

Description

The LM5D150N03 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.

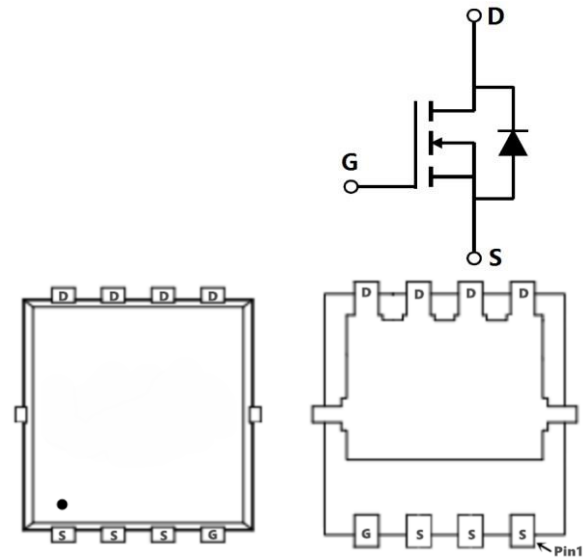
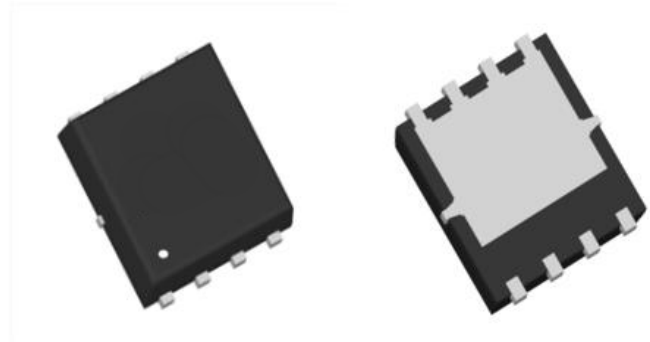
General Features

$V_{DS} = 30V$ $I_D = 150A$

$R_{DS(ON)} < 2m\Omega$ @ $V_{GS}=10V$ (Typ.1.4 m Ω)

Application

Battery protection
Load switch
Uninterruptible power supply



Package Marking and Ordering Information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
LM5D150N03	AP150N03NF	DFN5X6-8L	-	-	5000 units

Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_c = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	150	A
$I_D @ T_c = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	78	A
I_{DM}	Pulsed Drain Current ²	500	A
E_{AS}	Single Pulse Avalanche Energy ³	240	mJ
I_{AS}	Avalanche Current	55	A
$P_D @ T_c = 25^\circ\text{C}$	Total Power Dissipation ⁴	48	W
$P_D @ T_A = 25^\circ\text{C}$	Total Power Dissipation ⁴	2.6	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ (t $\leq 10s$)	25	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	2.6	$^\circ\text{C/W}$

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	33	---	V
ΔBVDSS/ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.0213	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =30A	---	1.4	2.0	mΩ
		V _{GS} =4.5V, I _D =20A	---	2.3	3.2	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2.5	V
ΔVGS(th)	VGS(th) Temperature Coefficient		---	-5.73	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =24V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =24V, V _{GS} =0V, T _J =55°C	---	---	5	
IGSS	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.4	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =15V, V _{GS} =4.5V, I _D =30A	---	70	---	nC
Q _{gs}	Gate-Source Charge		---	12	---	
Q _{gd}	Gate-Drain Charge		---	17	---	
Td(on)	Turn-On Delay Time	V _{DD} =15V, V _{GS} =10V, R _G =3Ω I _D =30A	---	10	---	ns
T _r	Rise Time		---	6.5	---	
Td(off)	Turn-Off Delay Time		---	75	---	
T _f	Fall Time		---	18	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	4930	---	Pf
C _{oss}	Output Capacitance		---	682	---	
Crss	Reverse Transfer Capacitance		---	566	---	
I _s	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	120	A
ISM	Pulsed Source Current ^{2,5}		---	---	480	A
VSD	Diode Forward Voltage ²	V _{GS} =0V, I _S =30A, T _J =25°C	---	---	1.2	V
Qrr	Body Diode Reverse Recovery Charge	IF =20A, dI/dt=100A/μs	---	30	---	ns
trr	Body Diode Reverse Recovery Time		---	15	---	nC

Note :

- 1、The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is VDD=24V,VGS =10V,L=0.1mH,IAS =55A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation

