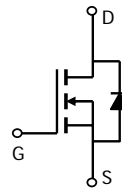
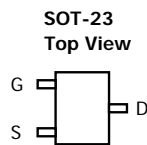


## N-Channel Enhancement Mode Field Effect Transistor

### ◆ Features




1. Advanced Trench Process Technology.
2. High Density Cell Design for Ultra Low On-Resistance.
3. Improved Shoot-Through FOM
4. RoHS Compliant



### PRODUCT SUMMARY

$V_{DSS}$	$I_D$	$R_{DS(on)}$ (m-ohm) Max
30V	5.8A	28 @ $V_{GS} = 10V$
		33 @ $V_{GS} = 4.5V$
		53 @ $V_{GS} = 2.5V$

### ◆ Ordering Information

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
SM3400SRL	SM3400SRG	SOT-23	G	S	D	Tape Reel
<p style="text-align: center;"><b>SM3400 X X X</b></p> <p>(1)Package Type </p> <p>(2)Packing Type </p> <p>(3)Lead Free </p>						
<p>(1) S: SOT-23;</p> <p>(2) R: Tape Reel</p> <p>(3) G: Halogen Free; L: Lead Free</p>						



## ◆ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current (Continuous) <sup>a</sup>	5.8	A
$I_{DM}$	Drain Current (Pulsed) <sup>b</sup>	30	A
$P_D$	Total Power Dissipation @ $T_A=25^\circ\text{C}$	1.4	W
$T_j, T_{stg}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (PCB mounted) <sup>c</sup>	140	$^\circ\text{C/W}$

a:Fused current that based on wire numbers and diameter

b:Repetitive Rating: Pulse width limited by the maximum junction temperature

c:1-in<sup>2</sup> 2oz Cu PCB board

## ◆ Electrical Characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.7	1.1	1.4	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}, V_{DS}=5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=5.8\text{A}$ $T_J=125^\circ\text{C}$		22.8	28	m $\Omega$
		$V_{GS}=4.5\text{V}, I_D=5\text{A}$		27.3	33	
		$V_{GS}=2.5\text{V}, I_D=4\text{A}$		43.3	52	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}, I_D=5\text{A}$	10	15		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.71	1	V
$I_S$	Maximum Body-Diode Continuous Current				2.5	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		823	1030	pF
$C_{oss}$	Output Capacitance			99		pF
$C_{rss}$	Reverse Transfer Capacitance			77		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		1.2	3.6	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=4.5\text{V}, V_{DS}=15\text{V}, I_D=5.8\text{A}$		9.7	12	nC
$Q_{gs}$	Gate Source Charge			1.6		nC
$Q_{gd}$	Gate Drain Charge			3.1		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=2.7\Omega,$ $R_{GEN}=3\Omega$		3.3	5	ns
$t_r$	Turn-On Rise Time			4.8	7	ns
$t_{D(off)}$	Turn-Off DelayTime			26.3	40	ns
$t_f$	Turn-Off Fall Time			4.1	6	ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		16	20	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		8.9	12	nC

