



## Description

The HRD3L01BATT1 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



TO-252-2L

## General Features

$V_{DS} = -60V, I_D = -20A$

$R_{DS(ON)} < 72m\Omega @ V_{GS} = -10V$

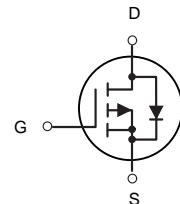
$R_{DS(ON)} < 100m\Omega @ V_{GS} = -4.5V$

## Application

PWM applications

Load switch

Power management



P-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
HRD3L01BATT1	TO-252-2L	HXY MOSFET	2500

## Absolute Maximum Ratings( $TA=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Limit	Unit
$V_{DS}$	Drain-Source Voltage	-60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D(25^\circ C)$		-20	A
$I_D(70^\circ C)$	Drain Current-Continuous@ Current-Pulsed (Note 1)	-15	A
$IDM$		-48	A
$P_D$	Maximum Power Dissipation	40	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 175	°C
$R_{\theta JA}$	Thermal Resistance,Junction-to-Ambient (Note 2)	20	°C/W



**ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VB <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-60			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V			-1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1	-1.8	-2.5	V
Drain-Source On-State Resistance	R <sub>DSS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A		64	72	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A		90	100	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-20A	5			S
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, F=1.0MHz		2460		PF
Output Capacitance	C <sub>oss</sub>			220		PF
Reverse Transfer Capacitance	C <sub>rss</sub>			155		PF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, R <sub>GEN</sub> =3Ω I <sub>D</sub> =1A		14		nS
Turn-on Rise Time	t <sub>r</sub>			20		nS
Turn-Off Delay Time	t <sub>d(off)</sub>			40		nS
Turn-Off Fall Time	t <sub>f</sub>			19		nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-30V, I <sub>D</sub> =-20A, V <sub>GS</sub> =-10V		48		nC
Gate-Source Charge	Q <sub>gs</sub>			11		nC
Gate-Drain Charge	Q <sub>gd</sub>			10		nC
Body Diode Reverse Recovery Time	T <sub>rr</sub>	I <sub>f</sub> =-20A, dI/dt=100A/μs		40		nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			56		nC
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>s</sub> =-1A		-0.72	-1	V

**NOTES:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on 1in<sup>2</sup> FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%. 4. Guaranteed by design, not subject to production testing.



## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

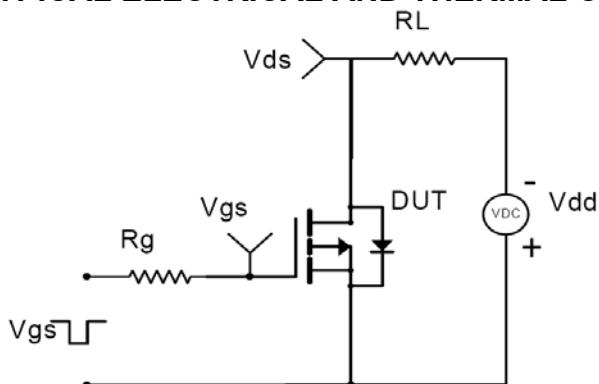


Figure 1:Switching Test Circuit

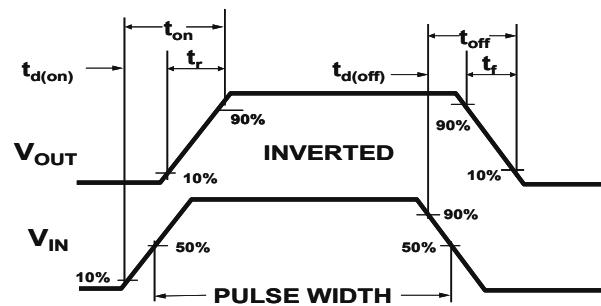


Figure 2:Switching Waveforms

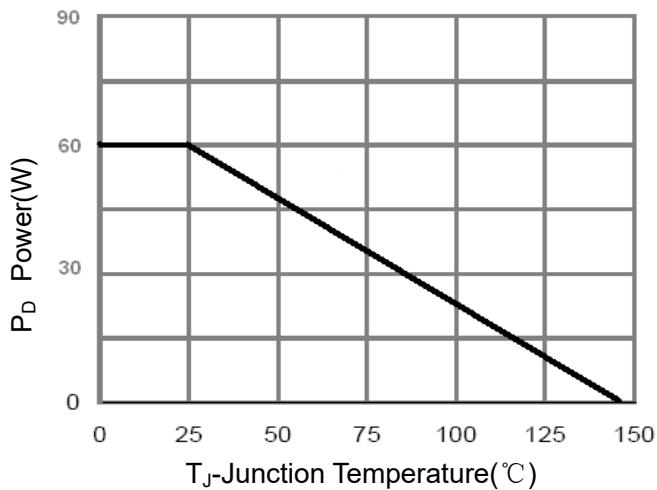


Figure 3 Power Dissipation

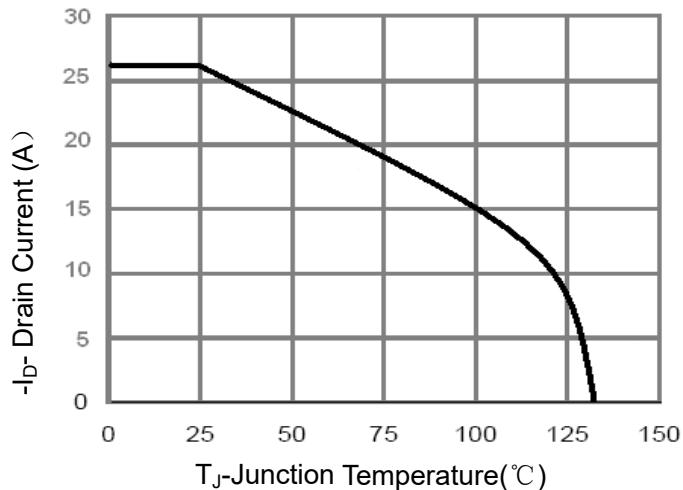


