



PWRLITE LD103SG6

High Performance N-Ch Vertical Power JFET Transistor with Schottky

Features

- ❖ Trench Power JFET with low threshold voltage V_{th} .
- ❖ Device fully "ON" with $V_{gs} = 0.7V$
- ❖ Optimum for "Low Side" Buck Converters
- ❖ Optimized for Secondary Rectification in isolated DC-DC
- ❖ Low R_g and low C_{ds} for high speed switching
- ❖ No "Body Diode"; extremely low C_{ds}
- ❖ Added Fast Recovery Schottky Diode in same package

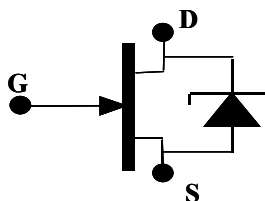
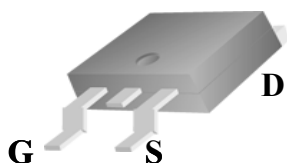
Applications

- ❖ DC-DC Converters
- ❖ Synchronous Rectifiers
- ❖ PC Motherboard Converters
- ❖ Step-down power supplies
- ❖ Brick Modules
- ❖ VRM Modules

Description

The Power JFET transistor from Lovoltech is a device that presents a Low R_{dson} allowing for improved efficiencies in DC-DC switching applications. The device is designed with a low threshold such that drivers can operate at 5V, which reduces the driver power dissipation and increases the overall efficiency. Lower threshold produces faster turn-on/turn-off, which minimizes the required dead time. The transistor "No Body Diode" provides a very low associated parasitic capacitance C_{ds} . A Schottky Diode is added for applications where a freewheeling diode is required. Ringing is also reduced so that a lower voltage device may be a better solution.

DPAK Pin Assignments



N – Channel Power JFET with Schottky Diode

Preliminary

Pin Definitions

Pin Number	Pin Name	Pin Function Description	Product Summary		
			V_{DS} (V)	R_{dson} (Ω)	I_D (A)
1	Gate	Gate. Transistor Gate	25V	0.0032	50
2	Drain	Drain. Transistor Drain			
3	Source	Source. Transistor Source			

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units
Drain-Source Voltage	V_{DS}	25	V
Gate-Source Voltage	V_{GS}	-10	V
Gate-Drain Voltage	V_{GD}	-25	V
Continuous Drain Current	I_D	50	A
Pulsed Drain Current	I_D	100	A
Junction Temperature	T_J	-55 to 150°C	°C
Storage Temperature	T_{STG}	-65 to 150°C	°C
Lead Soldering Temperature, 10 seconds	T	300°C	°C
Power Dissipation (Derated at 25°C)	P_D	80	W

Thermal Resistance

Symbol	Parameter	DPAK Ratings	Units
$R\theta_{JA}$	Thermal Resistance Junction-to-Ambient	80	°C/W
$R\theta_{JC}$	Thermal Resistance Junction-to-Case	1.6	°C/W

Electrical Specifications

($T_A = +25^\circ\text{C}$, unless otherwise noted.)

