

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



ESD



TVS



MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

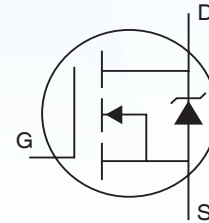
▶ Domestic	Part Number	IRLL014N
▶ Overseas	Part Number	IRLL014N
▶ Equivalent	Part Number	IRLL014N

EV is the abbreviation of name EVVO

## 55V N-Channel MOSFET

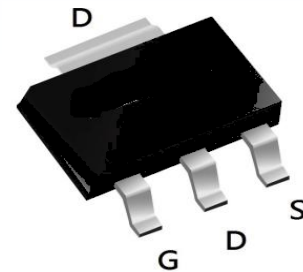
### Description

The SOT-223 package is designed for surface-mount using vapor phase, infra red, or wave soldering techniques. Unique package design allows for easy automatic pick-and-place as with other packages but has the added advantage of improved thermal performance due to an enlarged tab for heatsinking. Power dissipation of 1.0W is possible in a typical surface mount application.



### Benefits

- Surface Mount
- Advanced Process Technology
- Ultra Low On-resistance
- Dynamic  $dv/dt$  Rating
- Fast Switching
- $V_{DS(V)} = 55V$
- $I_D = 2.0A$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 140m\Omega$  ( $V_{GS} = 10V$ )



### Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{**}$	2.8	A
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^*$	2.0	
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^*$	1.6	
$I_{DM}$	Pulsed Drain Current ①	16	
$P_D @ T_A = 25^\circ C$	Power Dissipation (PCB Mount)**	2.1	W
$P_D @ T_A = 25^\circ C$	Power Dissipation (PCB Mount)*	1.0	W
	Linear Derating Factor (PCB Mount)*	8.3	mW/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 16$	V
$E_{AS}$	Single Pulse Avalanche Energy②	32	mJ
$I_{AR}$	Avalanche Current①	2.0	A
$E_{AR}$	Repetitive Avalanche Energy①*	0.1	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ ③	7.2	V/ns
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to +150	°C

### Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)*	90	120	°C/W
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)**	50	60	

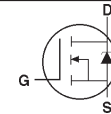
## 55V N-Channel MOSFET

### Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise specified

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.015		V/°C	Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance			140	mΩ	$V_{GS} = 10V, I_D = 2.0A$ ④
				200		$V_{GS} = 5.0V, I_D = 1.2A$ ④
				280		$V_{GS} = 4.0V, I_D = 1.0A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0		2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$g_{fs}$	Forward Transconductance	2.3			S	$V_{DS} = 25V, I_D = 1.0A$
$I_{DSS}$	Drain-to-Source Leakage Current			25	μA	$V_{DS} = 55V, V_{GS} = 0V$
				250		$V_{DS} = 44V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage			100	nA	$V_{GS} = 16V$
	Gate-to-Source Reverse Leakage			-100		$V_{GS} = -16V$
$Q_g$	Total Gate Charge		9.5	14	nC	$I_D = 2.0A$
$Q_{gs}$	Gate-to-Source Charge		1.1	1.7		$V_{DS} = 44V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge		3.0	4.4		$V_{GS} = 10V$ , See Fig. 6 and 9 ④
$t_{d(on)}$	Turn-On Delay Time		5.1		ns	$V_{DD} = 28V$
$t_r$	Rise Time		4.9			$I_D = 2.0A$
$t_{d(off)}$	Turn-Off Delay Time		14			$R_G = 6.0\Omega$
$t_f$	Fall Time		2.9			$R_D = 14\Omega$ , See Fig. 10 ④
$C_{iss}$	Input Capacitance		230		pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance		66			$V_{DS} = 25V$
$I_S$	Reverse Transfer Capacitance		30			$f = 1.0\text{MHz}$ , See Fig. 5
$C_{ISS}$	Continuous Source Current (Body Diode)			1.3	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①			16		
$V_{SD}$	Diode Forward Voltage			1.0	V	$T_J = 25^\circ\text{C}, I_S = 2.0A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time		41	61	ns	$T_J = 25^\circ\text{C}, I_F = 2.0A$
$Q_{rr}$	Reverse Recovery Charge		73	110	nC	$di/dt = 100A/\mu s$ ④
$t_{on}$	Forward Turn-On Time					Intrinsic turn-on time is negligible (turn-on is dominated by $L_S+L_D$ )

#### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ②  $V_{DD} = 25V$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 4.0\text{mH}$   $R_G = 25\Omega$ ,  $I_{AS} = 4.0A$ . (See Figure 12)
- ③  $I_{SD} \leq 2.0A$ ,  $di/dt \leq 170A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .



