
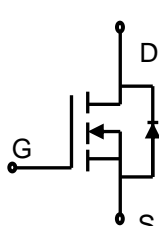



## Lonten P-channel -20V, -2A, 110mΩ Power MOSFET

<p><b>Description</b>                  These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.</p> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>◆ -20V,-2A,<math>R_{DS(ON),max}=110m\Omega@V_{GS}=-4.5V</math></li> <li>◆ Improved dv/dt capability</li> <li>◆ Fast switching</li> <li>◆ Green device available</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>◆ PWM applications</li> <li>◆ Load switch</li> <li>◆ Portable Equipment</li> </ul>	<p><b>Product Summary</b></p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;"><math>V_{DSS}</math></td> <td style="padding: 2px;">-20V</td> </tr> <tr> <td style="padding: 2px;"><math>R_{DS(on),max}@V_{GS}=-4.5V</math></td> <td style="padding: 2px;">110mΩ</td> </tr> <tr> <td style="padding: 2px;"><math>I_D</math></td> <td style="padding: 2px;">-2A</td> </tr> </table> <p><b>Pin Configuration</b></p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center;"><b>SOT-23</b></p> <p style="text-align: center;">P-Channel MOSFET <span style="float: right;"></span></p>	$V_{DSS}$	-20V	$R_{DS(on),max}@V_{GS}=-4.5V$	110mΩ	$I_D$	-2A
$V_{DSS}$	-20V						
$R_{DS(on),max}@V_{GS}=-4.5V$	110mΩ						
$I_D$	-2A						

### Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	-20	V
Continuous drain current ( $T_A = 25^\circ\text{C}$ )	$I_D$	-2	A
Continuous drain current ( $T_A = 100^\circ\text{C}$ )		-1.4	A
Pulsed drain current <sup>1)</sup>	$I_{DM}$	-10	A
Gate-Source voltage	$V_{GSS}$	$\pm 12$	V
Power Dissipation ( $T_A = 25^\circ\text{C}$ )	$P_D$	0.78	W
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JA}$	160	$^\circ\text{C/W}$

**Package Marking and Ordering Information**

Device	Device Package	Marking
LPSC2301	SOT-23	2301

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0\text{ V}, I_D=-250\mu\text{A}$	-20	---	---	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-0.4	-0.75	-1	V
Drain-source leakage current	$I_{DSS}$	$V_{DS}=-20\text{ V}, V_{GS}=0\text{ V}, T_J = 25^\circ\text{C}$	---	---	-1	$\mu\text{A}$
		$V_{DS}=-16\text{ V}, V_{GS}=0\text{ V}, T_J = 125^\circ\text{C}$	---	---	-10	$\mu\text{A}$
Gate leakage current, Forward	$I_{GSSF}$	$V_{GS}=12\text{ V}, V_{DS}=0\text{ V}$	---	---	100	nA
Gate leakage current, Reverse	$I_{GSSR}$	$V_{GS}=-12\text{ V}, V_{DS}=0\text{ V}$	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5\text{ V}, I_D=-2\text{ A}$	---	80	110	$\text{m}\Omega$
		$V_{GS}=-2.5\text{ V}, I_D=-1.5\text{ A}$	---	100	130	$\text{m}\Omega$
Forward transconductance	$g_{fs}$	$V_{DS} = -5\text{ V}, I_D = -2\text{ A}$	---	6	---	S
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$	---	406	---	pF
Output capacitance	$C_{oss}$		---	51.7	---	
Reverse transfer capacitance	$C_{rss}$		---	44.1	---	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, V_{GS}=-4.5\text{ V}, I_D = -2\text{ A}$	---	10	---	ns
Rise time	$t_r$		---	5.3	---	
Turn-off delay time	$t_{d(off)}$		---	32	---	
Fall time	$t_f$		---	8	---	
Gate resistance	$R_g$	$V_{GS}=0\text{ V}, V_{DS}=0\text{ V}, f=1\text{ MHz}$	---	20	---	$\Omega$
<b>Gate charge characteristics</b>						
Gate to source charge	$Q_{gs}$	$V_{DS}=-10\text{ V}, I_D=-2\text{ A},$ $V_{GS}=-4.5\text{ V}$	---	1.5	---	nC
Gate to drain charge	$Q_{gd}$		---	1.2	---	
Gate charge total	$Q_g$		---	8.2	---	
<b>Drain-Source diode characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$		---	---	-2	A
Pulsed Source Current <sup>2)</sup>	$I_{SM}$		---	---	-10	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_S=-2\text{ A}, T_J=25^\circ\text{C}$	---	---	-1.2	V

Notes:

1: Repetitive Rating: Pulse width limited by maximum junction temperature.

