

Description

The LM5D50P10 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

$V_{DS} = -100V$ $I_D = -50A$

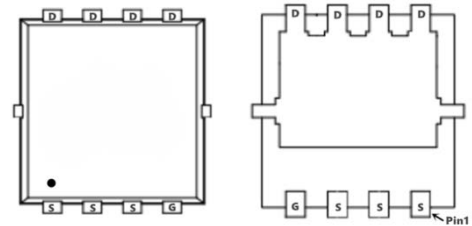
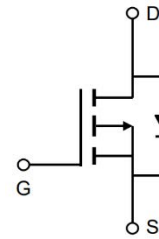
$R_{DS(ON)} < 52m\Omega$ @ $V_{GS}=10V$ (Type: 40m Ω)

Application

Brushless motor

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
LM5D50P10	DFN5*6-8L	AP50P10NF XXX YYYY	5000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, V_{GS} @ -10V ¹	-50	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, V_{GS} @ -10V ¹	-28	A
I_{DM}	Pulsed Drain Current ²	-150	A
EAS	Single Pulse Avalanche Energy ³	87	mJ
I_{AS}	Avalanche Current	-35	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	140	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	25	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	1.1	$^\circ C/W$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-100	-	-	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} =-100V, V _{GS} =0V,	-	-	-1.0	μA
IGSS	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.6	-2.5	V
RDS(on)	Static Drain-Source on-Resistance	V _{GS} =-10V, I _D =-20A	-	40	52	mΩ
		V _{GS} =-4.5V, I _D =-10A	-	44	62	
Ciss	Input Capacitance	V _{DS} =-50V, V _{GS} =0V, f=1.0MHz	-	2120	-	pF
Coss	Output Capacitance		-	194	-	pF
Crss	Reverse Transfer Capacitance		-	13	-	pF
Q _g	Total Gate Charge	V _{DS} =-50V, I _D =-5A, V _{GS} =-10V	-	40	-	nC
Q _{gs}	Gate-Source Charge		-	7.8	-	nC
Q _{gd}	Gate-Drain("Miller") Charge		-	8.6	-	nC
td(on)	Turn-on Delay Time	V _{DD} =-50V, I _D =-5A, R _G =6Ω, V _{GS} =-10V	-	13	-	ns
t _r	Turn-on Rise Time		-	39	-	ns
td(off)	Turn-off Delay Time		-	100.1	-	ns
t _f	Turn-off Fall Time		-	105.3	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-35	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-140	A
VSD	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =-30A	-	-	-1.2	V
t _{rr}	Body Diode Reverse Recovery Time	T _J =25°C, I _F =-5A, dI/dt=100A/μs	-	104	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	280	-	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 V DD =-25V, V GS =-10V, L=0.1mH, IAS =-24A
- 4、 The power dissipation is limited by 150 °C junction temperature
- 5、 The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

