

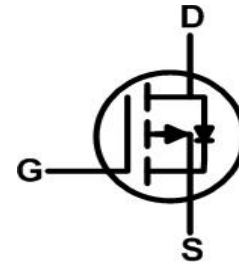


- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

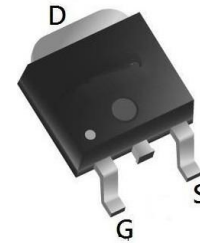
Description

The WLU50P04 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WLU50P04 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.



TO252 Pin Configuration



Product Summary

BVDSS	RDSON	ID
-40V	8.3 mΩ	-52A

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $-V_{GS} @ -10V^1$	-52	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $-V_{GS} @ -10V^1$	-35	A
I_{DM}	Pulsed Drain Current ²	-160	A
EAS	Single Pulse Avalanche Energy ³	144	mJ
I_{AS}	Avalanche Current	-30.0	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	45	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	3.6	$^\circ C/W$



Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.7	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=-10V, I_D=-20A$	-	8.3	13	m Ω
		$V_{GS}=-4.5V, I_D=-10A$	-	15	22	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V,$ $f=1.0MHz$	-	3800	-	pF
C_{oss}	Output Capacitance		-	329	-	pF
C_{rss}	Reverse Transfer Capacitance		-	289	-	pF
Q_g	Total Gate Charge	$V_{DS}=-20V, I_D=-20A,$ $V_{GS}=-10V$	-	68	-	nC
Q_{gs}	Gate-Source Charge		-	10	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	14	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-20V, I_D=-20A,$ $V_{GS}=-10V, R_{GEN}=2.4\Omega$	-	10	-	ns
t_r	Turn-on Rise Time		-	82	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	93	-	ns
t_f	Turn-off Fall Time		-	74	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-40	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-160	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=-30A$	-	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=-30A,$ $di/dt=100A/\mu s$	-	20	-	ns
Q_{rr}	Reverse Recovery Charge		-	13	-	nC

- Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
 2. EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=-20V, V_G=-10V, L=0.5mH, R_G=25\Omega, I_{AS}=-24A$
 3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$