2: Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

**Electrical Characteristics Diagrams**

Figure 1. Typ. Output Characteristics

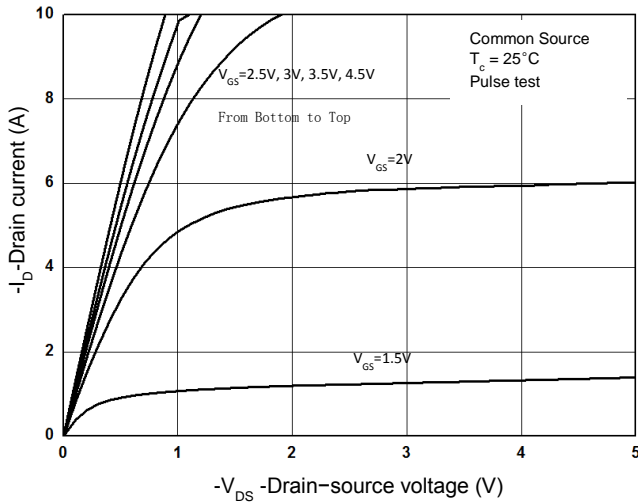


Figure 2. Transfer Characteristics

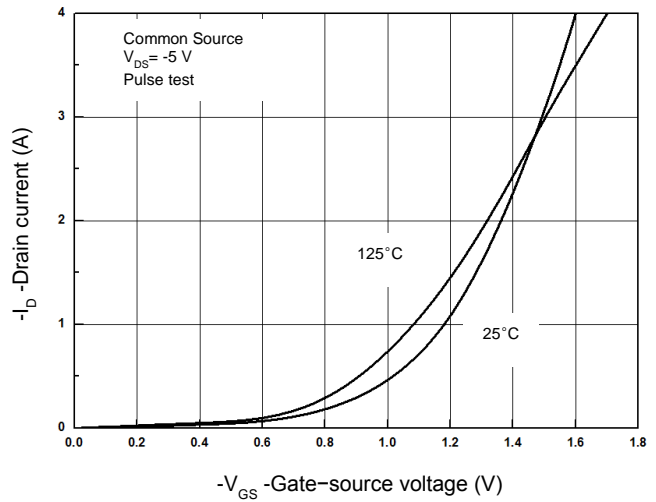


Figure 3. Capacitance Characteristics

