

### Description

The LMAK12P03 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

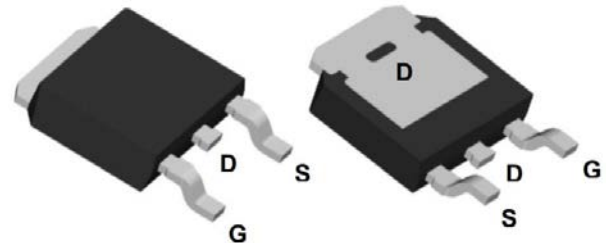
$V_{DS} = -30V$   $I_D = -120A$

$R_{DS(ON)} < 5.5m\Omega$  @  $V_{GS} = -10V$  (Typ.  $3.8m\Omega$ )

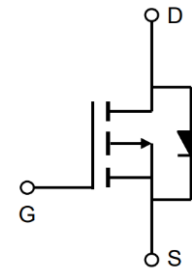
### Application

- Lithium battery protection
- Wireless impact
- Mobile phone fast charging

### Dimensions TO-252



### Pin Configuration



### Package Marking and Ordering Information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
LMAK12P03	AP120P03D	TO-252	-	-	2500 units

### Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Max.	Units
VDSS	Drain-Source Voltage	-30	V
VGSS	Gate-Source Voltage	±20	V
ID	Continuous Drain Current $T_C = 25^\circ C$	-120	A
ID	Continuous Drain Current $T_C = 100^\circ C$	-65	A
IDM	Pulsed Drain Current <sup>note1</sup>	-400	A
EAS	Single Pulsed Avalanche Energy <sup>note2</sup>	225	mJ
PD	Power Dissipation $T_C = 25^\circ C$	103	W
RθJC	Thermal Resistance, Junction to Case	1.46	°C/W
TJ, TSTG	Operating and Storage Temperature Range	-55 to +175	°C

## Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	VGS=0V, ID= -250μA	-30	-33	-	V
IDSS	Zero Gate Voltage Drain Current	VDS= -30V, VGS=0V,	-	-	-1	μA
IGSS	Gate to Body Leakage Current	VDS=0V, VGS= ±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID= -250μA	-1.0	-1.6	-2.5	V
RDS(on)	Static Drain-Source on-Resistance	VGS= -10V, ID= -30A	-	3.8	5.5	mΩ
		VGS= -4.5V, ID= -20A	-	5.8	8.2	
Ciss	Input Capacitance	VDS= -15V, VGS=0V, f=1.0MHz	-	9400	-	pF
Coss	Output Capacitance		-	1000	-	pF
Crss	Reverse Transfer Capacitance		-	767	-	pF
Qg	Total Gate Charge	VDS= -15V, ID= -30A, VGS= -10V	-	42	-	nC
Qgs	Gate-Source Charge		-	8.4	-	nC
Qgd	Gate-Drain("Miller") Charge		-	11.2	-	nC
td(on)	Turn-on Delay Time	VDD= -15V, ID= -30A, VGS= -10V, RGEN=2.5Ω	-	15	-	ns
tr	Turn-on Rise Time		-	16	-	ns
td(off)	Turn-off Delay Time		-	69	-	ns
tf	Turn-off Fall Time		-	27	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-90	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-360	A
VSD	Drain to Source Diode Forward Voltage	VGS=0V, IS= -30 A		-0.8	-1.2	V

### Notes:

- 1、 The data tested by surface mounted on a 1 inch<sup>2</sup> 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 T<sub>J</sub> =25°C , V<sub>DD</sub> = -15V, V<sub>G</sub> = -10V, R<sub>G</sub> =25Ω, L=0.5mH, I<sub>AS</sub> = -30A
- 4、 The power dissipation is limited by 150°C junction temperature
- 5、 The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