Figure 4 Drain Current

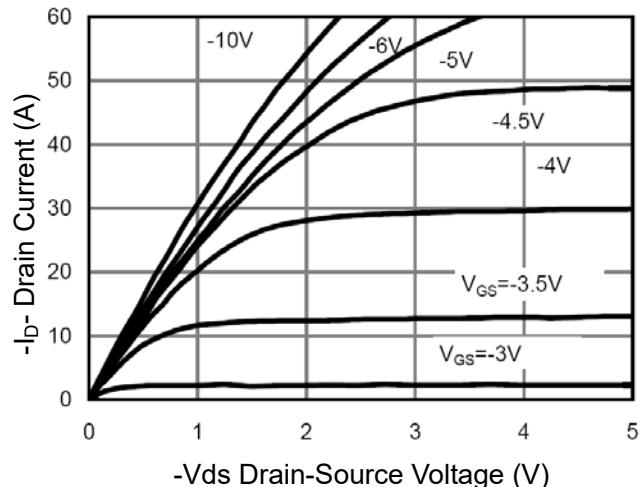


Figure 5 Output CHARACTERISTICS

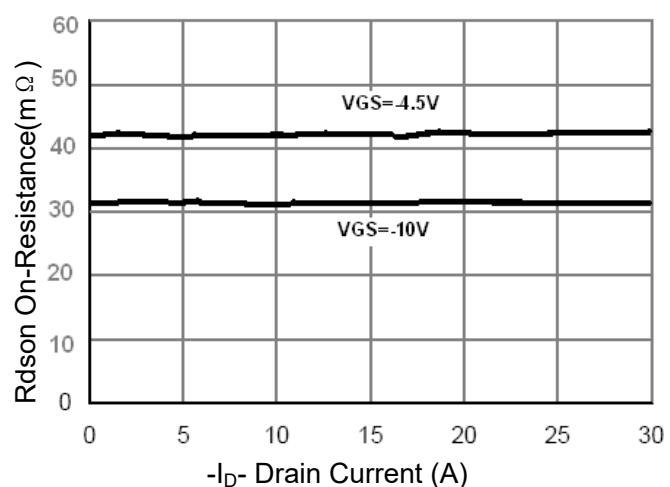


Figure 6 Drain-Source On-Resistance

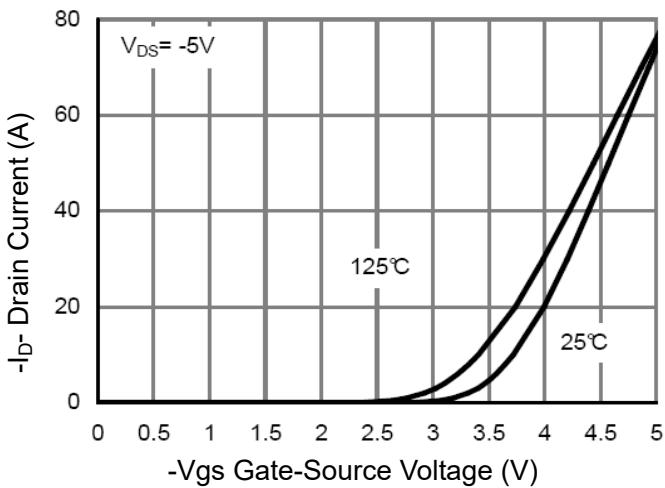


Figure 7 Transfer Characteristics

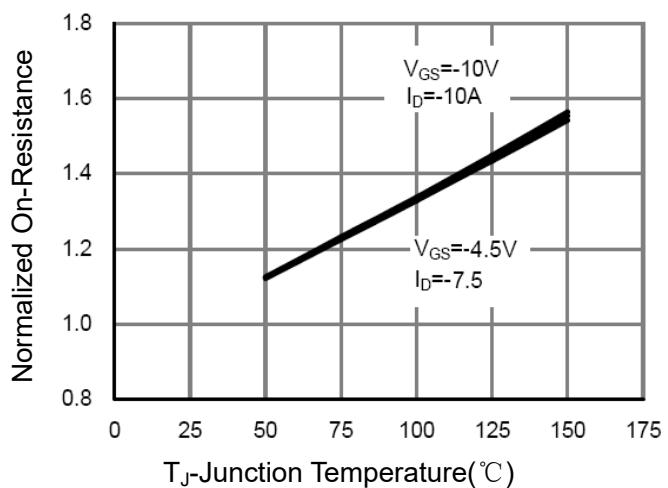


Figure 8 Drain-Source On-Resistance