Typical Characteristics

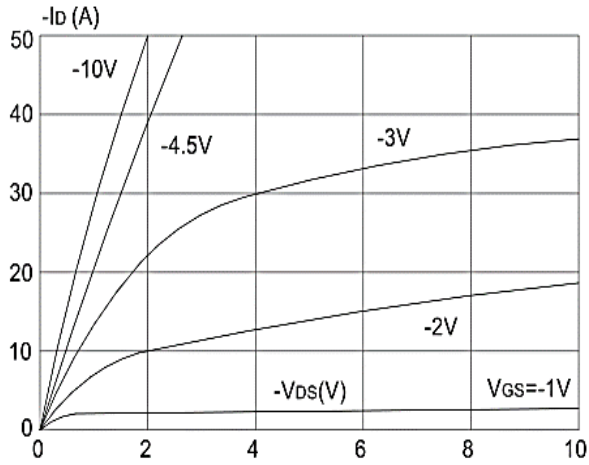


Figure 1: Output Characteristics

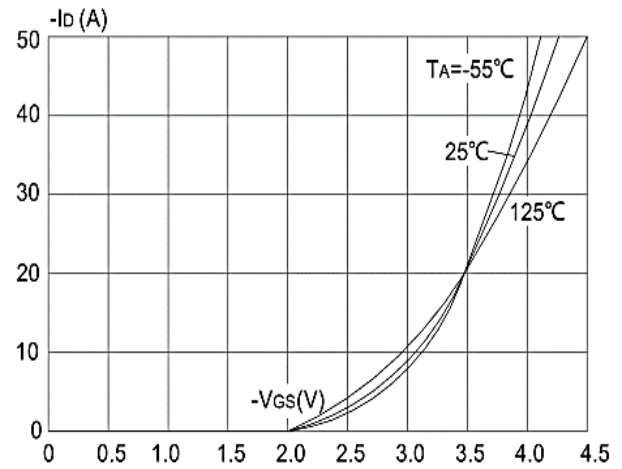


Figure 2: Typical Transfer Characteristics

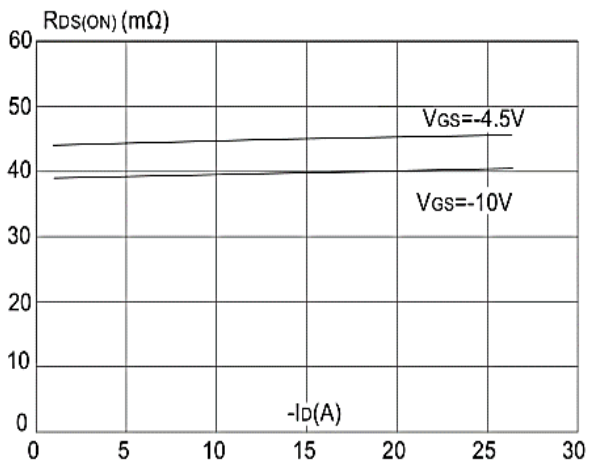


Figure 3: On-resistance vs. Drain Current

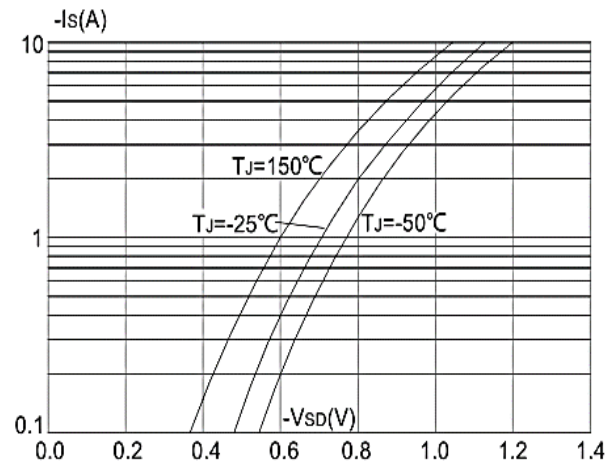


Figure 4: Body Diode Characteristics

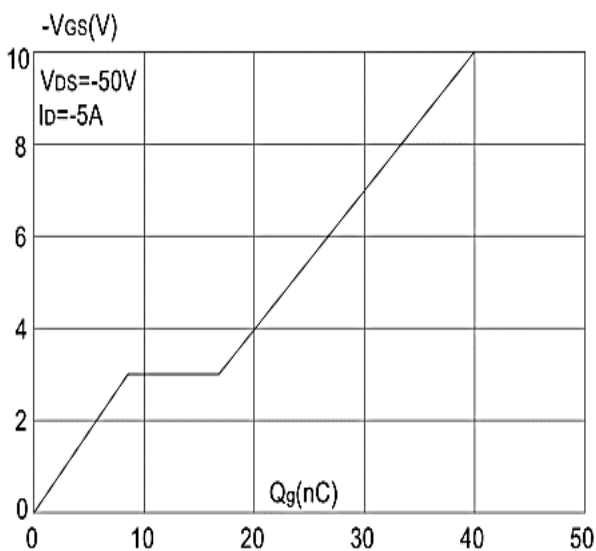