## Typical Characteristics

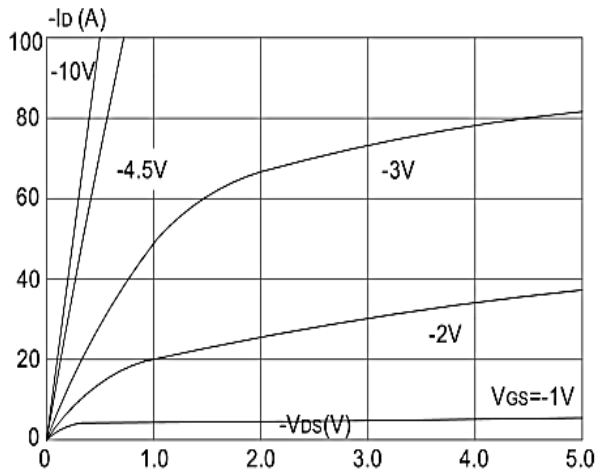


Figure 1: Output Characteristics

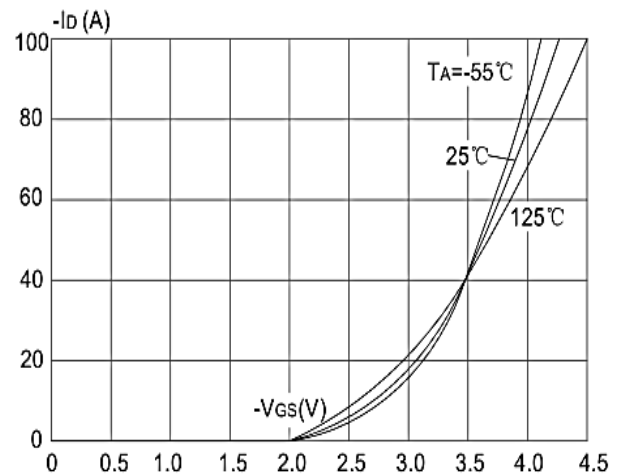


Figure 2: Typical Transfer Characteristics

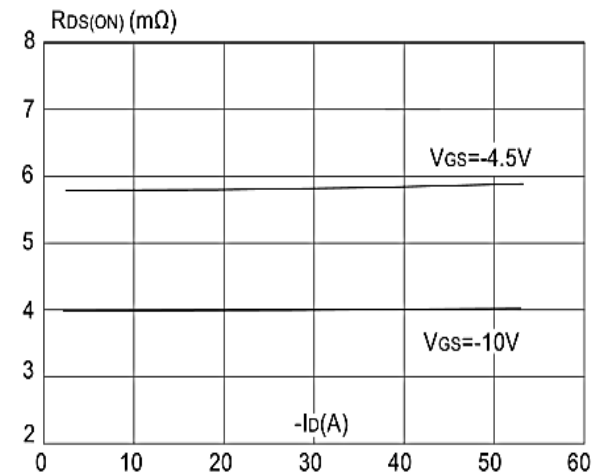


Figure 3: On-resistance vs. Drain Current

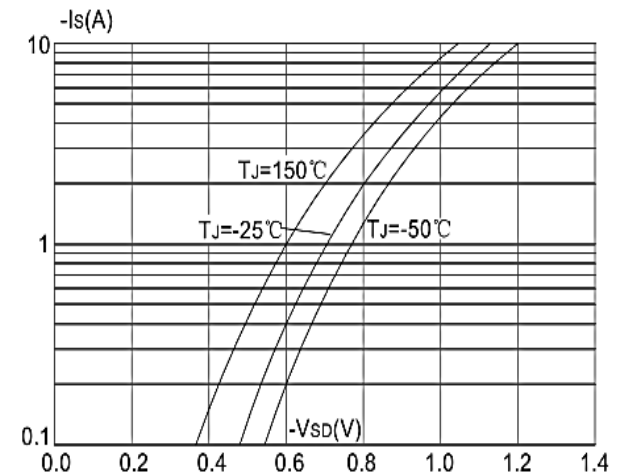


Figure 4: Body Diode Characteristics

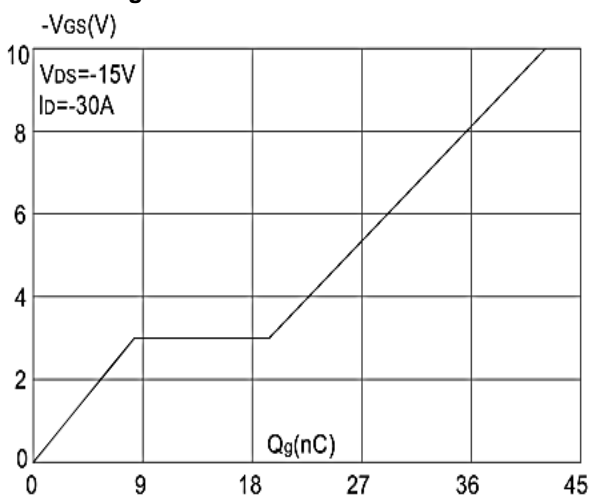