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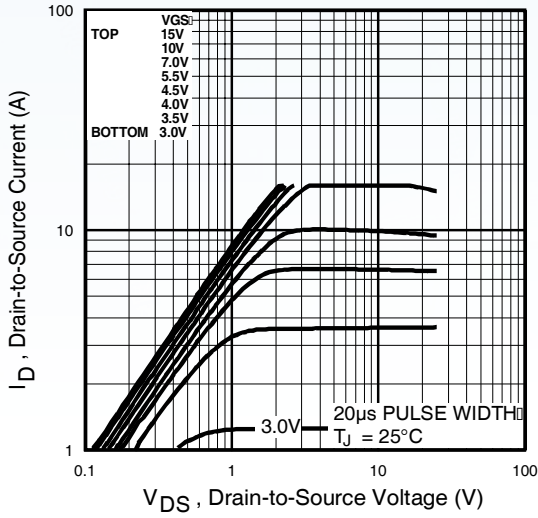


Fig 1. Typical Output Characteristics,

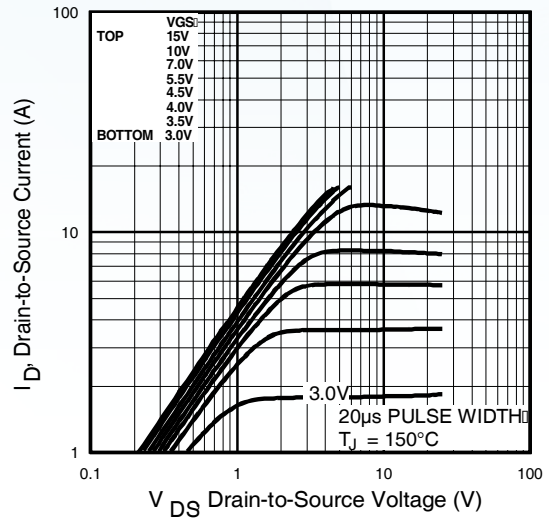


Fig 2. Typical Output Characteristics,

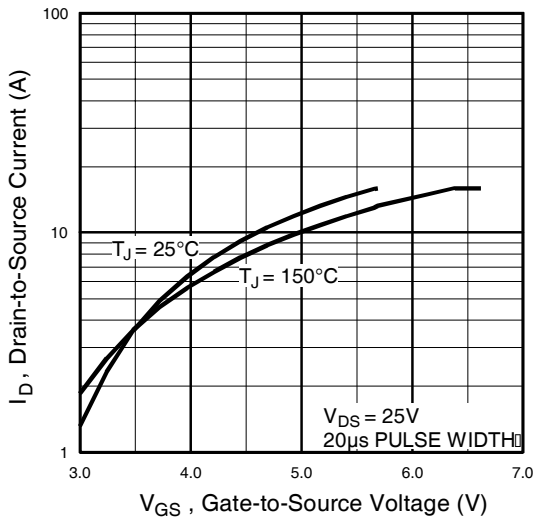


Fig 3. Typical Transfer Characteristics

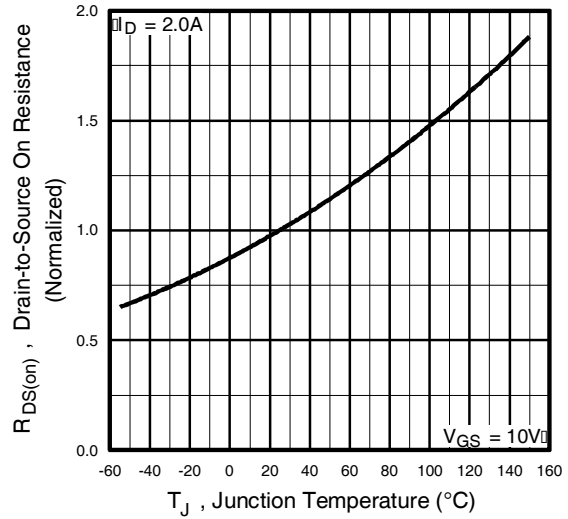


Fig 4. Normalized On-Resistance Vs. Temperature

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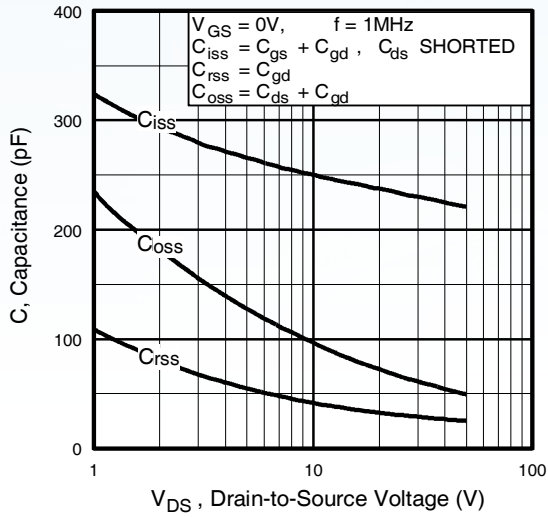