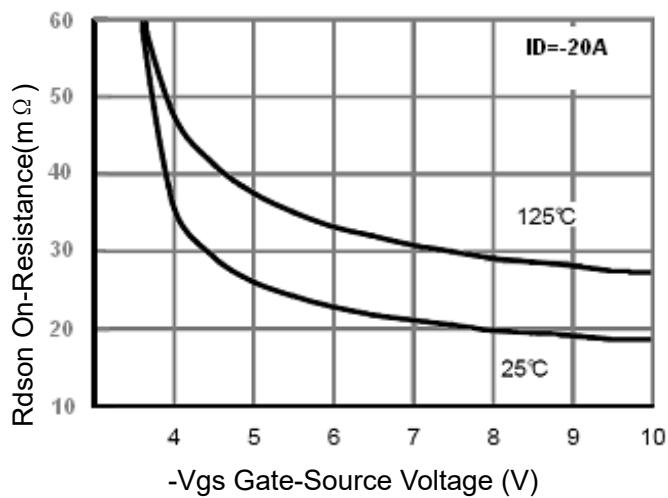


Figure 9 Rdson vs Vgs

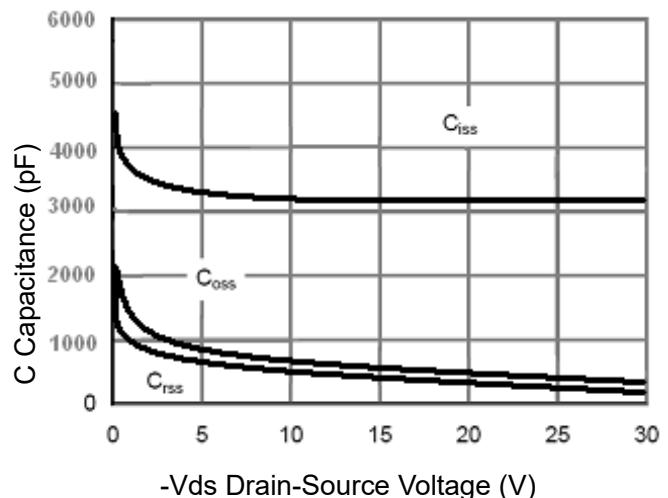


Figure 10 Capacitance vs Vds

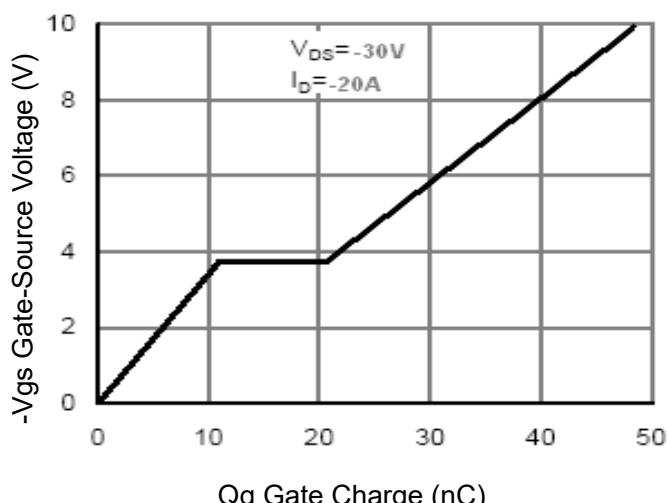


Figure 11 Gate Charge

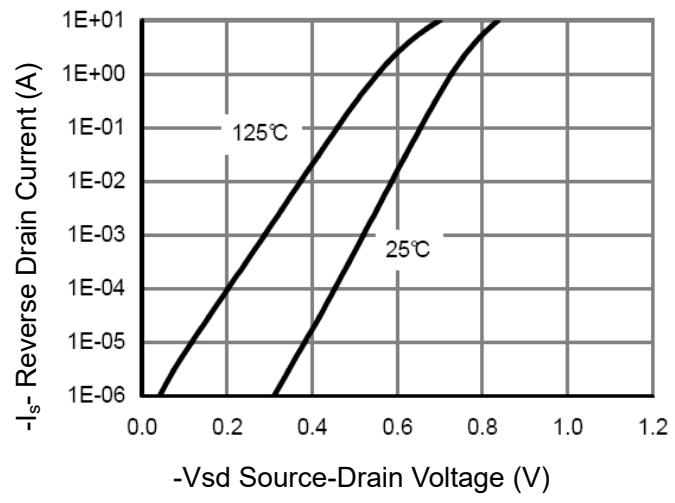


Figure 12 Source- Drain Diode Forward