The ϕ denotes a specification which apply over the full operating temperature range.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
Static							
BV_{DSX}	Breakdown Voltage Drain to Source	$I_G = 0.5 \text{ mA}$ $V_{GS} = -4 \text{ V}$	ϕ	25		V	
BV_{GDO}	Breakdown Voltage Gate to Drain	$I_G = -50\mu\text{A}$	ϕ		-28	V	
BV_{GSO}	Breakdown Voltage Gate to Source	$I_G = -1 \text{ mA}$	ϕ		-12	V	
$R_{DS(ON)}$	Static Drain to Source ¹ On Resistance (Current flows drain-to-source) See Fig. 1	$I_G = 40 \text{ mA}, I_D = 10\text{A}$ $I_G = 10 \text{ mA}, I_D = 10\text{A}$ $I_G = 5 \text{ mA}, I_D = 10\text{A}$		2.9 3.5 3.6	3.2 4.0	$\text{m}\Omega$ $\text{m}\Omega$	
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = 0.1 \text{ V}, I_D = 250\mu\text{A}$			-800	mV	
Dynamic							
Q_G	Total Gate Charge	$\Delta V_{Drive} = 5\text{V}, I_D = 10\text{A}, V_{DS} = 15\text{V}$		20		nC	
Q_{GD}	Gate to Drain Charge			12		nC	
Q_{GS}	Gate to Source Charge			1.5		nC	
Q_{SW}	Switching Charge			13.5		nC	
R_G	Gate Resistance			1		Ω	
$T_{D(ON)}$	Turn-on Delay Time	$V_{DD} = 16\text{V}, I_D = 15\text{A}$ $V_{Drive} = 5 \text{ V}$ Clamped Inductive Load	ϕ	5		ns	
T_R	Rise Time		ϕ	12			
$T_{D(OFF)}$	Turn-off Delay			2			
T_F	Fall Time			10			
C_{ISS}	Input Capacitance	$V_{DS} = 10\text{V}, V_{GS} = -5 \text{ V}, 1\text{MHz.}$		3000		pF	
C_{OSS}	Output Capacitance			900			
C_{GS}	Gate-Source Capacitance			2250			
C_{GD}	Gate-Drain Capacitance			750			
C_{DS}	Drain-Source Capacitance			150			
Schottky Diode							
B_V	Reverse Breakdown Voltage	$I_R = 0.1 \text{ mA}$		25	30	V	
I_R	Reverse Leakage	$V_R = 25\text{V}$			0.25	0.3	mA
V_F	Forward Voltage	$I_F = 1 \text{ A}$				400	mV
V_F	Forward Voltage	$I_F = 10 \text{ A}$				1000	mV
V_F	Forward Voltage	$I_F = 20 \text{ A}$			1100	mV	
Q_{RR}	Reverse Recovery Charge	$I_s = 25 \text{ A } di/dt = 700\text{A/us,}$			5	nC	

Notes:

1. Pulse width $\leq 500\mu\text{s}$, duty cycle $\leq 2\%$

Typical Operating Characteristics

($T_A = +25^\circ\text{C}$, unless otherwise noted.)