Figure 5: Gate Charge Characteristics

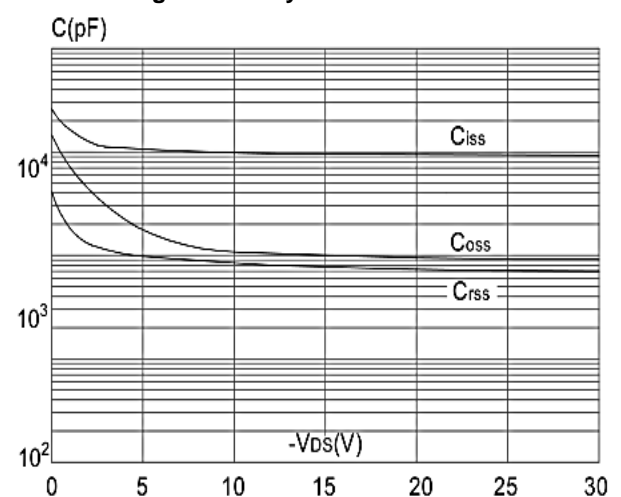


Figure 6: Capacitance Characteristics

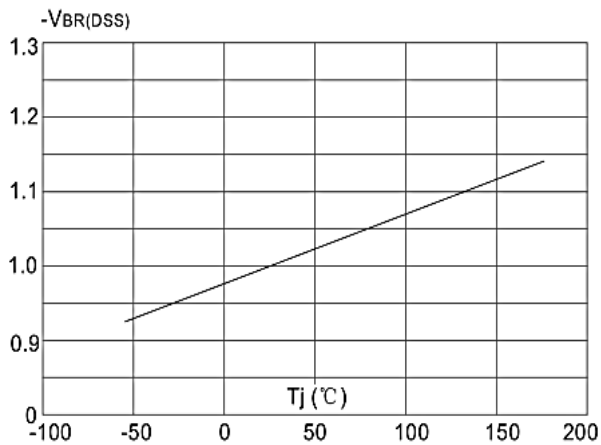


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

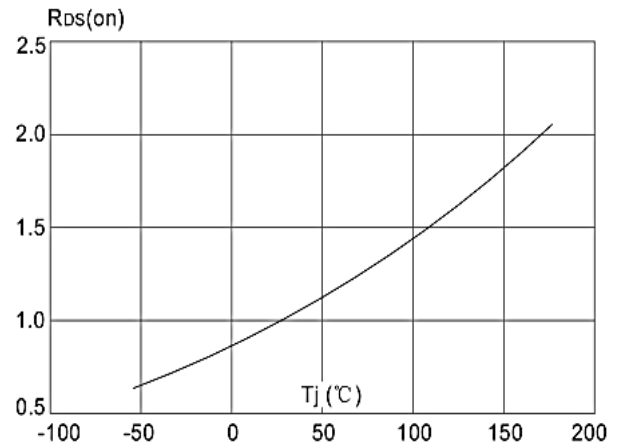


Figure 8: Normalized on Resistance vs. Junction Temperature

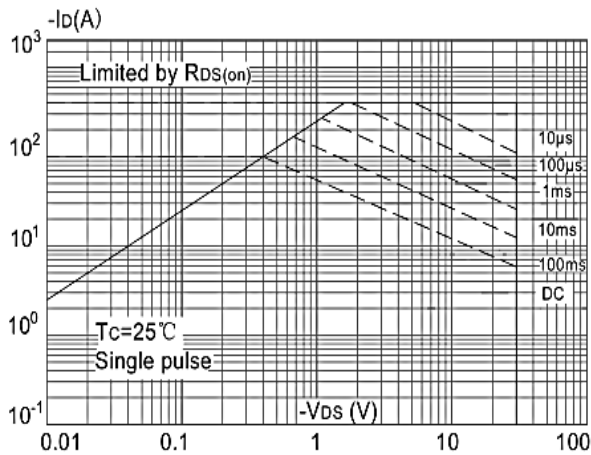


Figure 9: Maximum Safe Operating Area

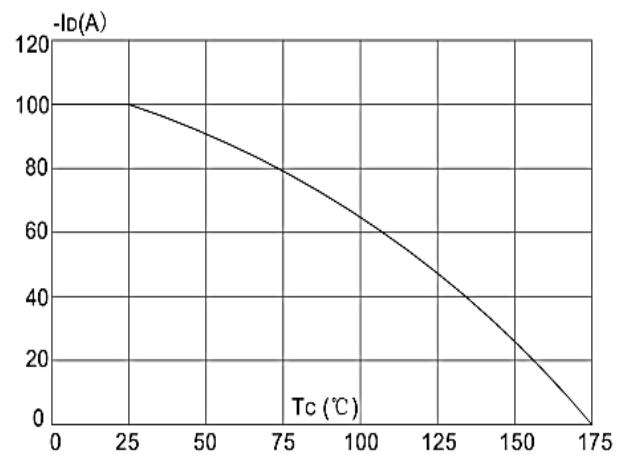


