

# SMG138K

640mA, 50V, R<sub>DS(ON)</sub> 2Ω

N-Channel Enhancement Mode Power Mos.FET

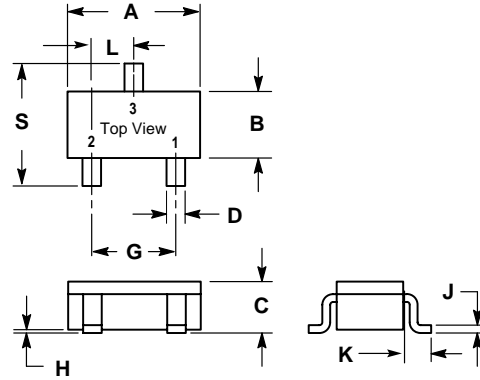
## Description

The SMG138K utilized advanced processing techniques to achieve the lowest possible on-resistance extremely efficient and cost-effectiveness device. The SMG138K is universally used for all commercial industrial application

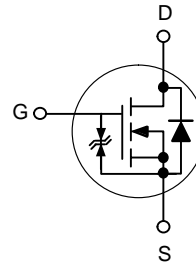
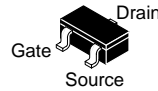
## Features

- \* Simple drive Requirement
- \* Small package outline
- \* RoHS Compliant Product

Marking : 138E



SC-59		
Dim	Min	Max
A	2.70	3.10
B	1.40	1.60
C	1.00	1.30
D	0.35	0.50
G	1.70	2.10
H	0.00	0.10
J	0.10	0.26
K	0.20	0.60
L	0.85	1.15
S	2.40	2.80
All Dimension in mm		



## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V <sub>DS</sub>	50	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current, <sup>3</sup> V <sub>GS</sub> @4.5V	I <sub>D</sub> @T <sub>A</sub> =25 °C	640	mA
Continuous Drain Current, <sup>3</sup> V <sub>GS</sub> @4.5V	I <sub>D</sub> @T <sub>A</sub> =70 °C	500	mA
Pulsed Drain Current <sup>1,2</sup>	I <sub>DM</sub>	950	mA
Total Power Dissipation	P <sub>D</sub> @T <sub>A</sub> =25 °C	1.38	W
Linear Derating Factor		0.01	W/°C
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C

## Thermal Data

Parameter	Symbol	Ratings	Unit
Thermal Resistance Junction-ambient <sup>3</sup>	R <sub>thj-a</sub>	90	°C/W

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## Electrical Characteristics( T<sub>j</sub>=25°C Unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	50	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA
Breakdown Voltage Temp. Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.06	-	V/°C	Reference to 25°C, I <sub>D</sub> =1mA
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	-	2.0	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =1mA
Gate-Source Leakage Current	I <sub>GSS</sub>	-	-	±10	nA	V <sub>GS</sub> =±20V
Drain-Source Leakage Current (T <sub>j</sub> =25°C)	I <sub>DSS</sub>	-	-	1	uA	V <sub>DS</sub> =50V, V <sub>GS</sub> =0
Drain-Source Leakage Current (T <sub>j</sub> =70°C)		-	-	100	uA	V <sub>DS</sub> =40V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	-	-	2	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A
		-	-	4		V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.4A
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	1	1.6	nC	I <sub>D</sub> =0.6A V <sub>DS</sub> =50V V <sub>GS</sub> =4.5V
Gate-Source Charge	Q <sub>gs</sub>	-	0.5	-		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>	-	0.5	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(ON)</sub>	-	12	-	nS	V <sub>DD</sub> =30V I <sub>D</sub> =0.6A V <sub>GS</sub> =10V R <sub>G</sub> =3.3Ω R <sub>D</sub> =52Ω
Rise Time	T <sub>r</sub>	-	10	-		
Turn-off Delay Time	T <sub>d(OFF)</sub>	-	56	-		
Fall Time	T <sub>f</sub>	-	29	-		
Input Capacitance	C <sub>iss</sub>	-	32	50	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =25V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	8	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	6	-		
Forward Transconductance	G <sub>fs</sub>	-	600	-	mS	V <sub>DS</sub> =10V, I <sub>D</sub> =0.6A

## Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Forward On Voltage <sup>2</sup>	V <sub>SD</sub>	-	-	1.2	V	I <sub>S</sub> =0.2A, V <sub>GS</sub> =0V.

