

SE3415

**P-Channel Enhancement-Mode MOSFET**

Revision: A

**General Description**

Advanced trench technology to provide excellent RDS(ON), low gate charge and low operation voltage. This device is suitable for using as a load switch or in PWM applications.

- Simple Drive Requirement
- Small Package Outline
- Surface Mount Device

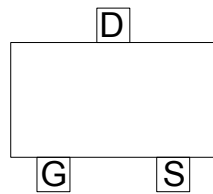
**Features**

For a single MOSFET

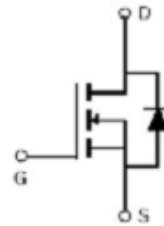
- $V_{DS} = -15V$
- $R_{DS(ON)} = 33m\Omega @ V_{GS}=-4.5 @ I_{DS}=-4A$

**Pin configurations**

See Diagram below



SOT-23



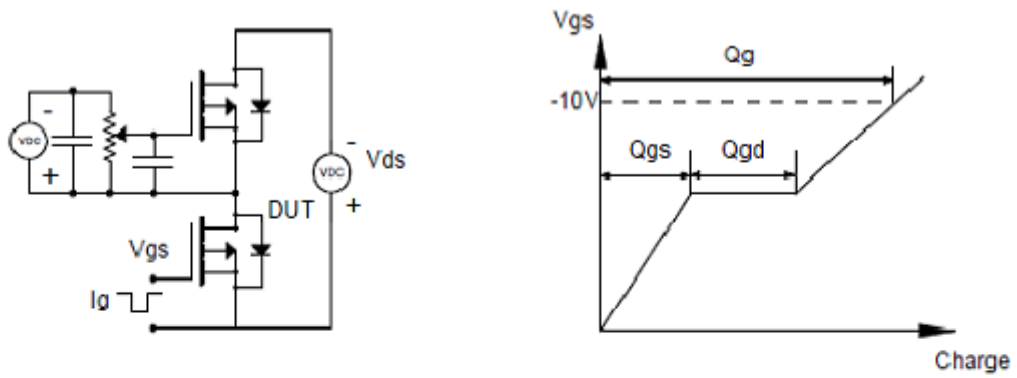
**Absolute Maximum Ratings**

Parameter		Symbol	Rating	Units
Drain-Source Voltage		$V_{DS}$	-15	V
Gate-Source Voltage		$V_{GS}$	$\pm 8$	V
Drain Current	Continuous	$I_D$	-4	A
	Pulsed		-30	
Total Power Dissipation	@TA=25°C	$P_D$	1.5	W
Operating Junction Temperature Range		$T_J$	-55 to 150	°C

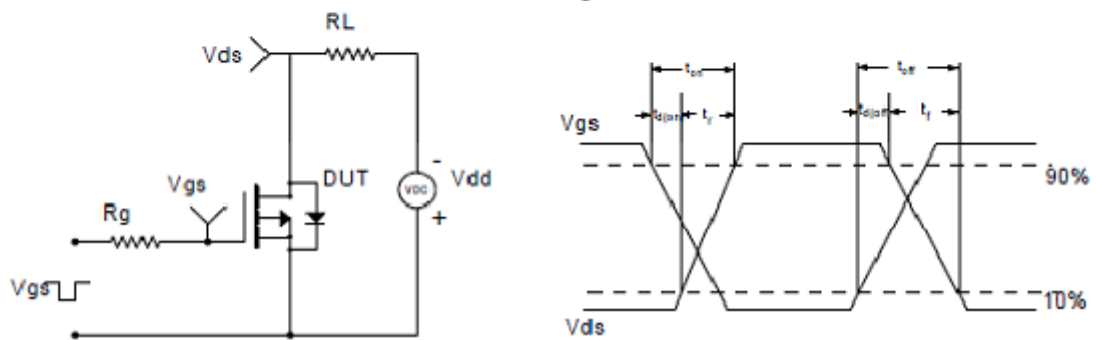
## SE3415

Electrical Characteristics (T <sub>J</sub> =25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS (Note 2)</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0 V	-15			V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> = -20V, V <sub>GS</sub> =0V			-1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = 18V			110	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	-0.45	-0.57	-0.9	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A	-	33	36	mΩ
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, f=1MHz	600	751	905	pF
C <sub>oss</sub>	Output Capacitance		80	115	150	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		48	80	115	pF
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge <sup>2</sup>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =4A	7.4	9.3	11	nC
Q <sub>gs</sub>	Gate Source Charge		0.8	1	12	nC
Q <sub>gd</sub>	Gate Drain Charge		1.3	2.2	3.1	nC
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, R <sub>GEN</sub> =3Ω, R <sub>L</sub> =2.5Ω		13		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			19		ns
t <sub>d(r)</sub>	Turn-On Rise Time			9		ns
t <sub>d(f)</sub>	Turn-Off Fall Time			29		ns
<b>Thermal Resistance</b>						
Symbol	Parameter		Typ	Max		Units
R <sub>θJC</sub>	Junction to Case		-	43		°C/W
R <sub>θJA</sub>	Junction to Ambient (t ≤ 10s)		-	65		°C/W