Typical Performance Characteristics

Figure 1: Output Characteristics

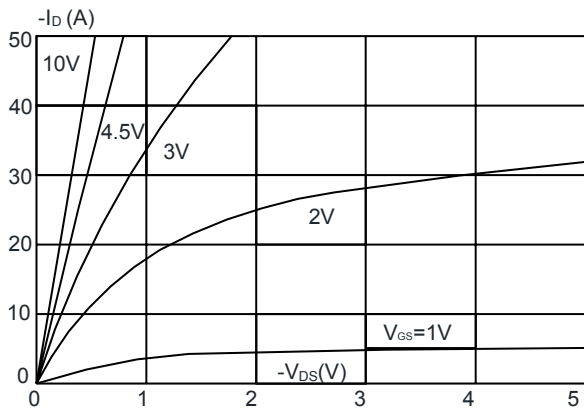


Figure 2: Typical Transfer Characteristics

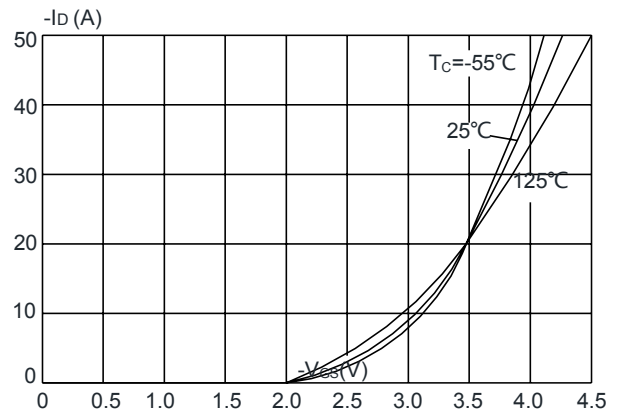


Figure 3: On-resistance vs. Drain Current

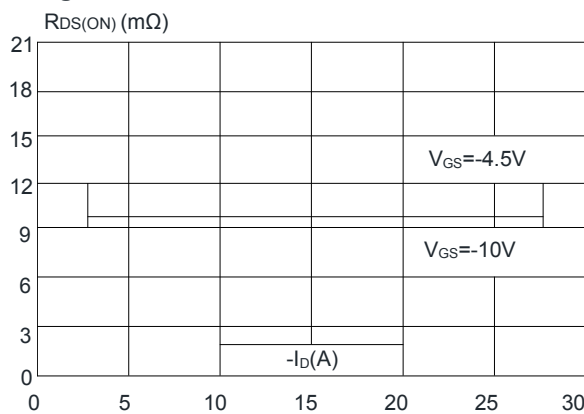


Figure 4: Body Diode Characteristics

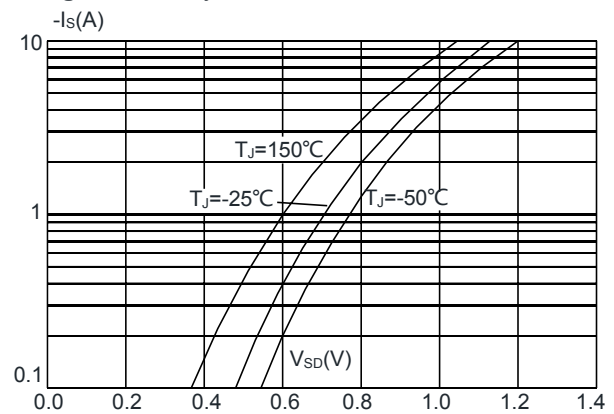


Figure 5: Gate Charge Characteristics

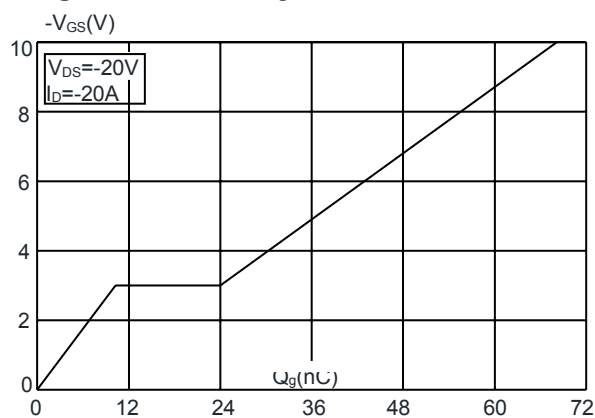


Figure 6: Capacitance Characteristics