Notes: 1.Pulse width limited by Max. junction temperature.

2.Pulse width ≤300us, dutycycle≤2%.

3.Surface mounted on 1 inch<sup>2</sup> copper pad of FR4 board; 270°C/W when mounted on Min. copper pad.

### Characteristics Curve

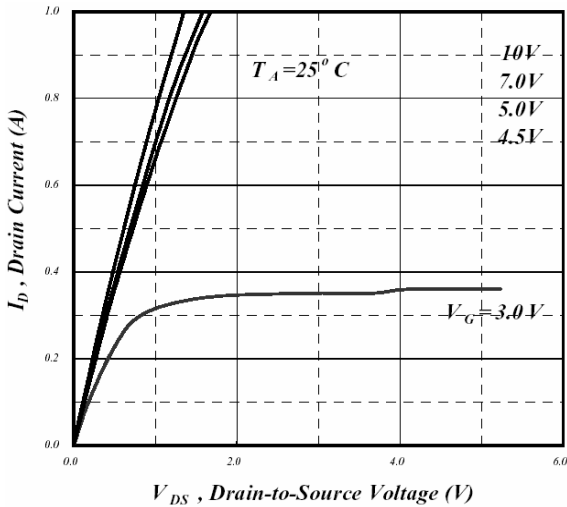


Fig 1. Typical Output Characteristics

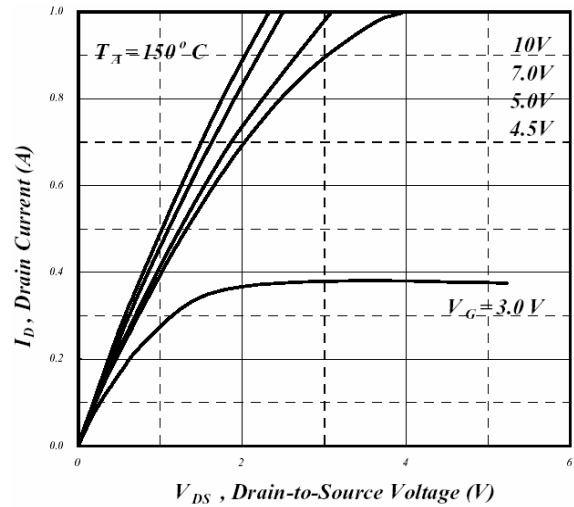


Fig 2. Typical Output Characteristics

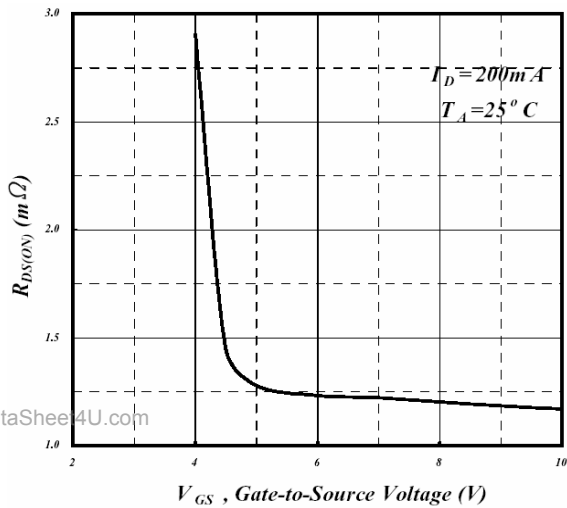