Figure 5: Gate Charge Characteristics

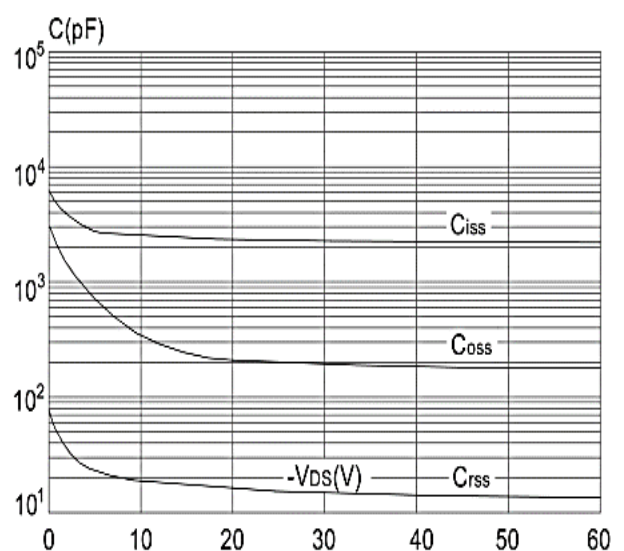


Figure 6: Capacitance Characteristics

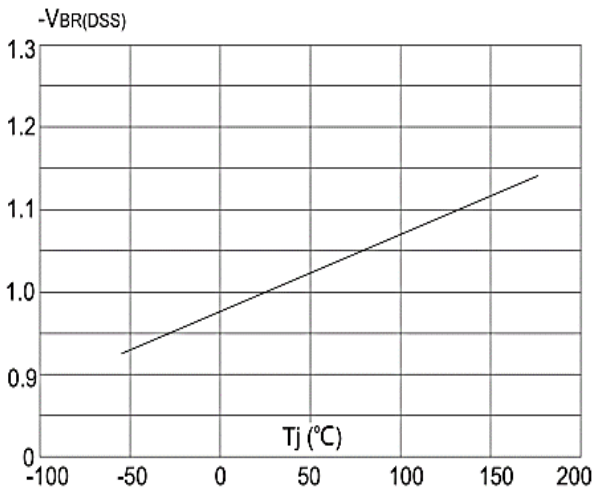


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

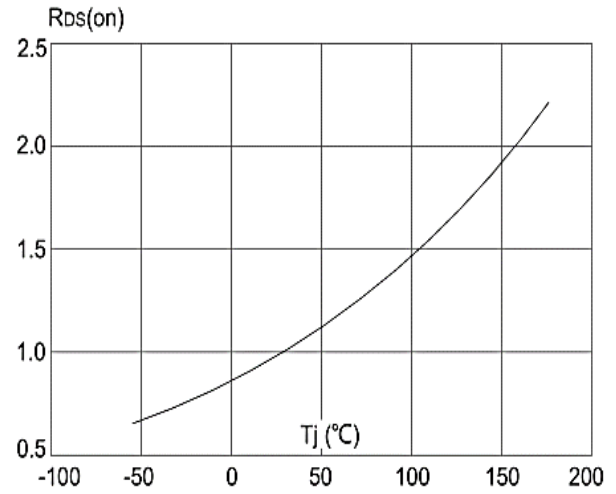


Figure 8: Normalized on Resistance vs. Junction Temperature

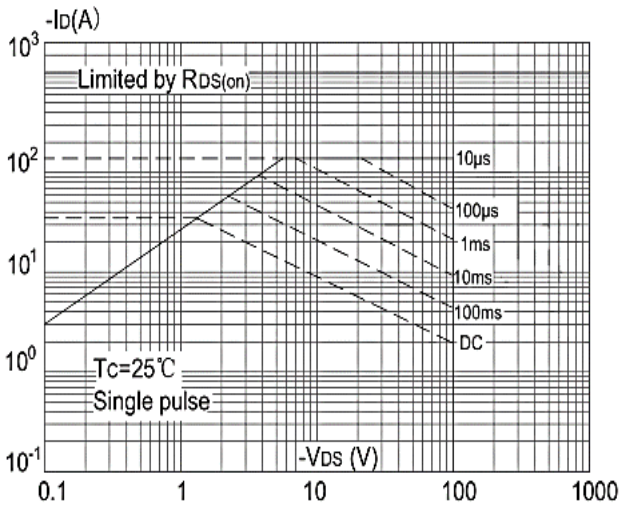