Note: Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

d: Guaranteed by design: not subject to production testing

## ◆ Characteristics Curve

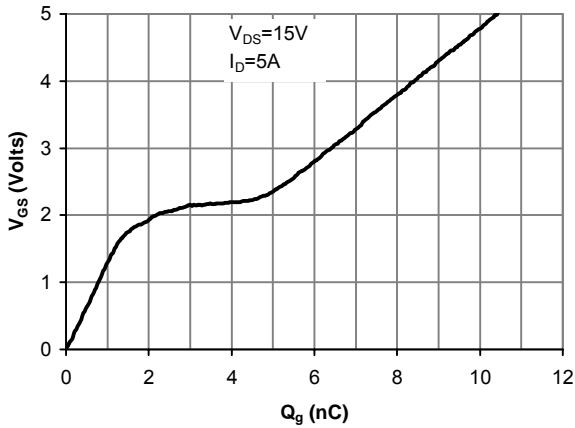


Figure 7: Gate-Charge Characteristics

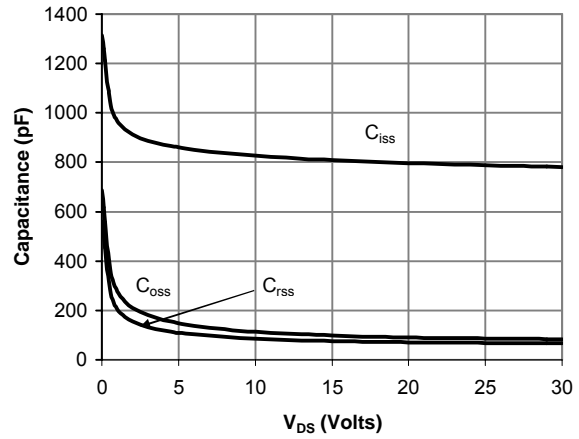


Figure 8: Capacitance Characteristics

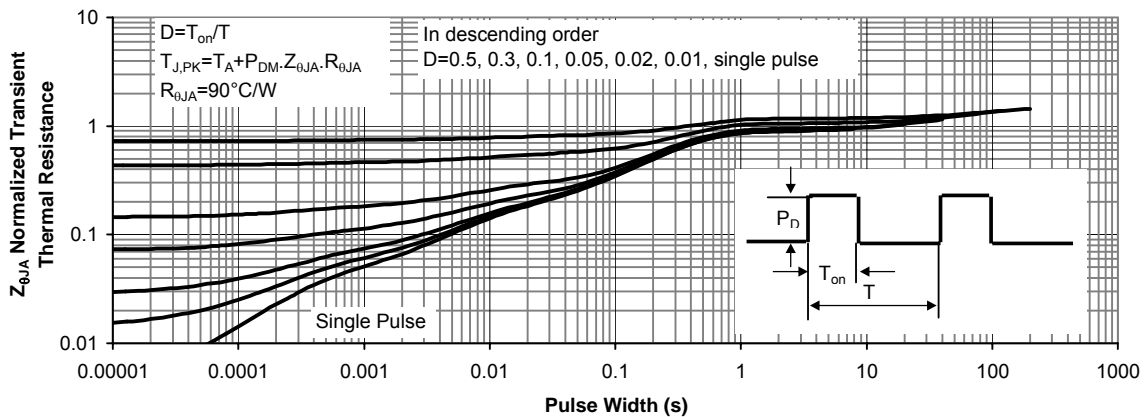
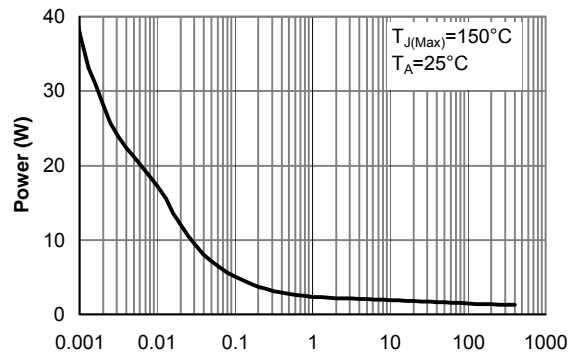
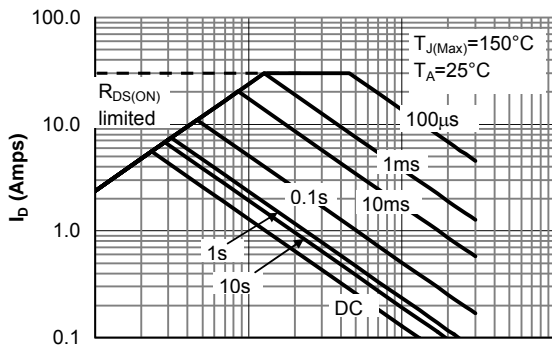