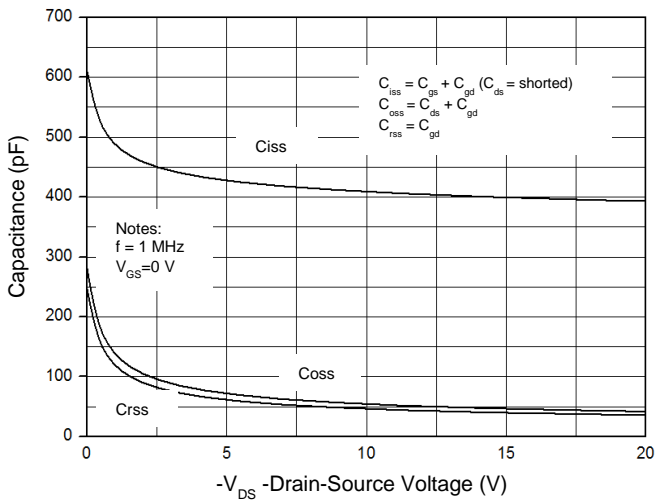


Figure 4. Gate Charge Waveform

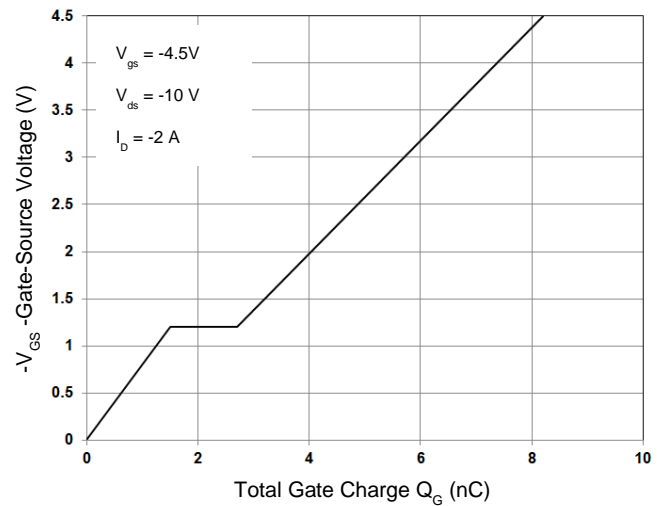


Figure 5. Body-Diode Characteristics

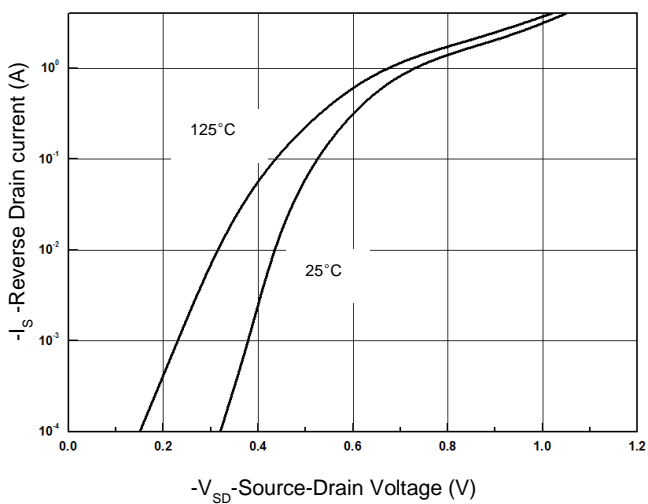


Figure 6. R<sub>ds(on)</sub>-Drain Current

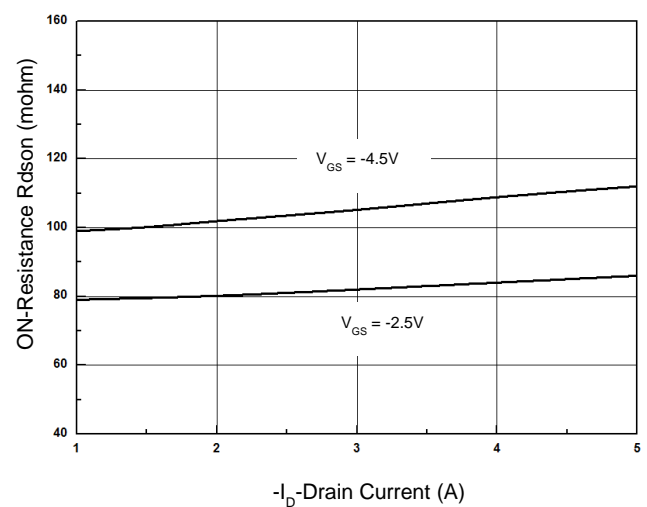


Figure 7. R<sub>ds(on)</sub>-Junction Temperature(°C)