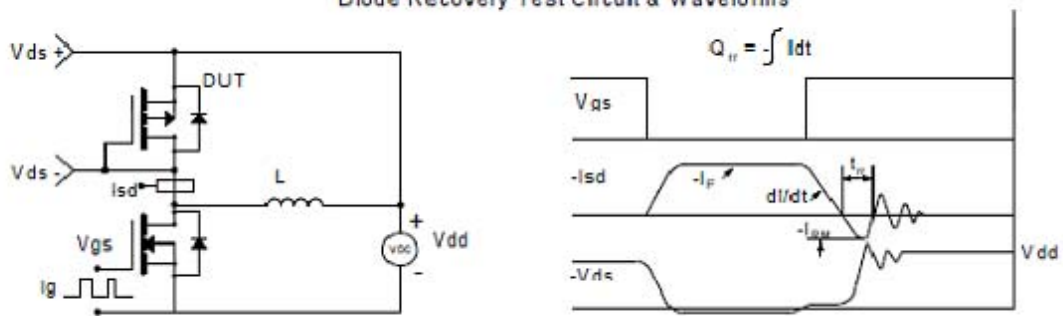
Test Circuits and Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Characteristics

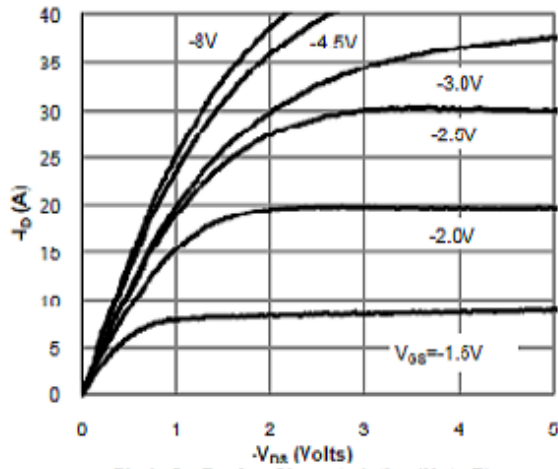


Fig 1: On-Region Characteristics (Note E)

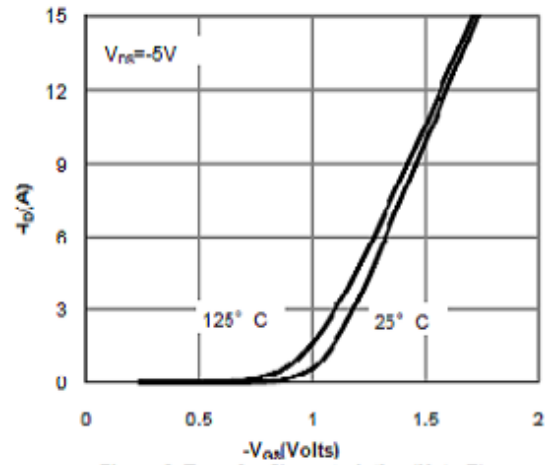


Figure 2: Transfer Characteristics (Note E)

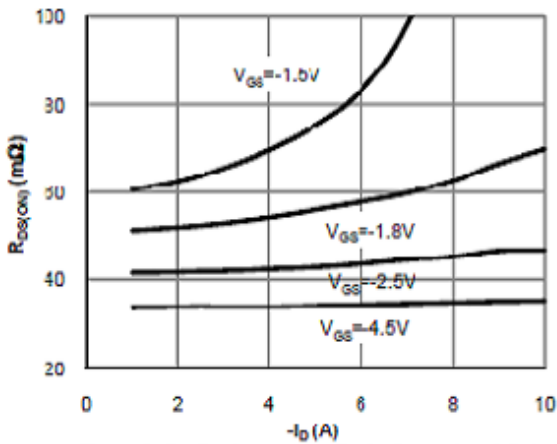


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

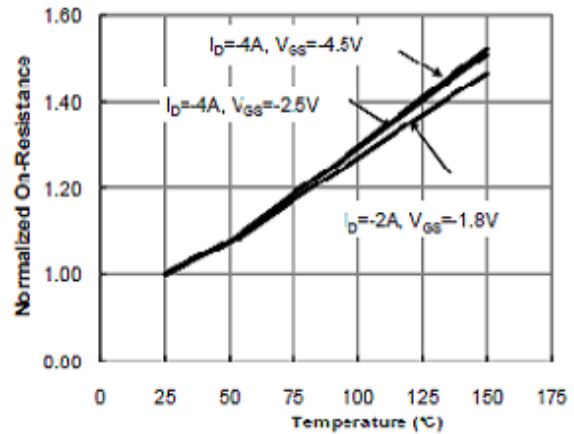


Figure 4: On-Resistance vs. Junction Temperature (Note E)