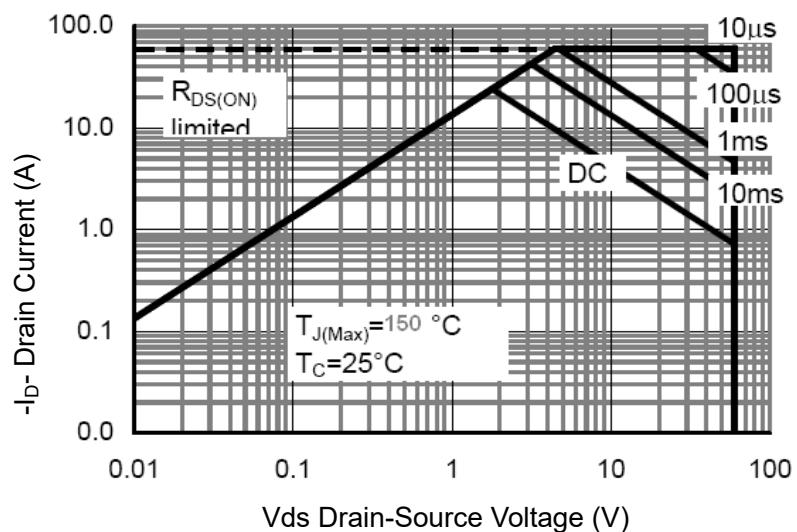


Figure 13 Safe Operation Area

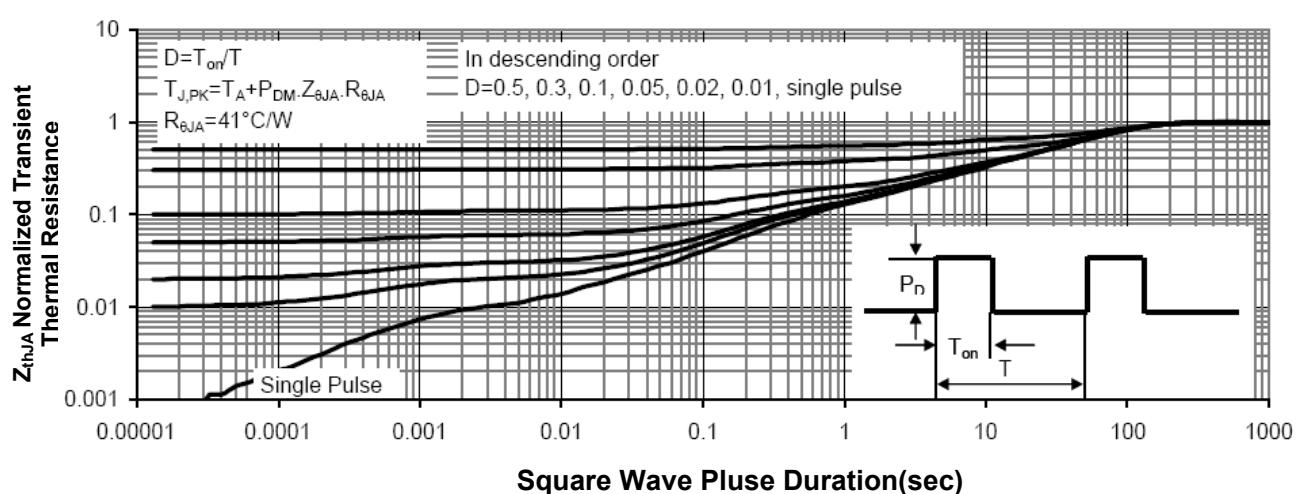
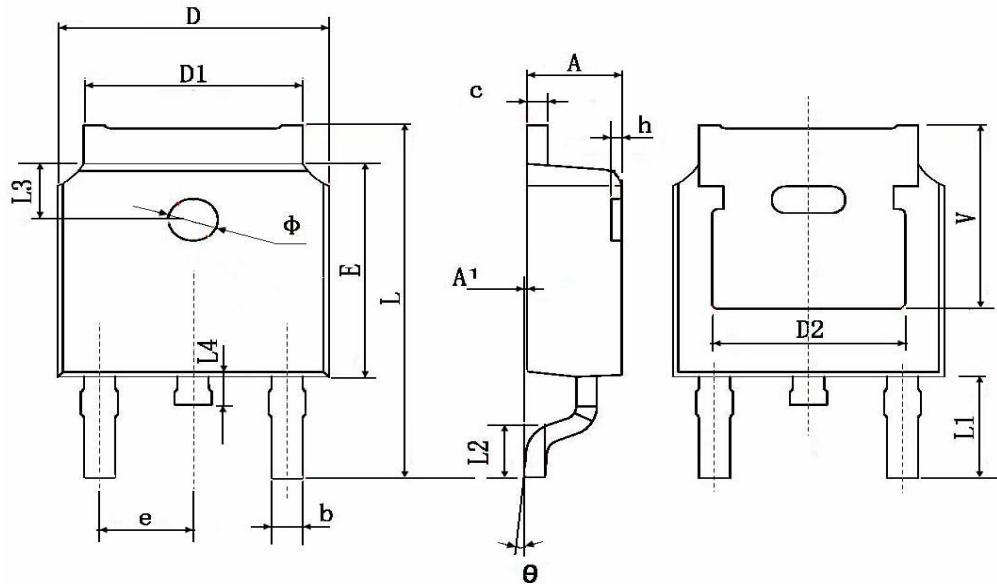


Figure 14 Normalized Maximum Transient Thermal Impedance



## TO252-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	



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