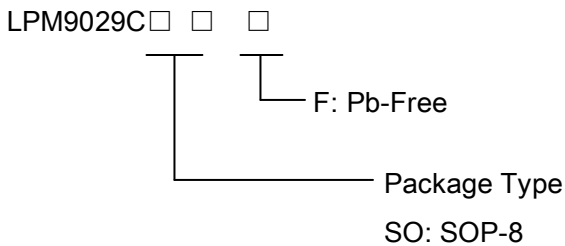


## N and P-Channel Enhancement Power MOSFET

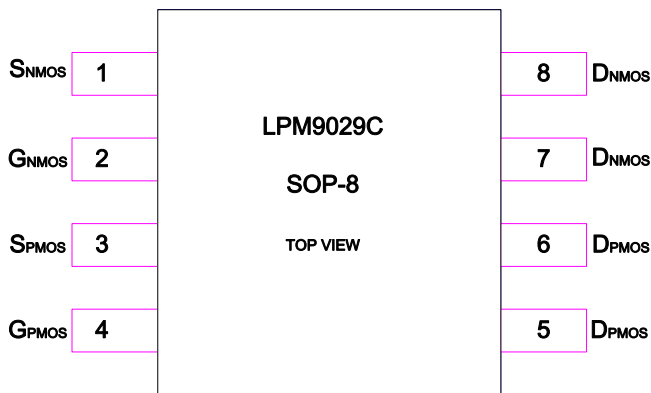
### General Description

The LPM9029C integrates N-Channel and P-Channel enhancement MOSFET Transistor. It uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for using in DC-DC conversion, power switch and charging circuit. Standard Product LPM9029C is Pb-free and Halogen-free.

### Ordering Information



### Pin Configurations



### Features

- ◆ Trench Technology
- ◆ NMOS:
  - $V_{NDS}=30V, I_{ND}=12A$
  - $R_{NDS(ON)} < 40m\Omega @ V_{GS}=2.5V$
  - $R_{NDS(ON)} < 20m\Omega @ V_{GS}=4.5V$
- ◆ PMOS:
  - $V_{PDS}=-20V, I_{PD}=-4.5A$
  - $R_{PDS(ON)} < 95m\Omega @ V_{GS}=-2.5V$
  - $R_{PDS(ON)} < 60m\Omega @ V_{GS}=-4.5V$
- ◆ Super high density cell design
- ◆ Extremely Low Threshold Voltage
- ◆ Small package SOP-8

### Applications

- ✧ Driver for Relay, Solenoid, Motor, LED etc.
- ✧ DC-DC converter circuit
- ✧ Power Switch
- ✧ Load Switch
- ✧ Charging

### Marking Information

Device	Marking	Package	Shipping
LPM9029C		SOP-8	3K/REEL

### Pin Description

Pin Number	Pin Description
1	Source Of NMOS
2	Gate Of NMOS
3	Source Of PMOS
4	Gate Of PMOS
5,6	Drain Of PMOS
7,8	Drain Of NMOS

## Absolute Maximum Ratings

Parameter		Symbol	NMOS	PMOS	Unit
Drain-Source Voltage		$V_{DS}$	30	-20	V
Gate-Source Voltage		$V_{GS}$	$\pm 10$	$\pm 10$	
Continuous Drain Current	TA=25°C		12	-4.5	A
Maximum Power Dissipation	TA=25°C		2.5		W
Operating Junction Temperature		$T_J$	-40 to 85		°C
Lead Temperature		$T_L$	260		°C
Storage Temperature Range		$T_{stg}$	-55 to 150		°C

## Thermal resistance ratings

Parameter		Symbol	NMOS	PMOS	Unit
Junction-to-Case Thermal Resistance ( Note b )	Steady State	$R_{\theta JC}$	50	50	°C/W

## Electrical Characteristics

### N-Channel MOSFET Electrical Characteristics:

Parameter	Symbol	Test Condition	Min	Typ.	Max	Units
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$		30		V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$			500	nA
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{V}, V_{GS} = \pm 10\text{V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS ( Note c )</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	0.4		0.95	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{V}, I_D = 5\text{A}$			40	m $\Omega$
		$V_{GS} = 5\text{V}, I_D = 5\text{A}$			20	
Forward Transconductance	$g_{FS}$	$V_{DS} = 2.5\text{V}, I_D = 10\text{A}$	4			S
<b>CAPACITANCES, CHARGES ( Note d )</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$ $V_{DS} = 15\text{V}$		1550		pF
Output Capacitance	$C_{OSS}$			300		
Reverse Transfer Capacitance	$C_{RSS}$			180		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{V},$ $V_{DS} = 15\text{V},$ $I_D = 10\text{A}$		13		nC
Gate-to-Source Charge	$Q_{GS}$			5.5		
Gate-to-Drain Charge	$Q_{GD}$			3.5		
<b>SWITCHING CHARACTERISTICS ( Note d )</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{V},$ $V_{DD} = 25\text{V},$ $I_D = 1.0\text{A},$ $R_G = 6\Omega$		30		ns
Rise Time	$t_r$			20		
Turn-Off Delay Time	$t_{d(OFF)}$			100		
Fall Time	$t_f$			80		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage <sup>(Note c)</sup>	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 6\text{A}$		0.2	1.0	V