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

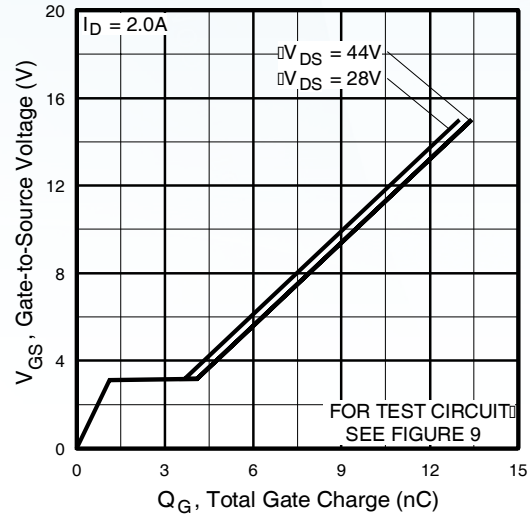


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

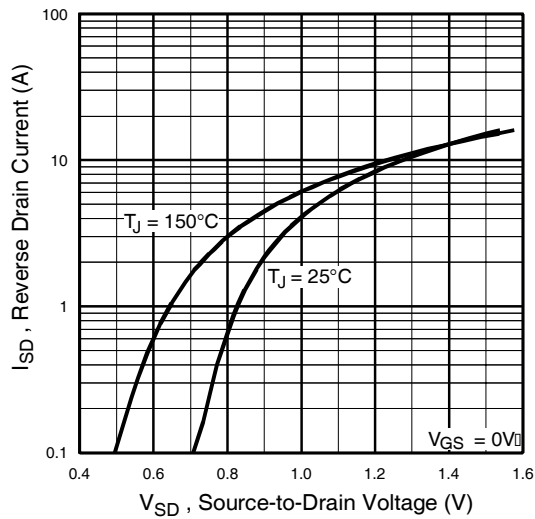


Fig 7. Typical Source-Drain Diode Forward Voltage

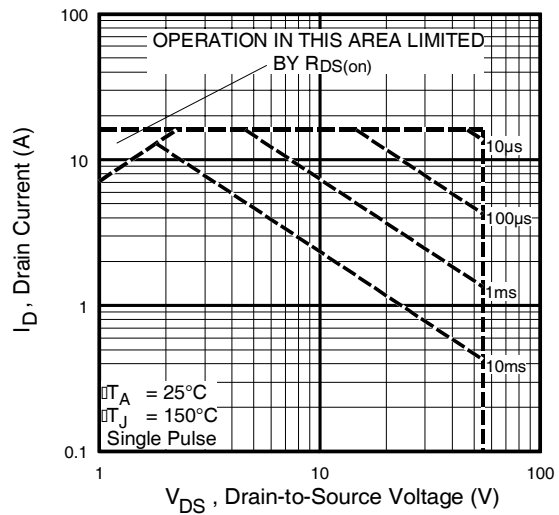


Fig 8. Maximum Safe Operating Area

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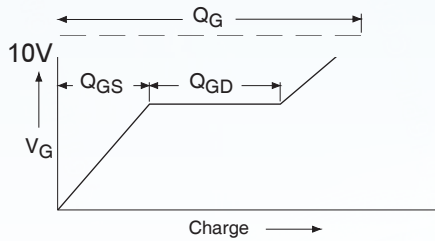