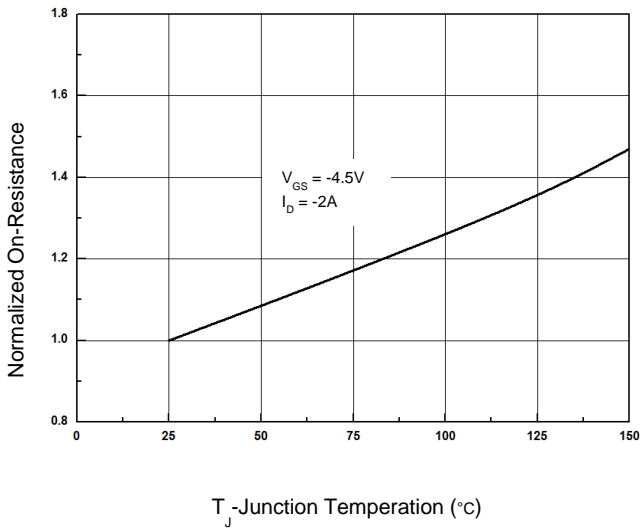


Figure 8. Maximum Safe Operating Area

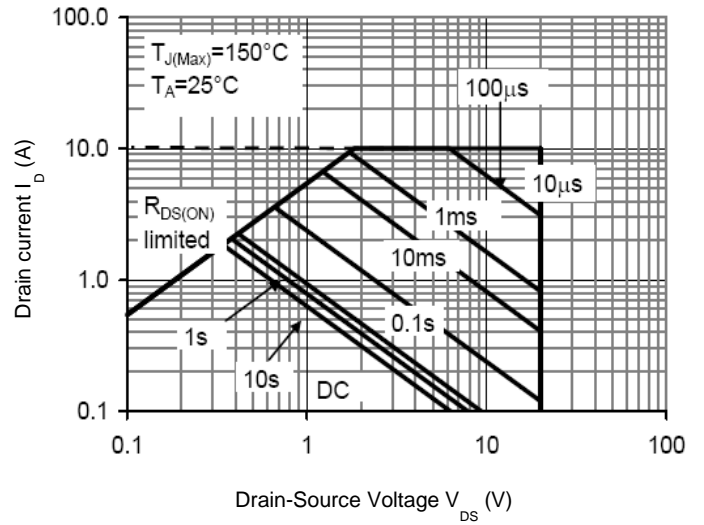
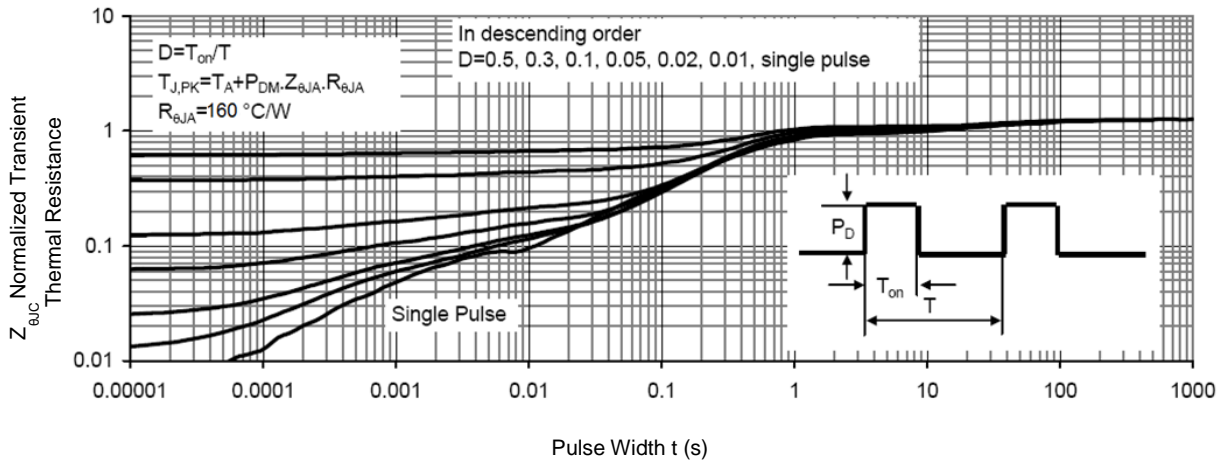


Figure 6. Normalized Maximum Transient Thermal Impedance (R<sub>thJA</sub>)