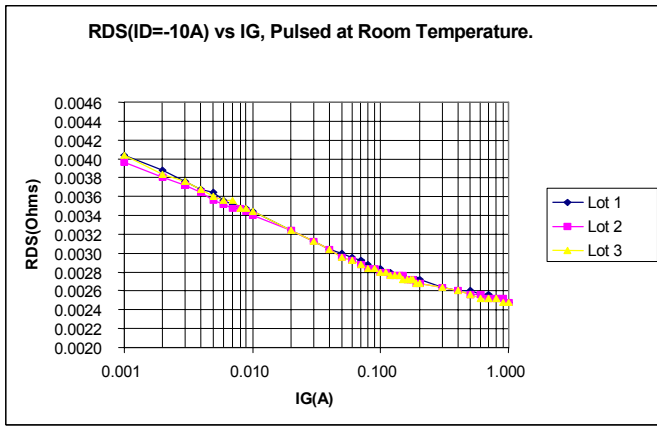


Figure 1 – $R_{DS(on)}$ vs Gate Current at $I_D = 10A$

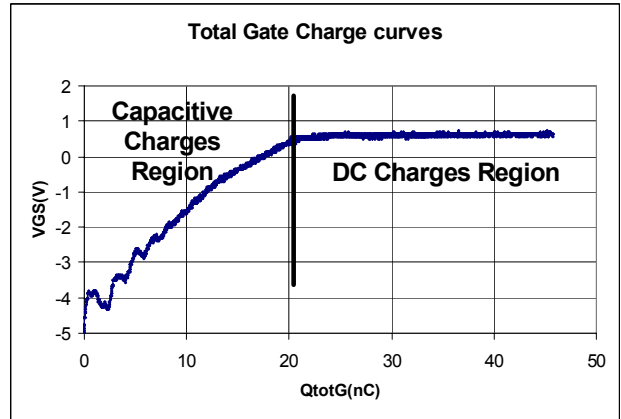


Figure 2 – Total Gate Charge

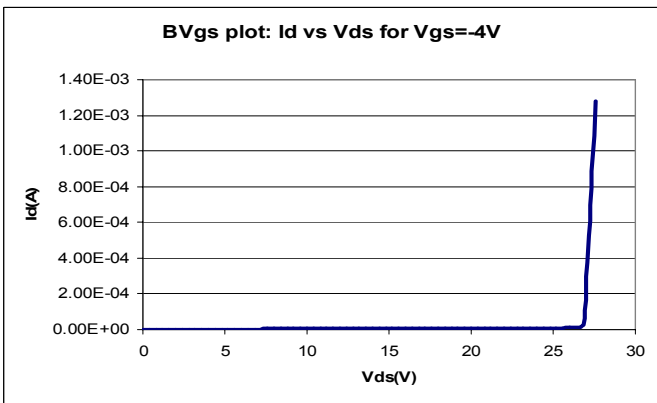


Figure 3 – Breakdown Voltage V_{ds} vs I_d

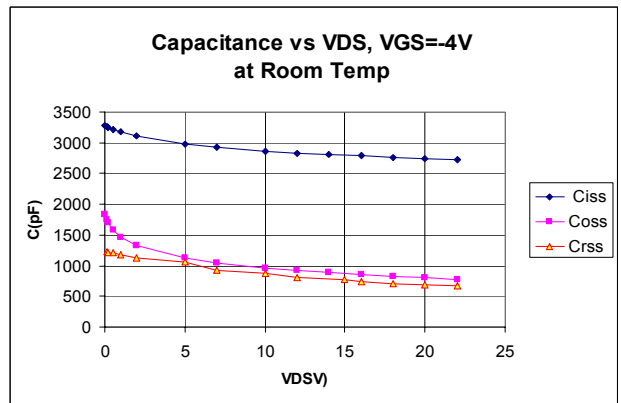


Figure 4 – Capacitance vs Drain Voltage V_{ds}

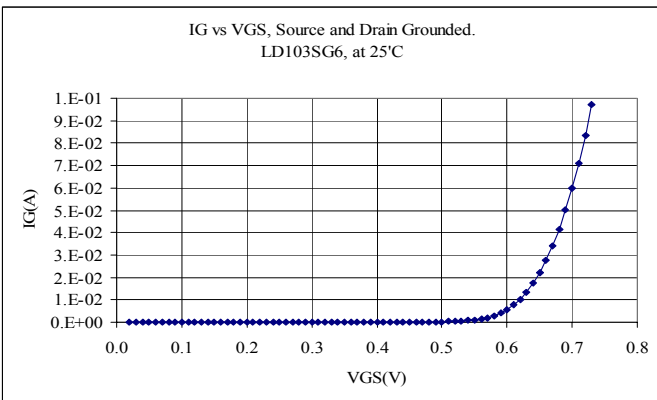


Figure 5 – I_G vs Gate Voltage V_{GS}

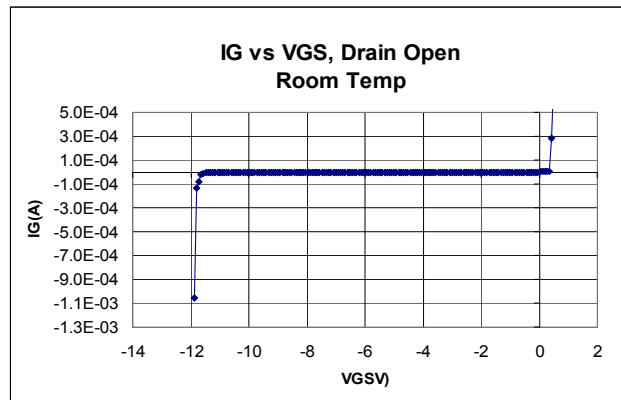


Figure 6 – Typical Gate Voltage Characteristic

Typical Operating Characteristics

($T_A = +25^\circ\text{C}$, unless otherwise noted.)

