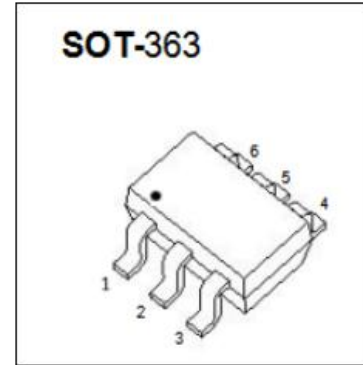


## Plastic-Encapsulate MOSFETS

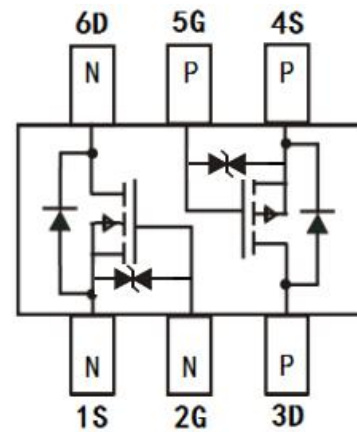
N-Channel and P-Channel Silicon MOSFETS

### Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead Free By Design/RoHS Compliant (Note 2)
- ESD Protected up to 2kV



Equivalent Circuit



MARKING:P2N

### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 6$	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	0.63	A
		$T_A = 85^\circ\text{C}$		0.45	
Pulsed Drain Current			$I_{DM}$	6	A

### Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 1)	$P_D$	0.28	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	452	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

Notes: 1. Device mounted on FR-4 PCB.  
2. No purposefully added lead.

### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Units	
Drain-Source Voltage	$V_{DSS}$	-20	V	
Gate-Source Voltage	$V_{GSS}$	$\pm 6$	V	
Drain Current (Note 1) Steady State	$I_D$	$T_A = 25^\circ\text{C}$ $T_A = 85^\circ\text{C}$	-0.46 -0.33	A
Pulsed Drain Current		$I_{DM}$	-6	A

### Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 1)	$P_D$	0.27	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	461	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

Notes: 1. Device mounted on FR-4 PCB.  
2. No purposefully added lead.

### Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified - N-channel

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	20	-	-	V	$V_{GS} = 0V, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	$I_{DSS}$	-	-	100	nA	$V_{DS} = 20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 1.0$	$\mu\text{A}$	$V_{GS} = \pm 4.5V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 4)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	0.3	0.4	$\Omega$	$V_{GS} = 4.5V, I_D = 600\text{mA}$
			0.4	0.5		$V_{GS} = 2.5V, I_D = 500\text{mA}$
			0.5	0.7		$V_{GS} = 1.8V, I_D = 350\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	-	1.4	-	S	$V_{DS} = 10V, I_D = 400\text{mA}$
Diode Forward Voltage (Note 4)	$V_{SD}$		0.7	1.2	V	$V_{GS} = 0V, I_S = 150\text{mA}$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{iss}$	-	60.67	-	pF	$V_{DS} = 16V, V_{GS} = 0V, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	9.68	-	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	5.37	-	pF	
Total Gate Charge	$Q_g$	-	736.6	-	pC	$V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250\text{mA}$
Gate-Source Charge	$Q_{gs}$	-	93.6	-	pC	
Gate-Drain Charge	$Q_{gd}$	-	116.6	-	pC	
Turn-On Delay Time	$t_{D(on)}$	-	5.1	-	ns	$V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47\Omega, R_G = 10\Omega, I_D = 200\text{mA}$
Turn-On Rise Time	$t_r$	-	7.4	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	26.7	-	ns	
Turn-Off Fall Time	$t_f$	-	12.3	-	ns	

Notes: 4. Short duration pulse test used to minimize self-heating effect.

### Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified - P-channel

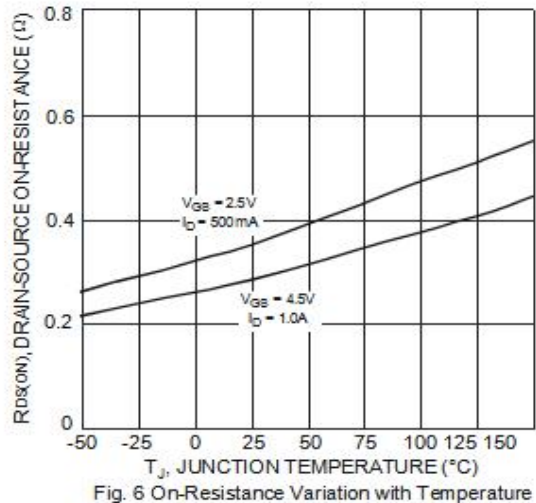
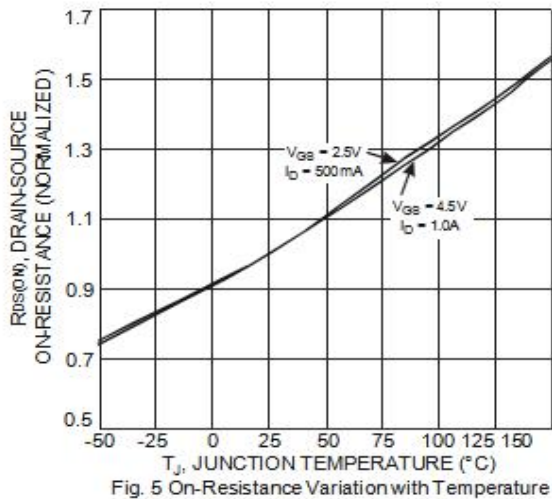
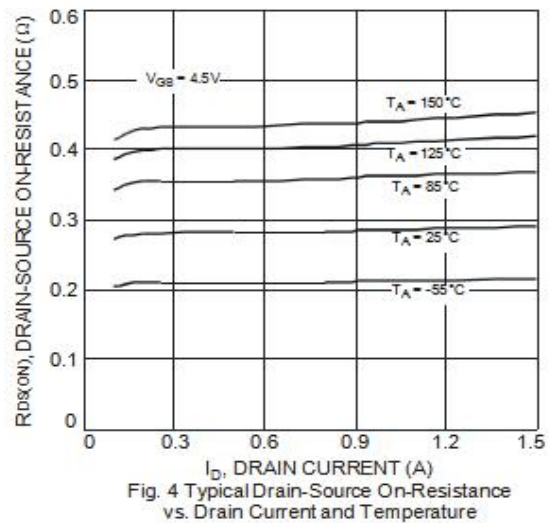
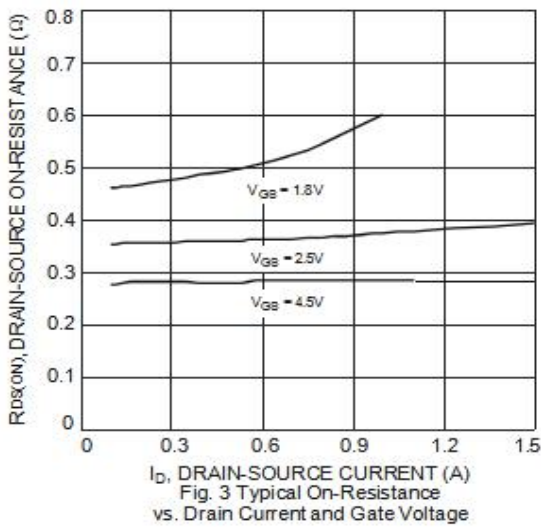
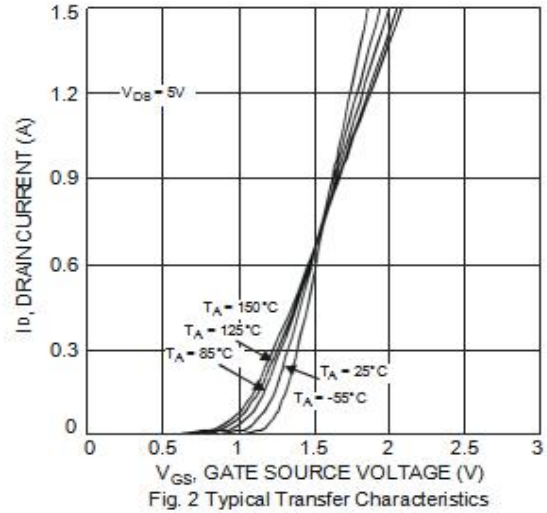
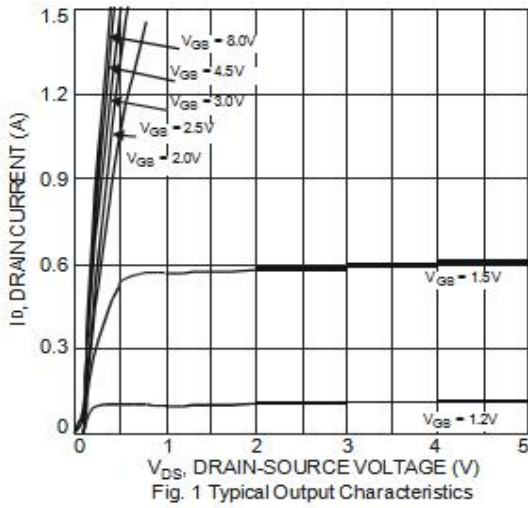
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C	I <sub>DSS</sub>	-	-	-100	nA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±2.0	μA	V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 4)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.5	-	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	0.5	0.7	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -350mA
			0.7	0.9		
			1.0	1.3		
Forward Transfer Admittance	Y <sub>fs</sub>	-	0.9	-	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Diode Forward Voltage (Note 4)	V <sub>SD</sub>	-	-0.8	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -150mA
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>iss</sub>	-	59.76	-	pF	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	12.07	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	6.36	-	pF	
Total Gate Charge	Q <sub>g</sub>	-	622.4	-	pC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Gate-Source Charge	Q <sub>gs</sub>	-	100.3	-	pC	
Gate-Drain Charge	Q <sub>gd</sub>	-	132.2	-	pC	
Turn-On Delay Time	t <sub>0(on)</sub>	-	5.1	-	ns	V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 47Ω, R <sub>G</sub> = 10Ω, I <sub>D</sub> = -200mA
Turn-On Rise Time	t <sub>r</sub>	-	8.1	-	ns	
Turn-Off Delay Time	t <sub>0(off)</sub>	-	28.4	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	20.7	-	ns	