**Test Circuit & Waveform**

Figure 8. Gate Charge Test Circuit & Waveform

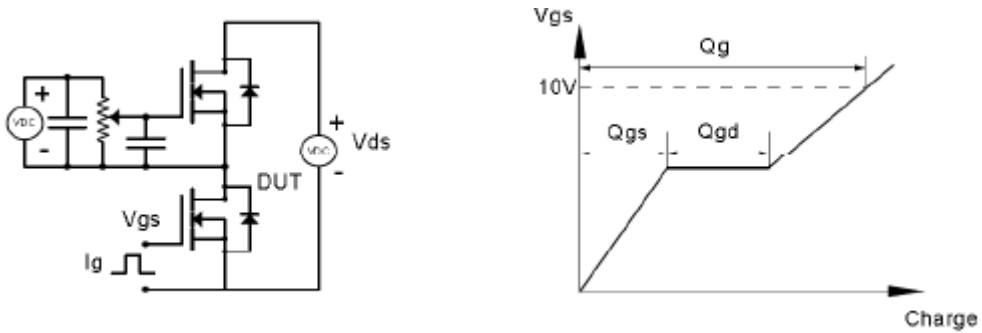


Figure 9. Resistive Switching Test Circuit & Waveforms

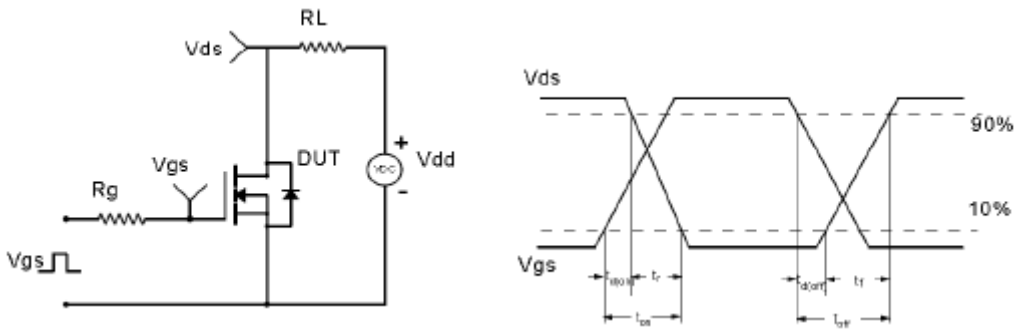


Figure 10. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

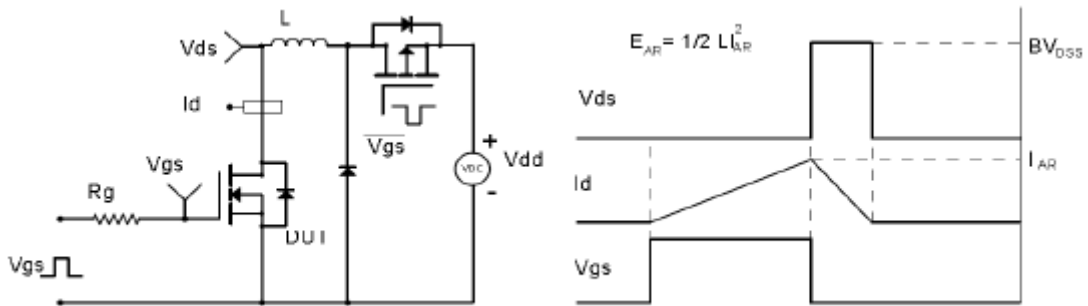
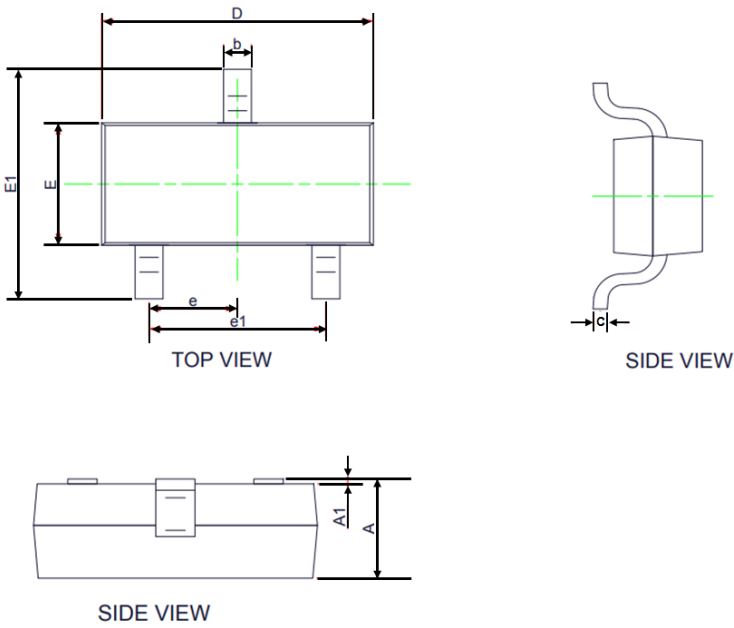


Figure 11. Diode Recovery Circuit & Waveform

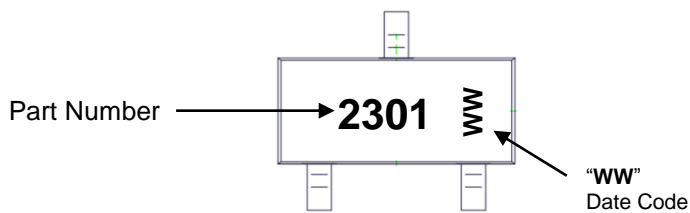


**Mechanical Dimensions for SOT-23**



COMMON DIMENSIONS				
SYMBOL	MILLIMETERS		INCHS	
	MIN	MAX	MIN	MAX
A	0.95	1.40	0.037	0.055
A1	0.01	0.10	0.000	0.004
b	0.35	0.50	0.014	0.020
c	0.08	0.19	0.003	0.007
D	2.70	3.10	0.106	0.122
E	1.20	1.65	0.047	0.065
E1	2.20	3.00	0.087	0.118
e	0.95 TYP.		0.037 TYP.	
e1	1.78	2.04	0.070	0.080

**SOT-23 Part Marking Information**



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