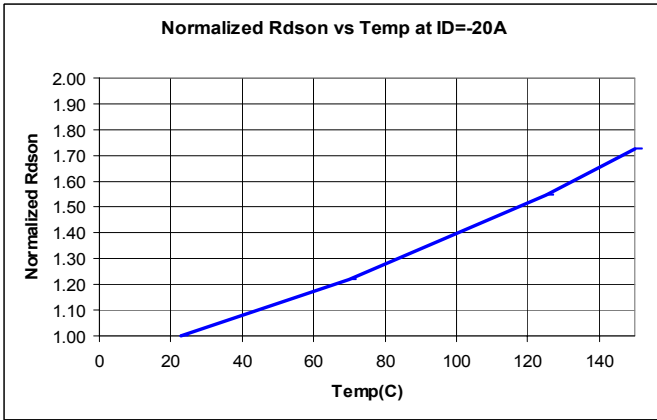


Figure 7 – $R_{DS(on)}$ Temperature Coefficient

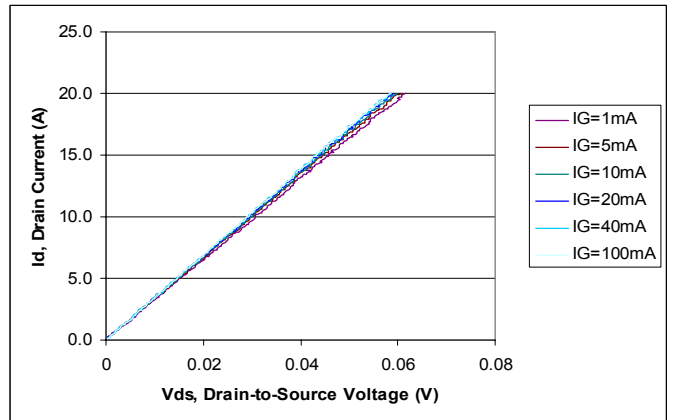


Figure 8 – On-Region Characteristics

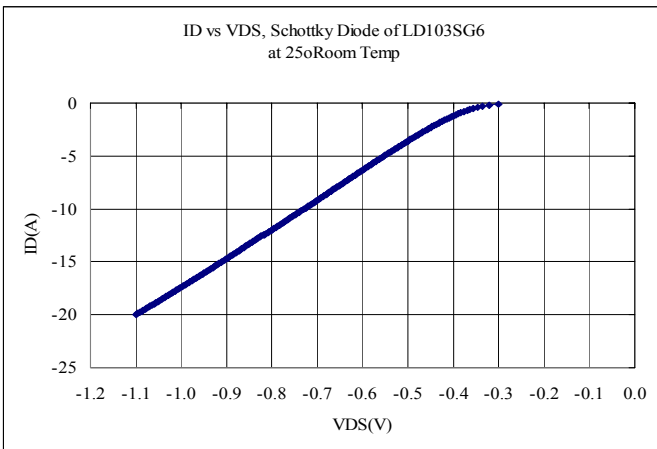


Figure 9 – Schottky Diode Voltage vs Current

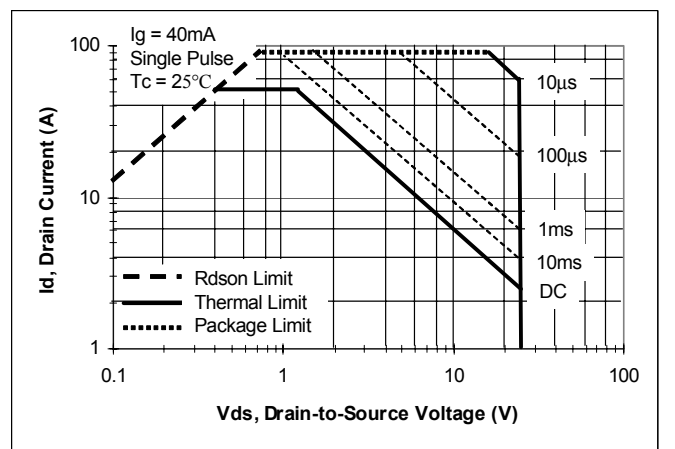


Figure 10 – Safe Operating Area

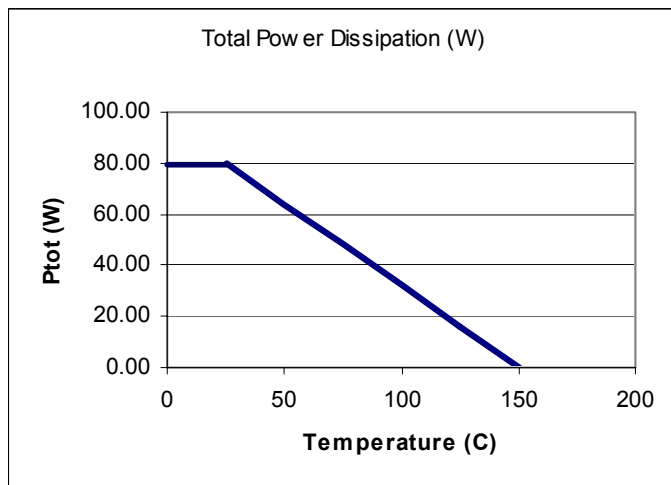


Figure 11 – Total Power Dissipation

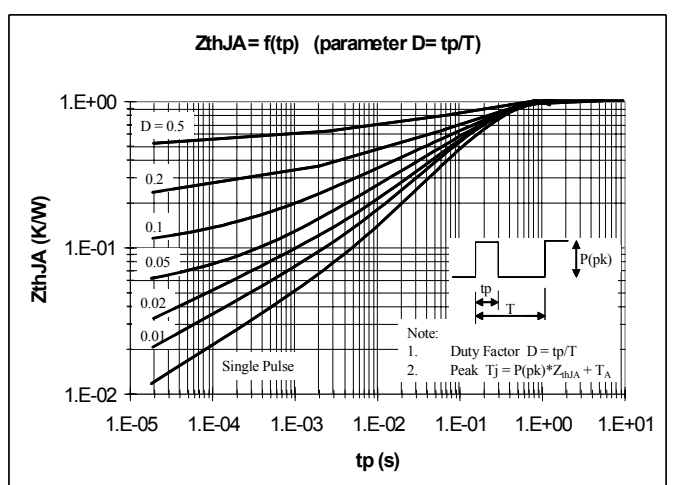


Figure 12 – Normalized Thermal Response

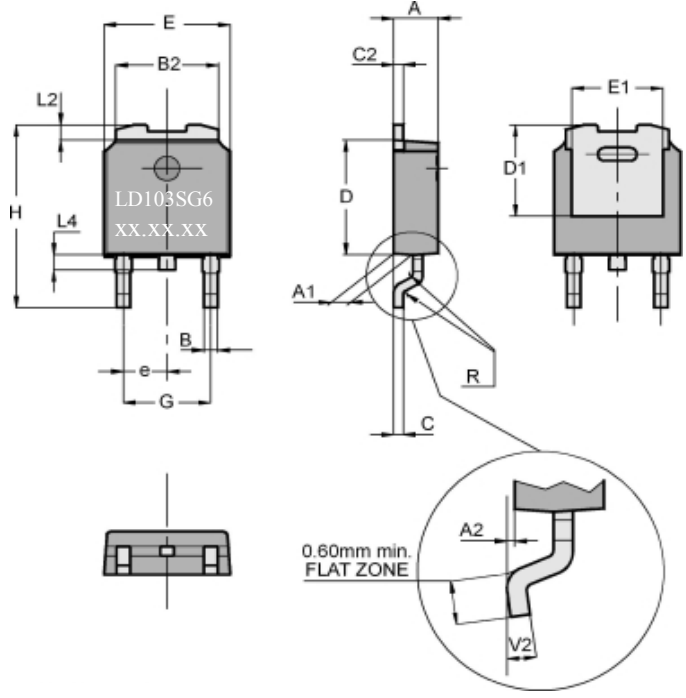
Ordering Information

Product Number	PN Marking	Package
LD103SG6	LD103SG6	TO252 (DPAK)

Package and Marking Information

DIMENSIONS

DIM.	mm.			inch		
	TYP.	MIN.	MAX.	TYP.	MIN.	MAX.
A		2.20	2.40	0.086	0.094	
A1		0.90	1.10	0.035	0.043	
A2		0.03	0.23	0.001	0.009	
B		0.64	0.90	0.025	0.035	
B2		5.20	5.40	0.204	0.212	
C		0.45	0.60	0.017	0.023	
C2		0.48	0.60	0.019	0.023	
D		6.00	6.20	0.236	0.244	
D1	5.10			0.201		
E		6.40	6.60	0.252	0.260	
E1	4.70			0.185		
e	2.28			0.090		
G		4.40	4.60	0.173	0.181	
H		9.35	10.10	0.368	0.397	
L2	0.80			0.031		
L4		0.60	1.00	0.023	0.039	
R	0.20			0.008		
V2		0°	8°	0°	8°	



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Datasheet Identification	Product Status	Definition
Advance Information	In definition or in Design	This datasheet contains the design specifications for product development. Specifications may change without notice.
Preliminary	Initial Production	This datasheet contains preliminary data; additional and application data will be published at a later date. Lovoltech, Inc. reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	In Production	This datasheet contains final specifications. Lovoltech reserves the right to make changes at any time without notice in order to improve the design.