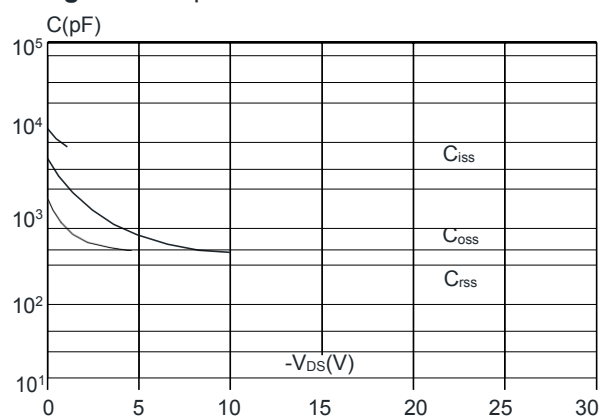




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

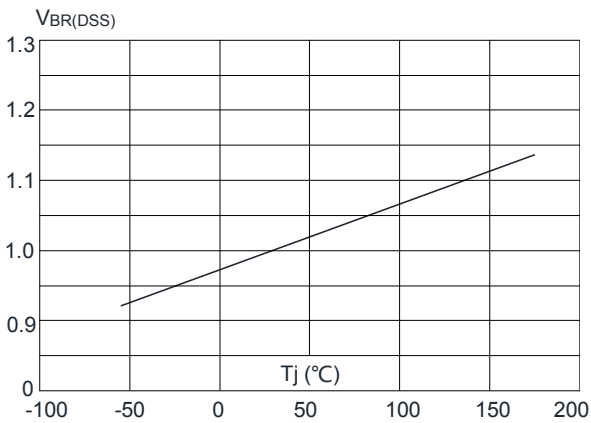


Figure 8: Normalized on Resistance vs. Junction Temperature

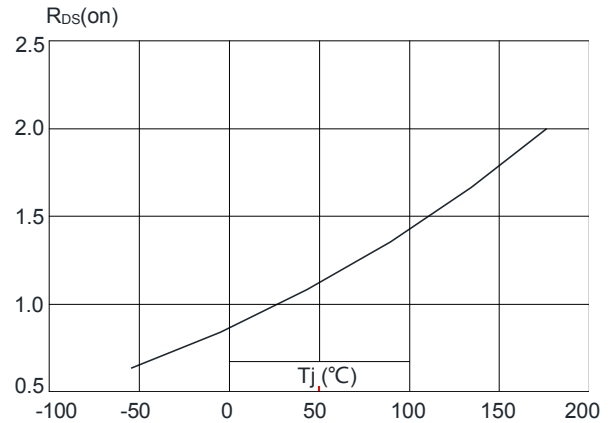


Figure 9: Maximum Safe Operating Area

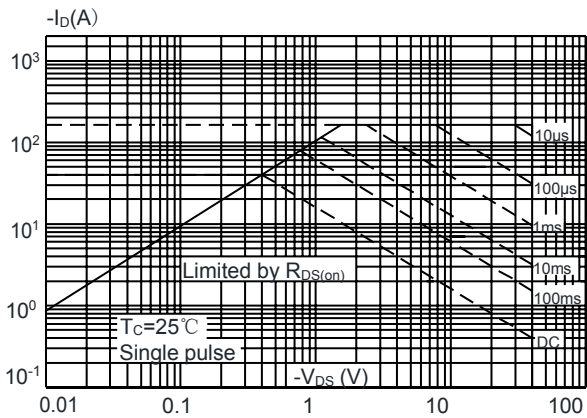


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

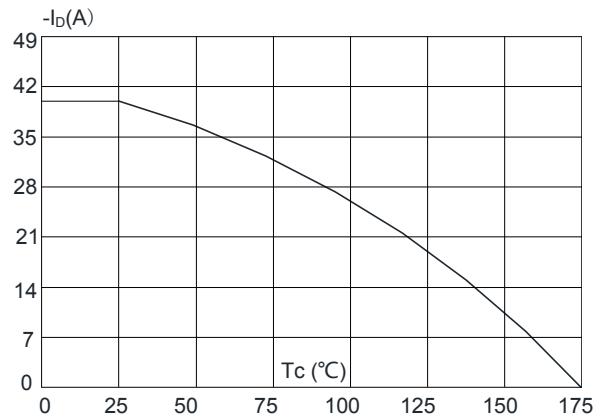
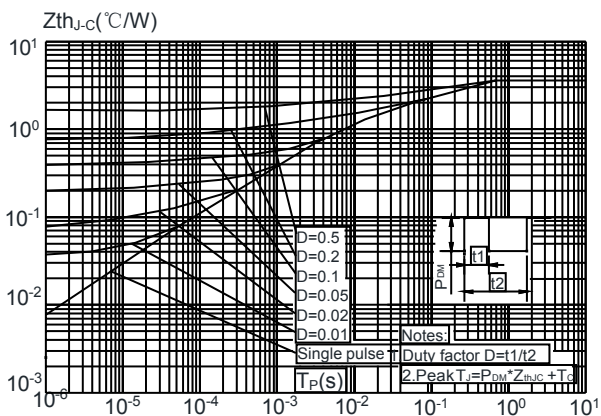