Figure 9: Maximum Safe Operating Area

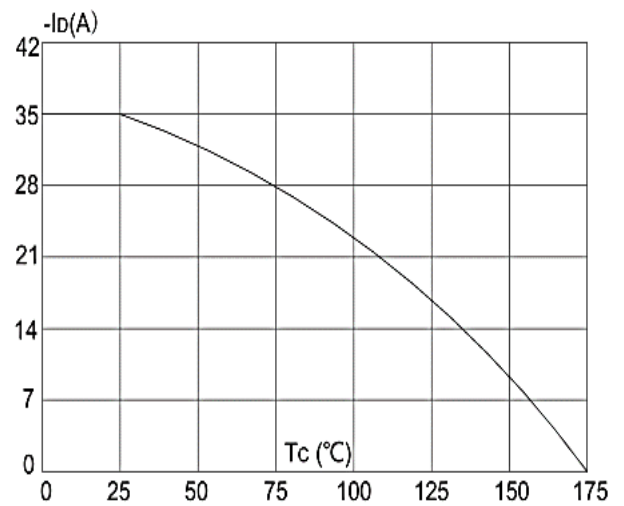


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

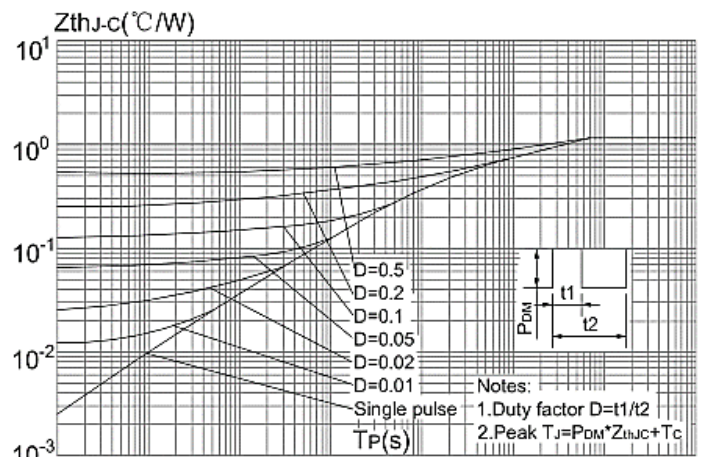
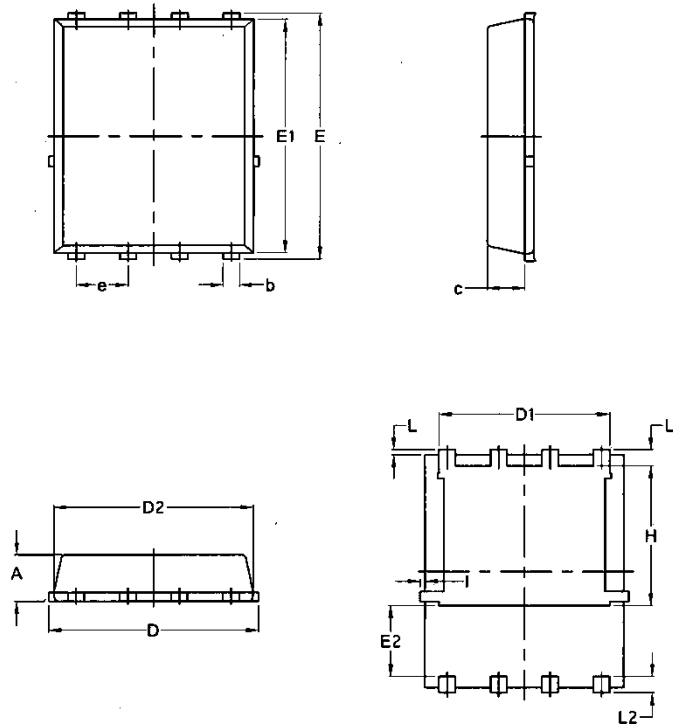


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

Package Mechanical Data-DFN5*6-8L Single



Symbol	Common			
	mm		Inch	
	Min	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