Figure 11: Normalized Maximum Transient Thermal Impedance

## ◆ Characteristics Curve

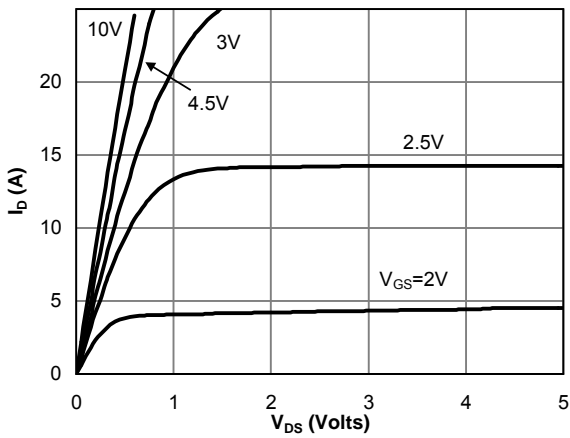


Fig 1: On-Region Characteristics

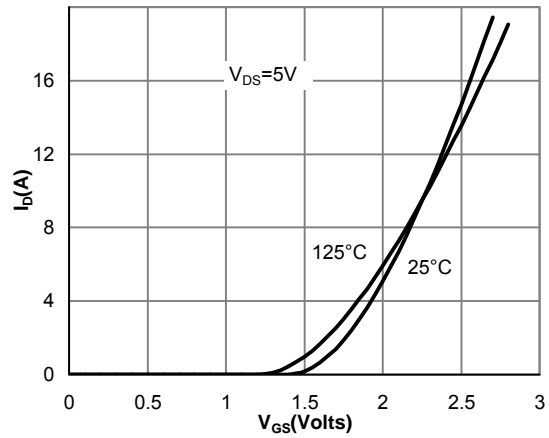


Figure 2: Transfer Characteristics

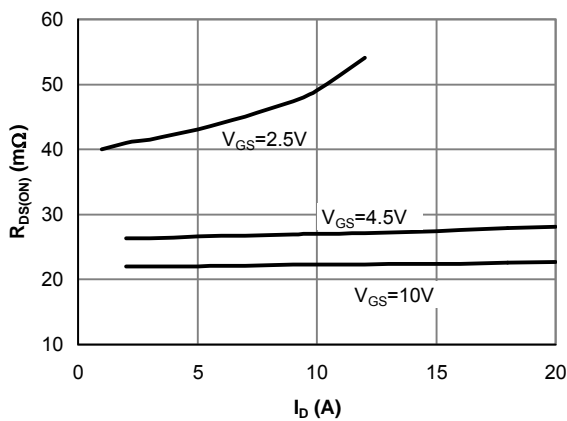


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

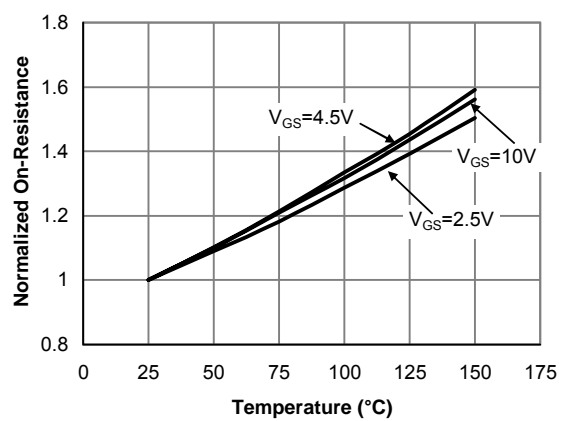