Fig 9a. Basic Gate Charge Waveform

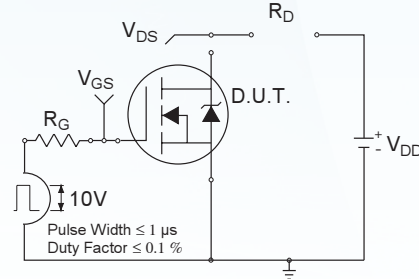


Fig 10a. Switching Time Test Circuit

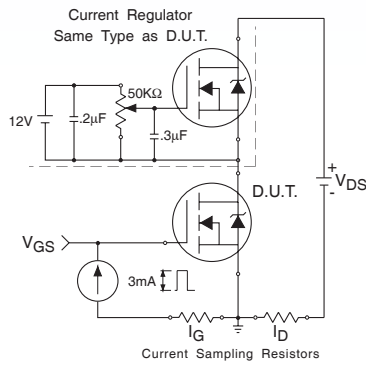


Fig 9b. Gate Charge Test Circuit

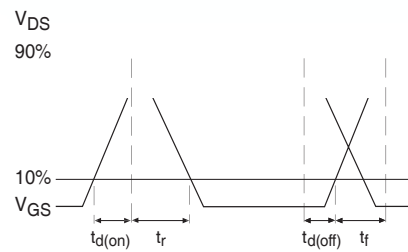


Fig 10b. Switching Time Waveforms

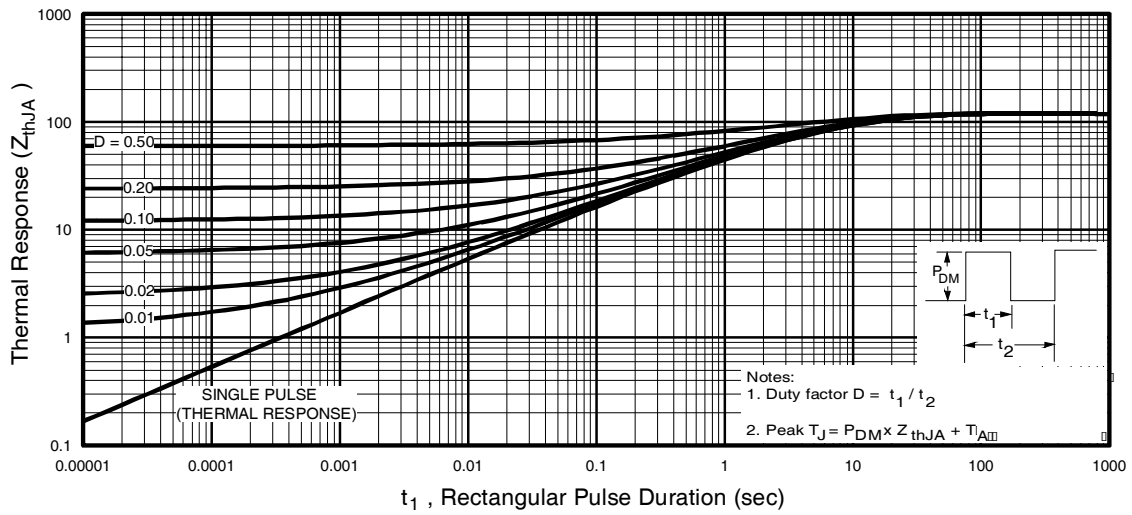
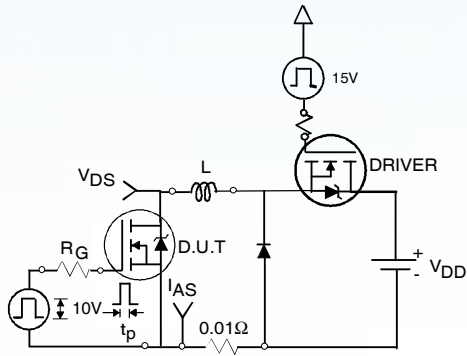
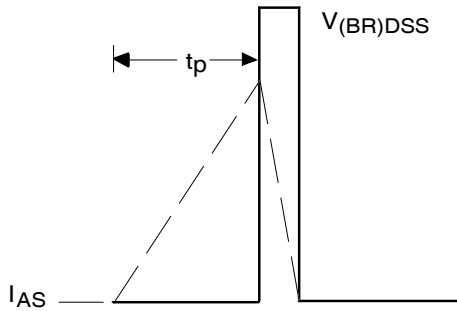