Typical Electrical and Thermal Characteristics

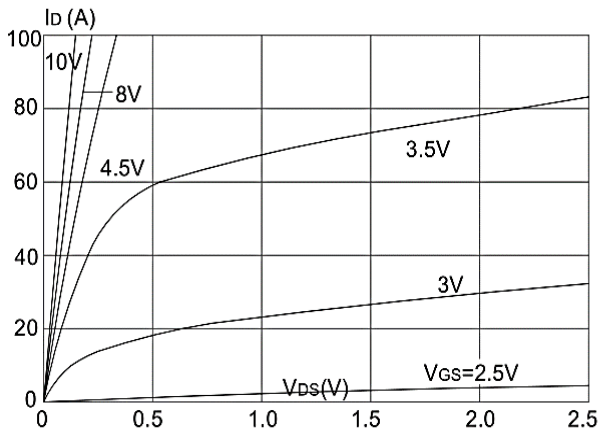


Figure 1: Output Characteristics

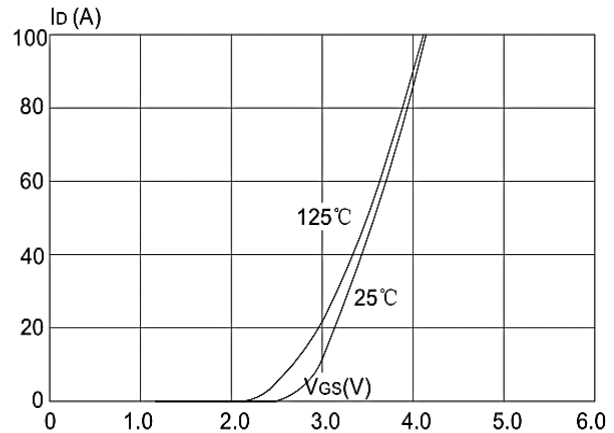


Figure 2: Typical Transfer Characteristics

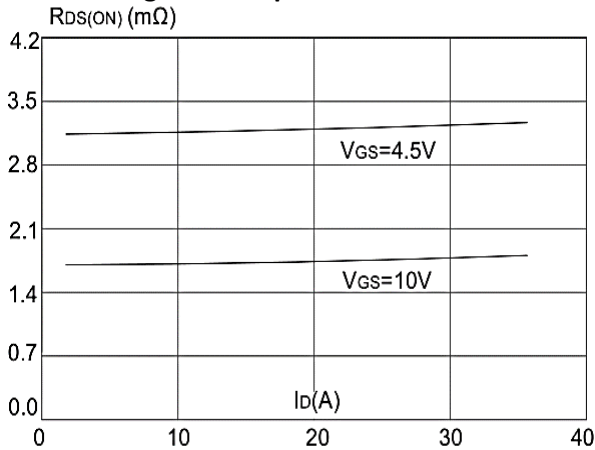


Figure 3: On-resistance vs. Drain Current

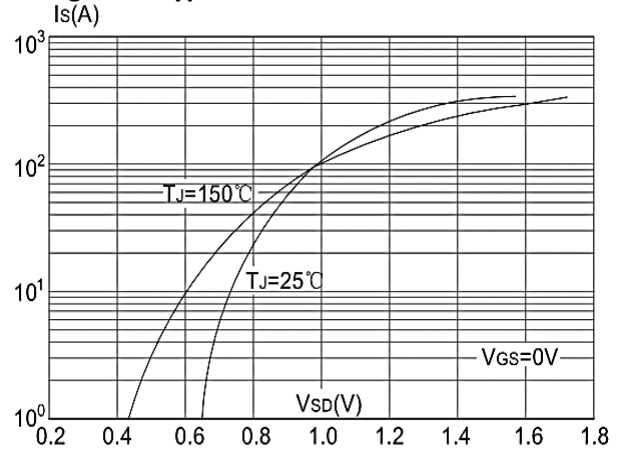


Figure 4: Body Diode Characteristics

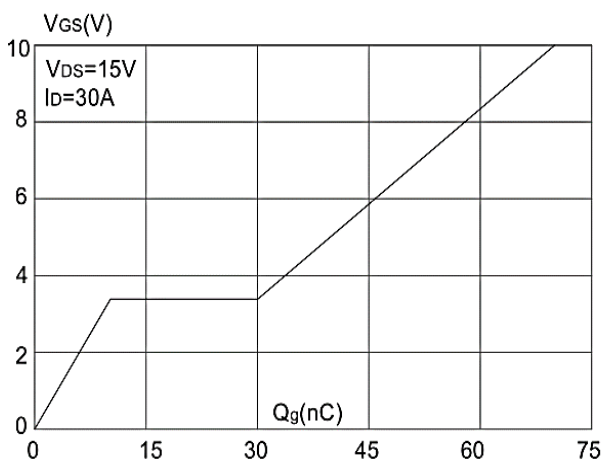