Notes: 4. Short duration pulse test used to minimize self-heating effect.



## Typical Characteristics

N-channel



## Typical Characteristics

P-channel

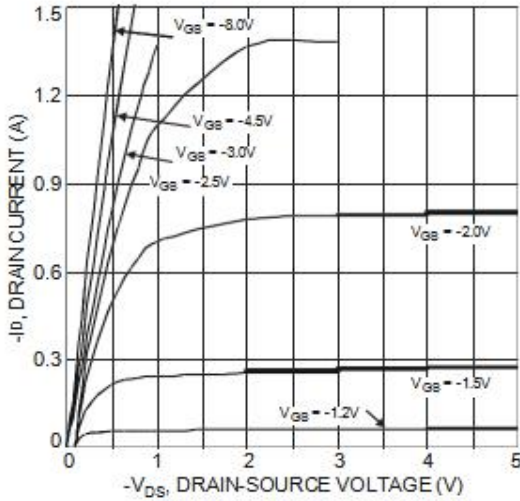


Fig. 1 Typical Output Characteristic

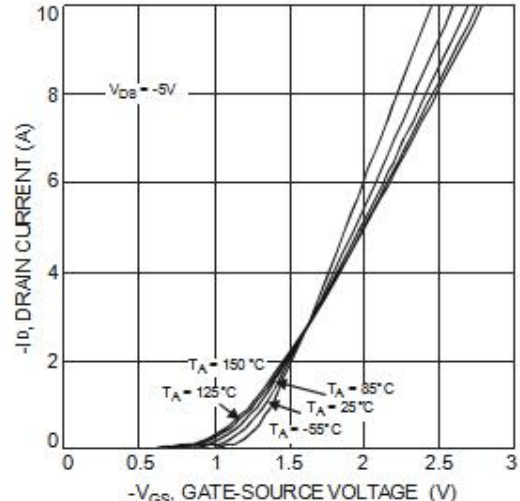


Fig. 2 Typical Transfer Characteristic

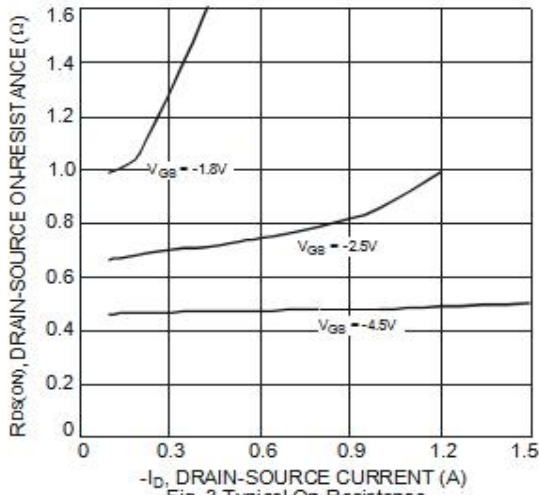


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

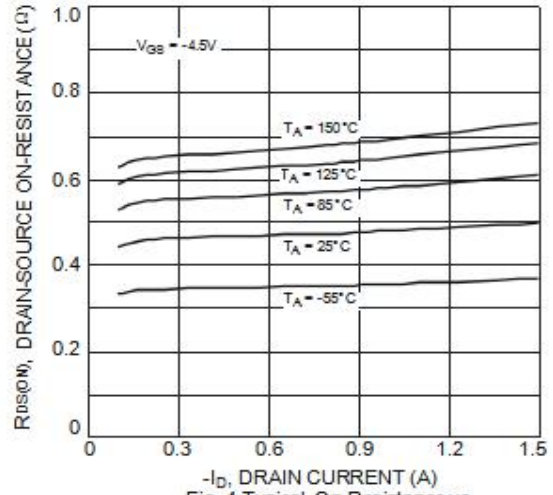