Figure 4: On-Resistance vs. Junction Temperature

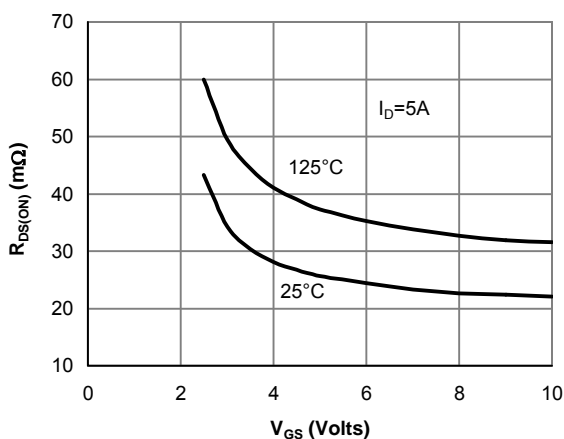


Figure 5: On-Resistance vs. Gate-Source Voltage

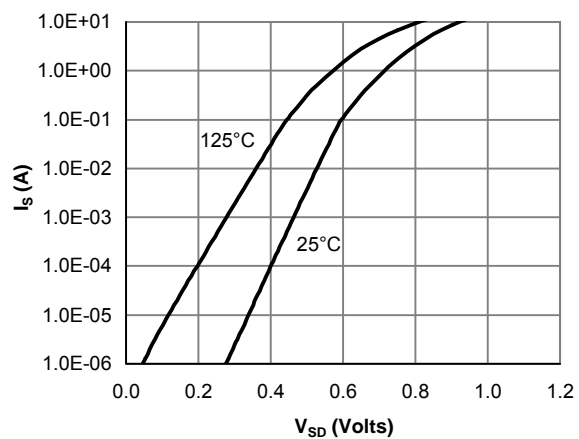
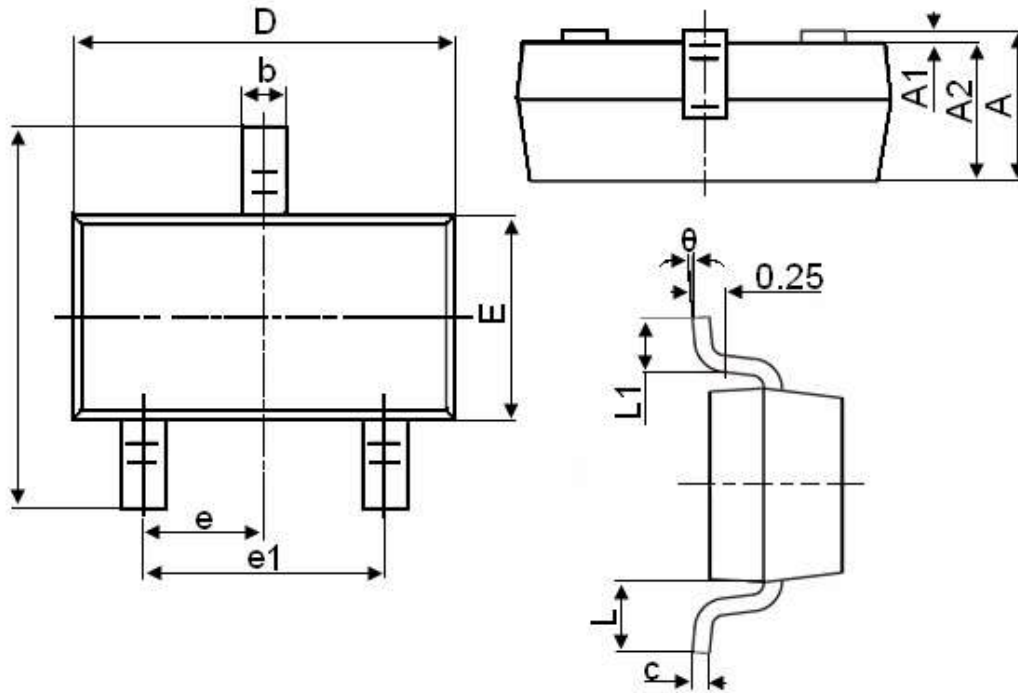


Figure 6: Body-Diode Characteristics

## SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

### Notes

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.