Figure 5: Gate Charge Characteristics

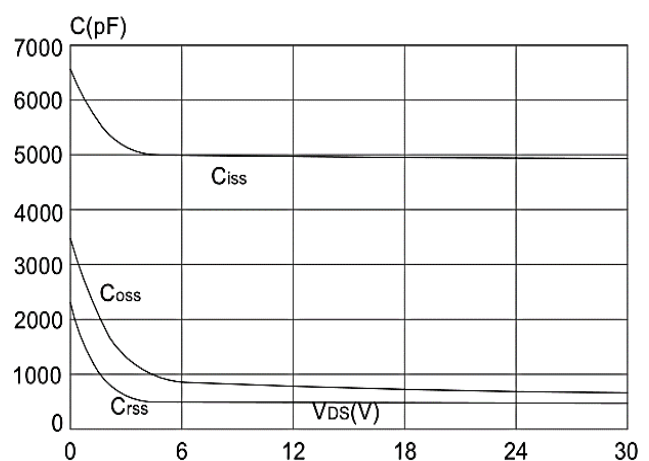


Figure 6: Capacitance Characteristics

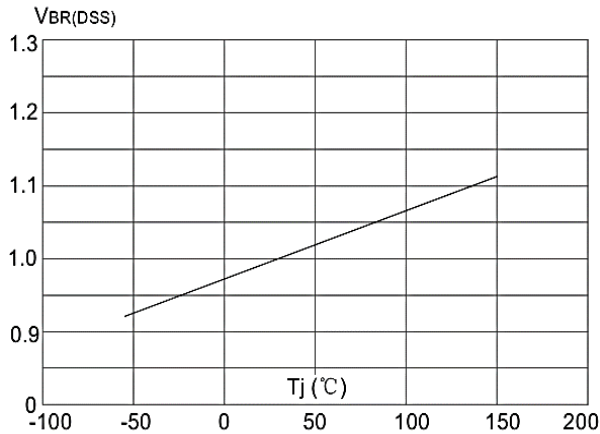


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

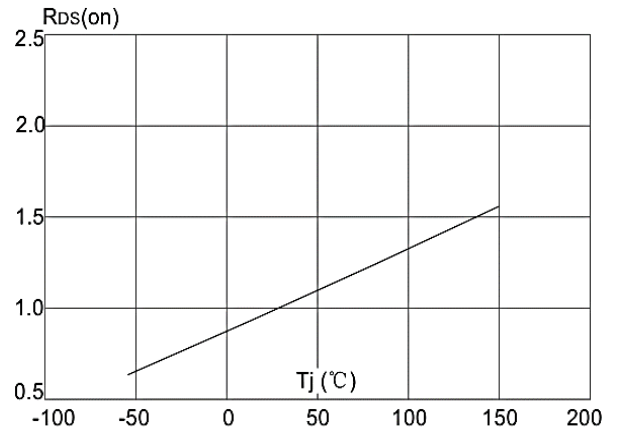


Figure 8: Normalized on Resistance vs. Junction Temperature

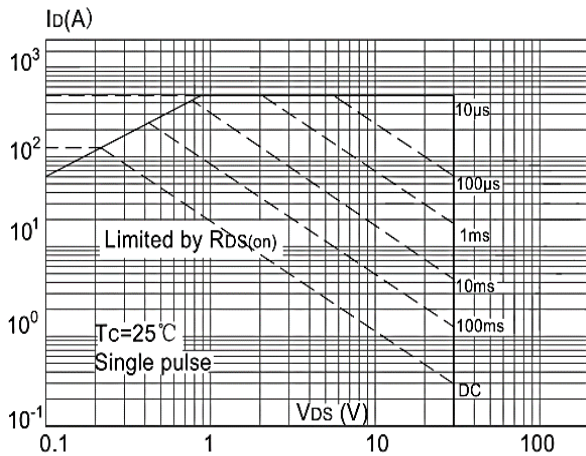