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

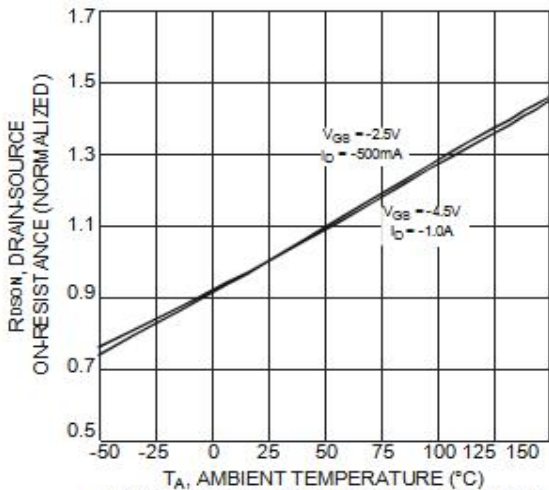


Fig. 5 On-Resistance Variation with Temperature

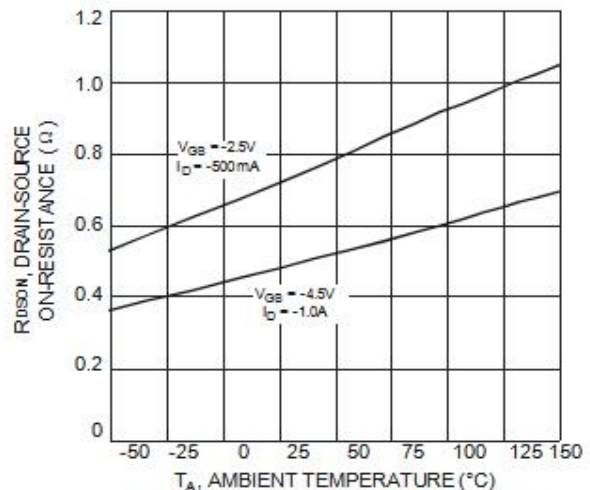
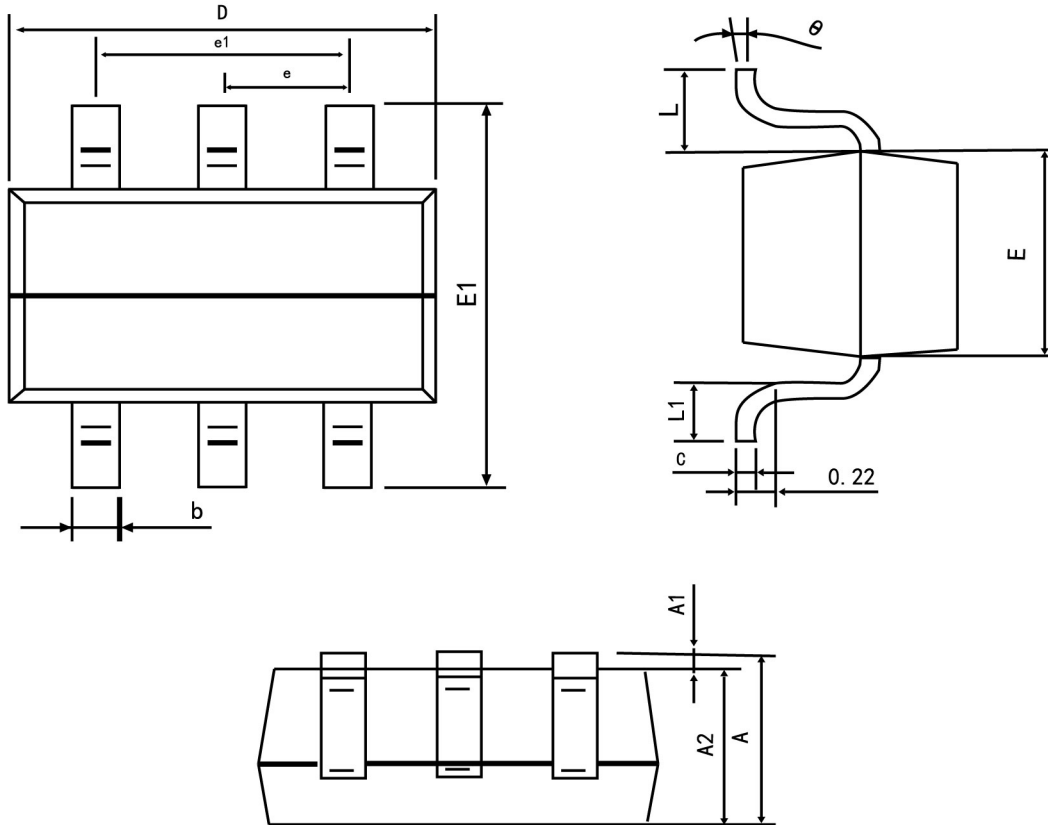


Fig. 6 On-Resistance Variation with Temperature



## SOT-363-Package Outline Dimensions



Symbol	Dimension in Millimeters	
	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.650 TYP	
e1	1.200	1.400
L	0.525 REF	
L1	0.260	0.460
θ	0°	8°