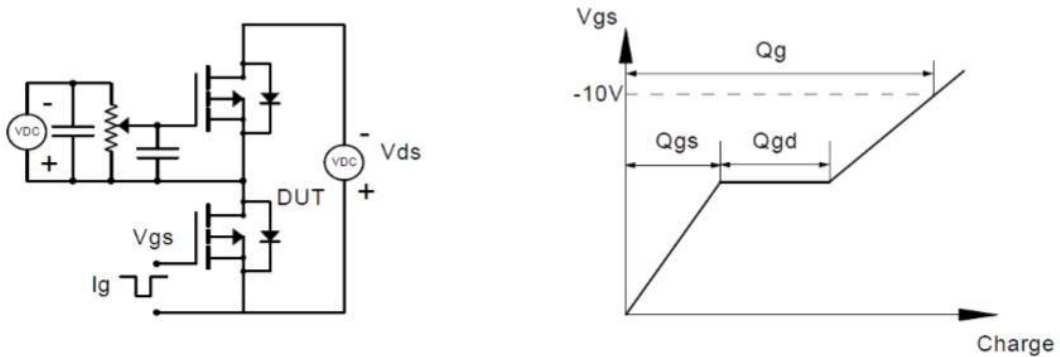
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



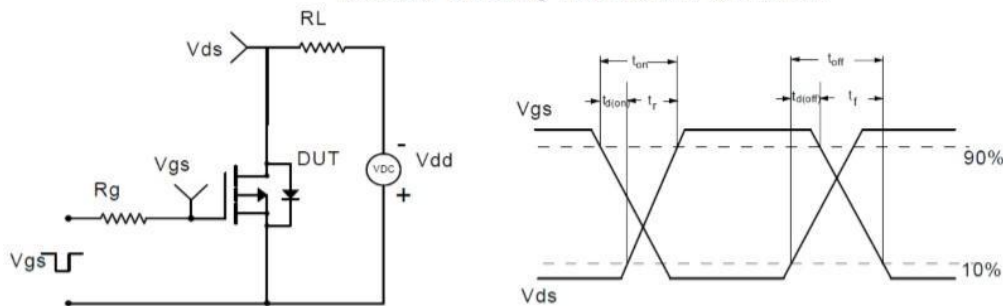


Test Circuit

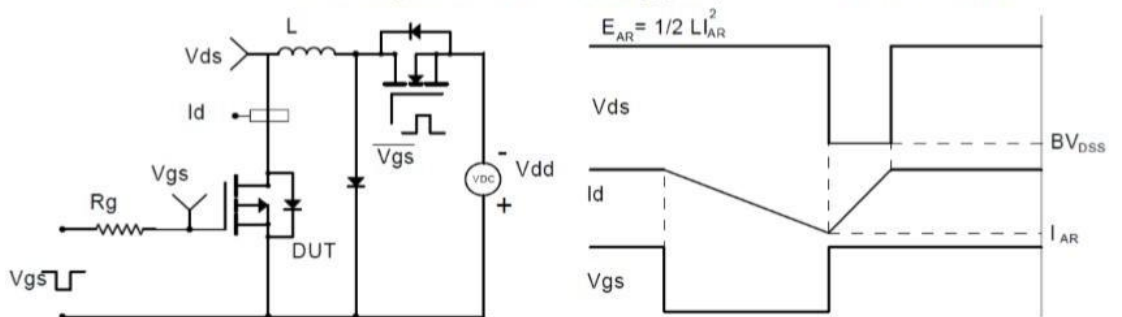
Gate Charge Test Circuit & Waveform



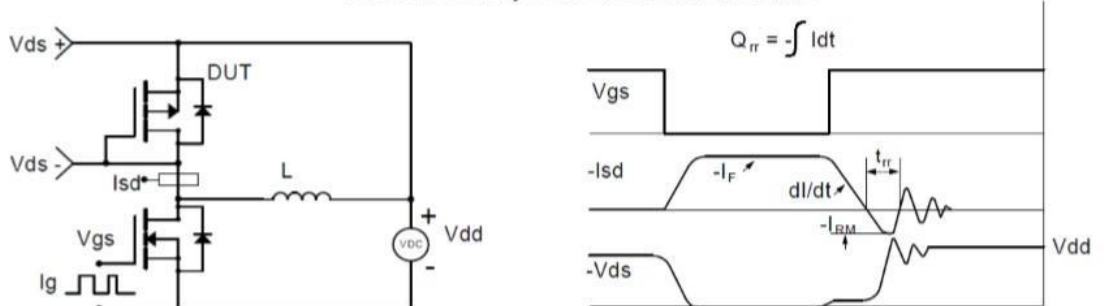
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

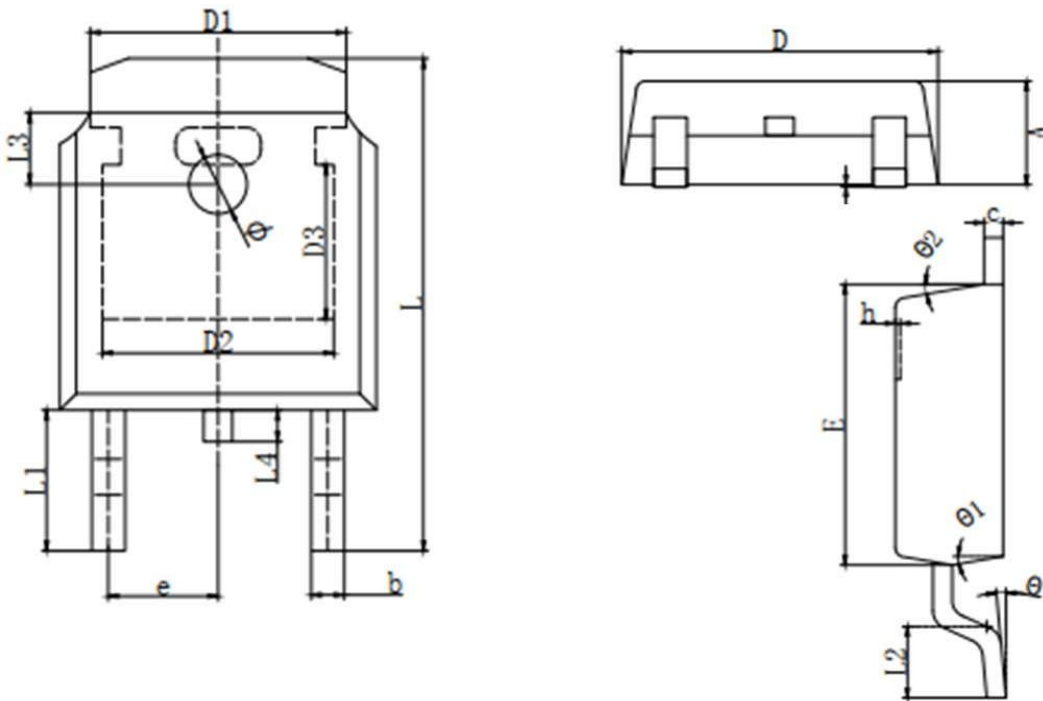


Diode Recovery Test Circuit & Waveforms





TO-252 Package outline



SYMBOL	MILLIMETER		SYMBOL	MILLIMETER	
	MIN	MAX		MIN	MAX
A	2.200	2.400	h	0.000	0.200
A1	0.000	0.127	L	9.900	10.30
b	0.640	0.740	L1	2.888 REF	
c	0.460	0.580	L2	1.400	1.700
D	6.500	6.700	L3	1.600 REF	
D1	5.334 REF		L4	0.600	1.000
D2	4.826 REF		φ	1.100	1.300
D3	3.166 REF		θ	0°	8°
E	6.000	6.200	θ 1	9° TYP2	
e	2.286 TYP		θ 2	9° TYP	



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