Figure 9: Maximum Safe Operating Area vs. Case Temperature

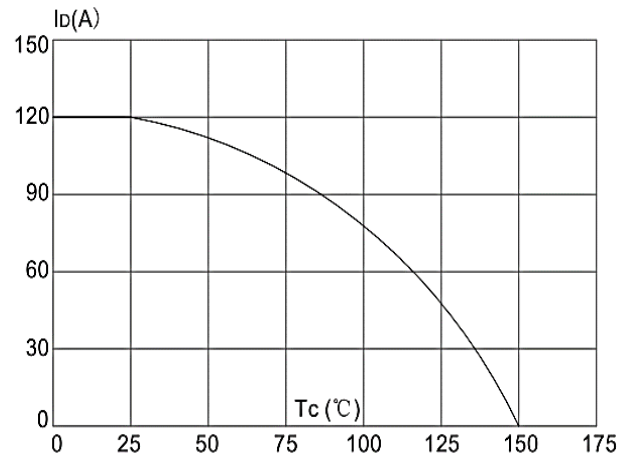


Figure 10: Maximum Continuous Drain Current

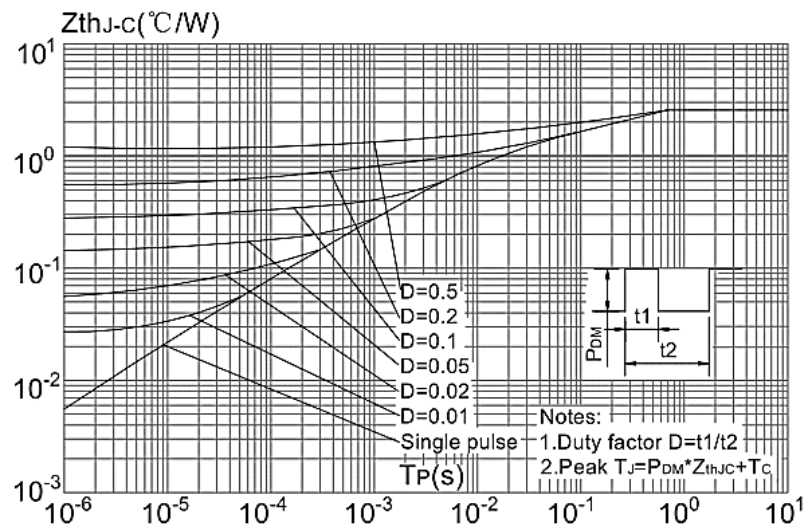
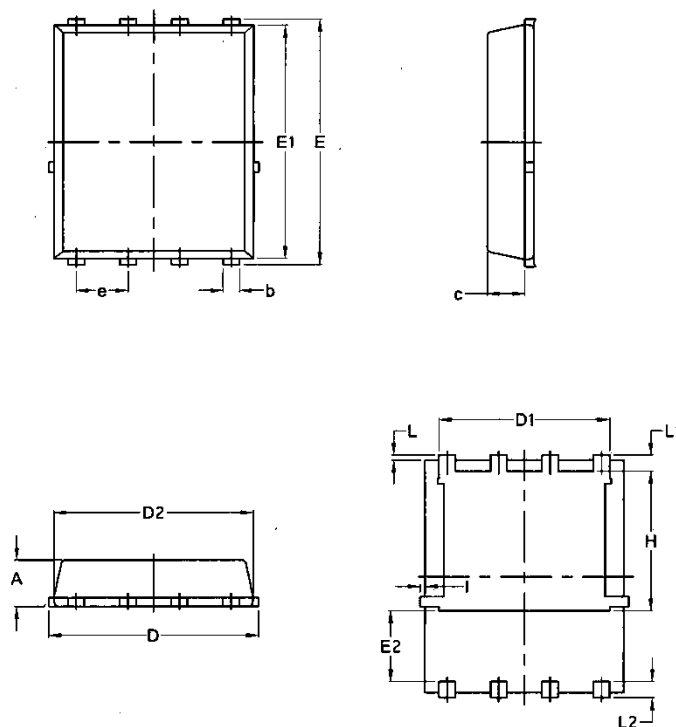


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data-DFN5*6-8L-JQ Single



Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070

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