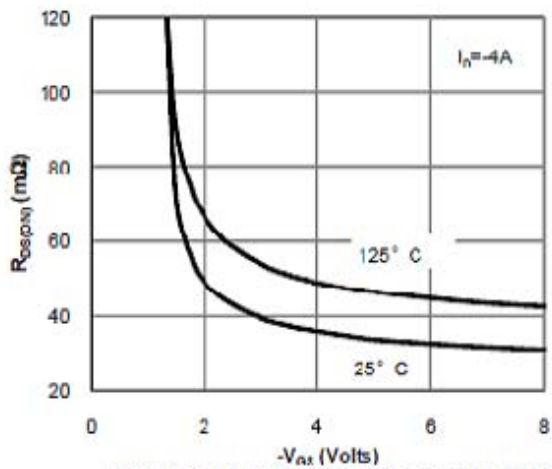


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

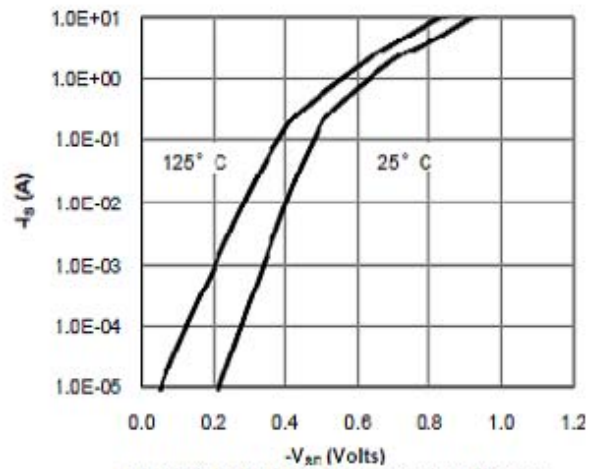


Figure 6: Body-Diode Characteristics (Note E)

