L2	0.50	0.65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

Ordering Information

Part	Package	Marking	Packing method
WMZ51N60XJ	PDFN 8x8	WMZ51N60XJ	Tape and Reel
WMLL51N60XJ	TO-LL	WMLL51N60XJ	Tape and Reel

Marking Information



Contact Information

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For additional information, please contact your local Sales Representative.

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