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

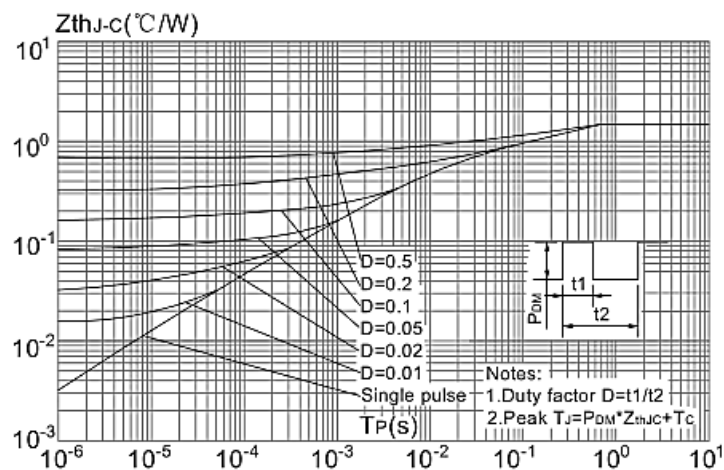
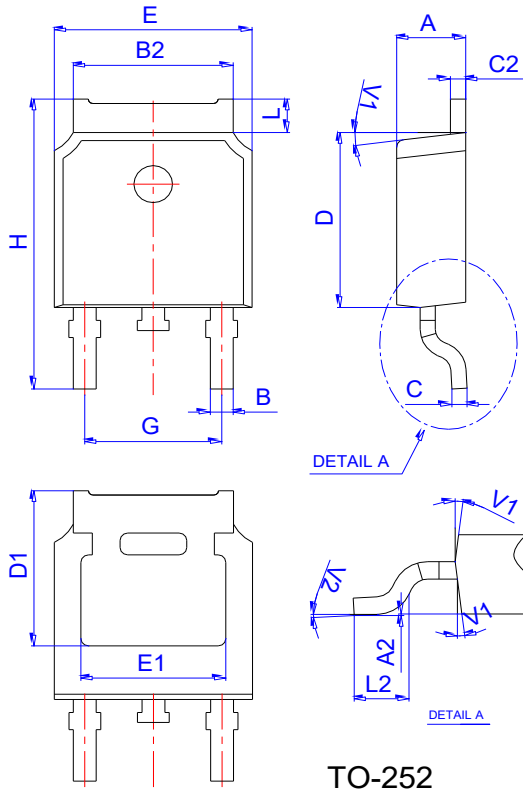


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

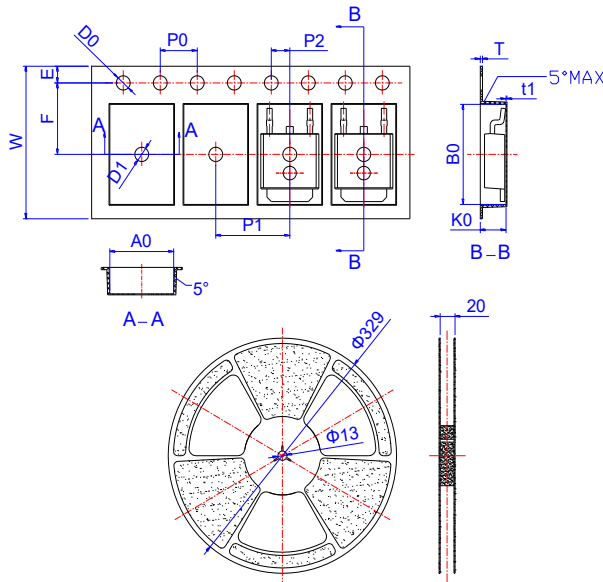
## Package Mechanical Data



TO-252

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

## Reel Specification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583