Typical Characteristics

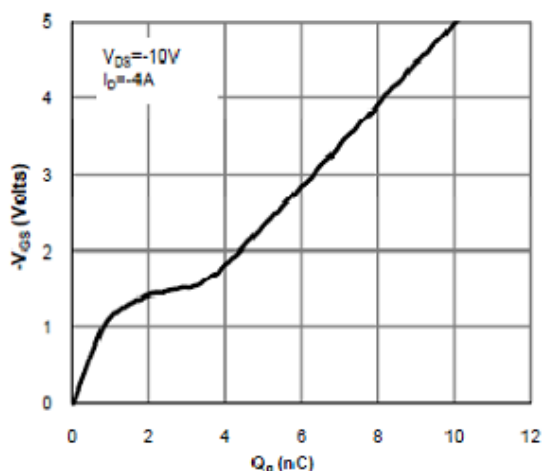


Figure 7: Gate-Charge Characteristics

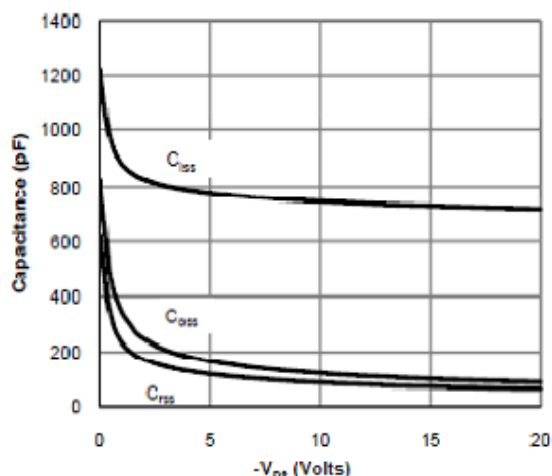


Figure 8: Capacitance Characteristics

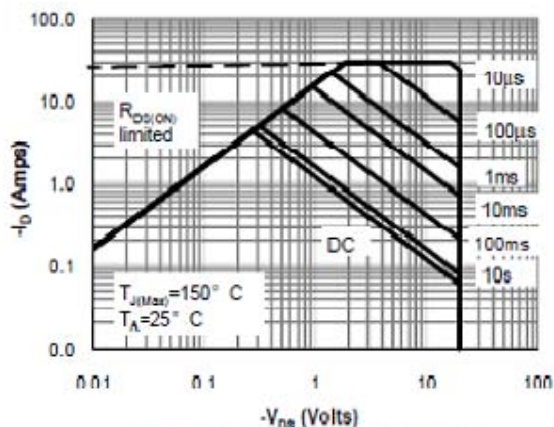


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

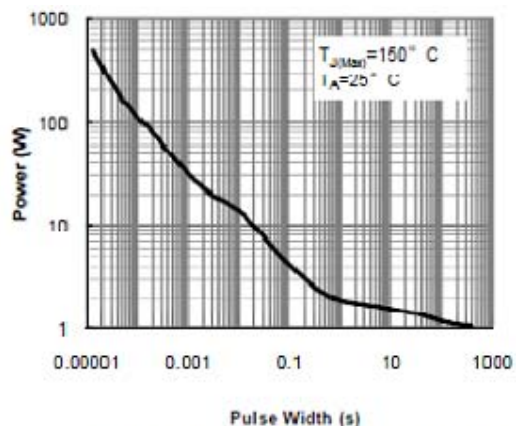


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

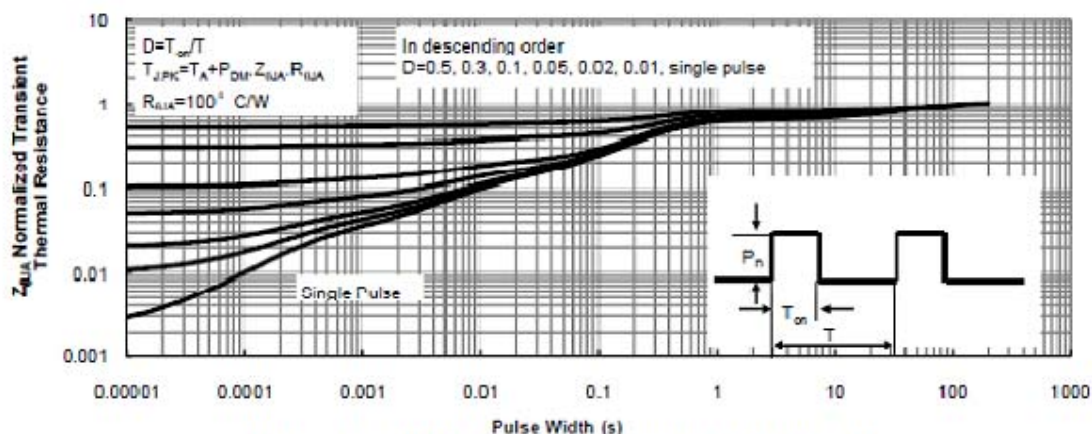
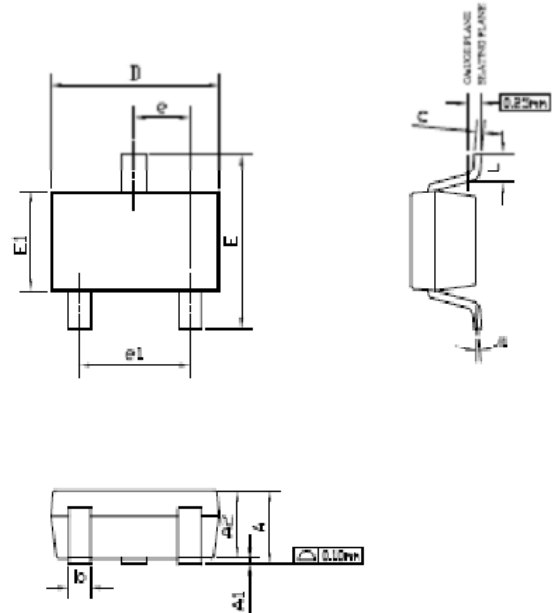


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

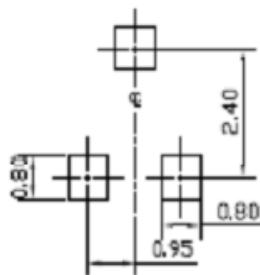
# SE3415

## Package Outline Dimension

### SOT-23



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	—	1.25	0.033	—	0.049
A1	0.00	—	0.13	0.000	—	0.005
A2	0.70	1.00	1.13	0.028	0.039	0.045
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.08	0.13	0.20	0.003	0.005	0.008
D	2.80	2.90	3.10	0.110	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.40	1.60	1.80	0.055	0.063	0.071
e	λ95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	—	0.60	0.012	—	0.024
Bl	0°	5°	8°	0°	5°	8°

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