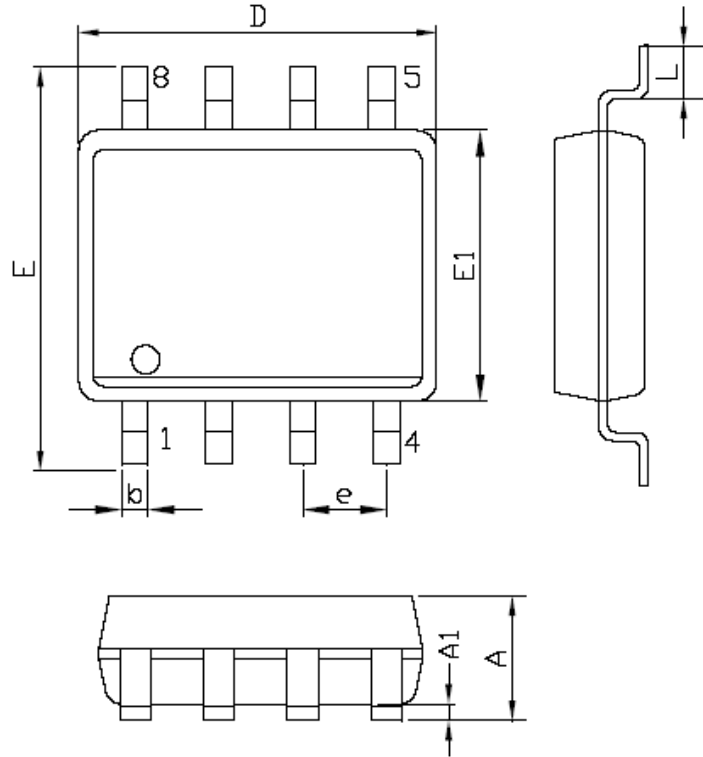
P-Channel MOSFET Electrical Characteristics:

Parameter	Symbol	Test Condition	Min	Typ.	Max	Units
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$			-500	nA
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{V}, V_{GS} = \pm 10\text{V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS ( Note c )</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-0.4		-0.95	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = -2.5\text{V}, I_D = -2\text{A}$			95	mΩ
		$V_{GS} = -4.5\text{V}, I_D = -4\text{A}$			60	
Forward Transconductance	$g_{FS}$	$V_{DS} = -4.5\text{V}, I_D = -3\text{A}$	2			S
<b>CAPACITANCES, CHARGES ( Note d )</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$ $V_{DS} = -15\text{V}$		1600		pF
Output Capacitance	$C_{OSS}$			350		
Reverse Transfer Capacitance	$C_{RSS}$			300		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{V},$ $V_{DS} = -15\text{V},$ $I_D = -3\text{A}$		30		nC
Gate-to-Source Charge	$Q_{GS}$			5.5		
Gate-to-Drain Charge	$Q_{GD}$			8		
<b>SWITCHING CHARACTERISTICS ( Note d )</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -10\text{V},$ $V_{DD} = -20\text{V},$ $I_D = -1.0\text{A},$ $R_G = 6\Omega$		10		ns
Rise Time	$t_r$			15		
Turn-Off Delay Time	$t_{d(OFF)}$			110		
Fall Time	$t_f$			70		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage <sup>(Note c)</sup>	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -1\text{A}$	-0.2		-0.95	V

**Note:**

- a. Pulse width limited by maximum junction temperature.
- b. Surface mounted on FR4 board,  $t < 10\text{s}$ .
- c. Pulse width  $< 295\mu\text{s}$ , Duty Cycle  $< 2\%$ .
- d. Guaranteed by design, not subject to production.

## Packaging Information



SYMBOLS	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.90		0.193	
E	5.80	6.20	0.228	0.244
E1	3.90		0.153	
L	0.40	1.27	0.016	0.050
b	0.31	0.51	0.012	0.020
e	1.27		0.050	