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

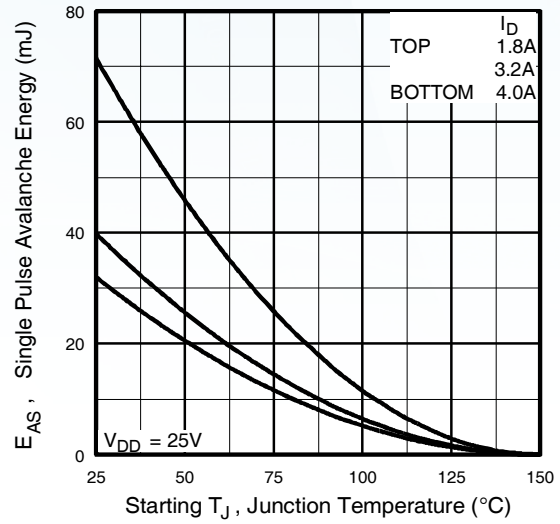
**55V N-Channel MOSFET**



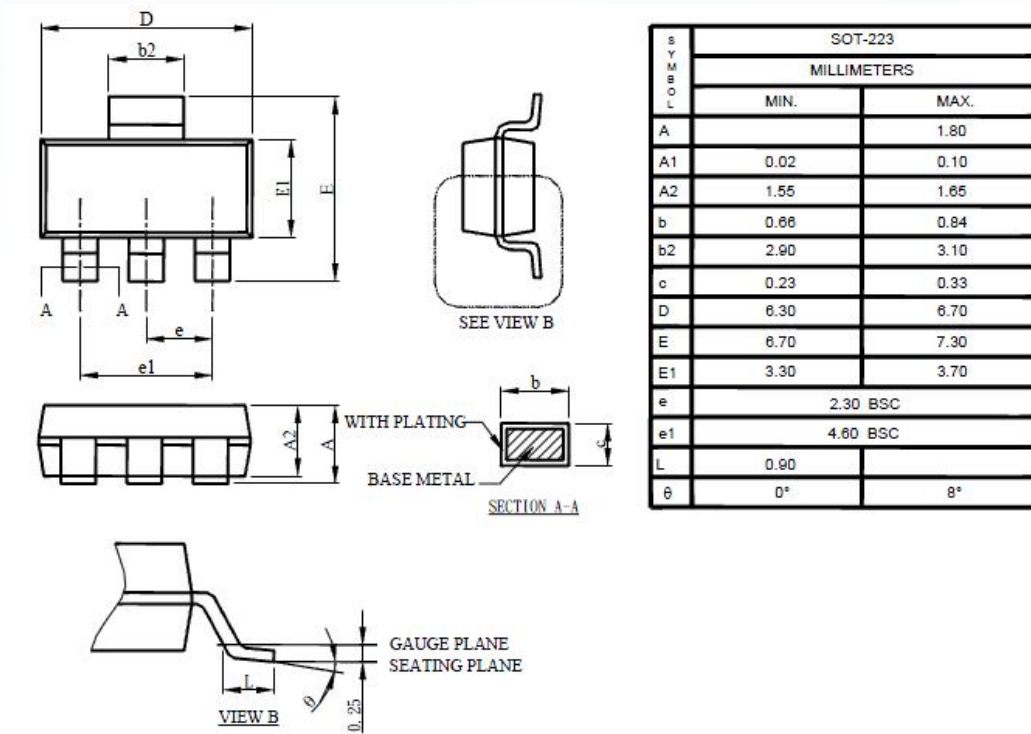
**Fig 12a.** Unclamped Inductive Test Circuit



**Fig 12b.** Unclamped Inductive Waveforms



**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current

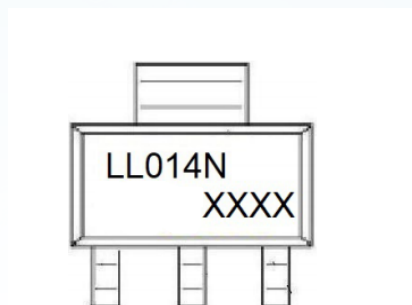
**55V N-Channel MOSFET**
**■ SOT223 封裝外形圖**

**Note:**

1. Refer to JEDEC TO-261AA.
2. Dimension D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs, and interlead flash, but including any mismatch between the top and bottom of the plastic body.
3. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.



## 55V N-Channel MOSFET

## Marking



## Ordering information

Order code	Package	Baseqty	Deliverymode
IRLL014N	SOT-223	2500	Tape and reel

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