Fig 3. On-Resistance v.s. Gate Voltage

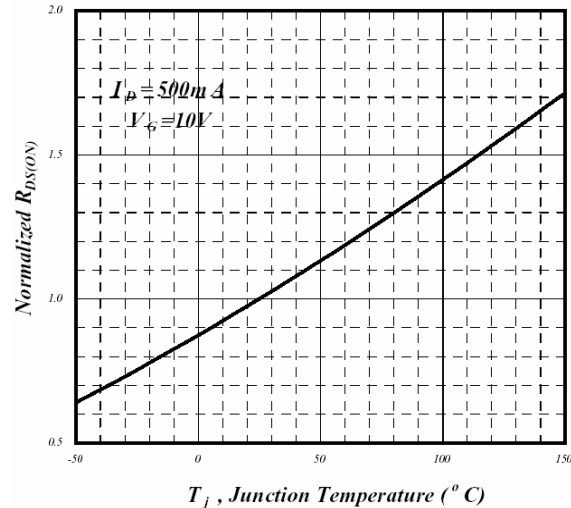


Fig 4. Normalized On-Resistance v.s. Junction Temperature

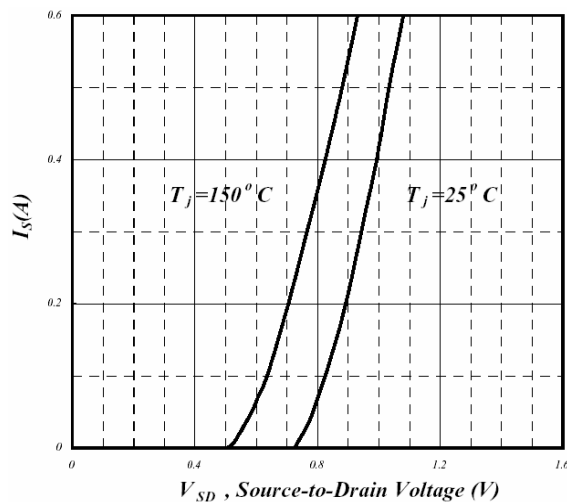


Fig 5. Forward Characteristics of Reverse Diode

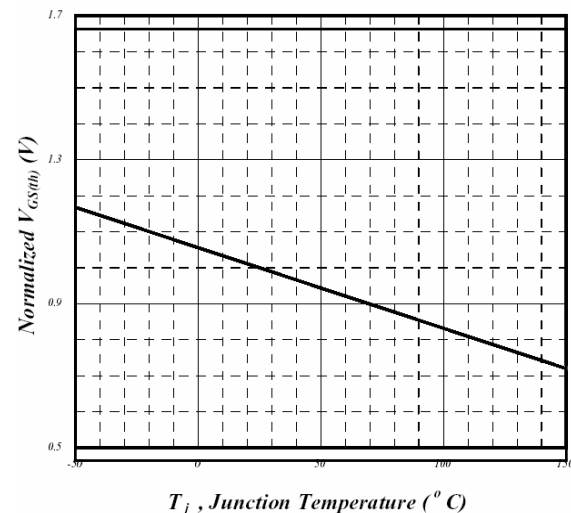


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

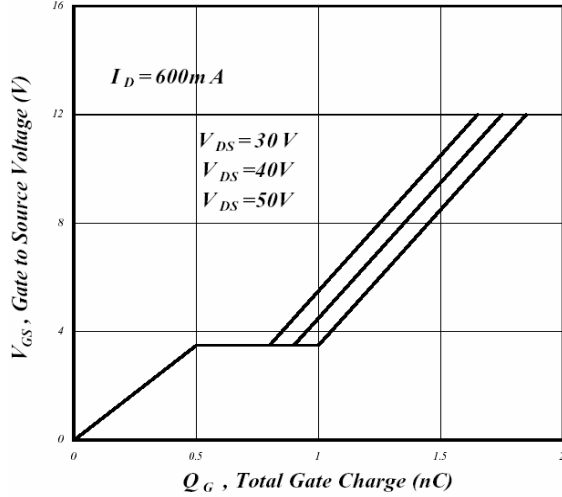


Fig 7. Gate Charge Characteristics

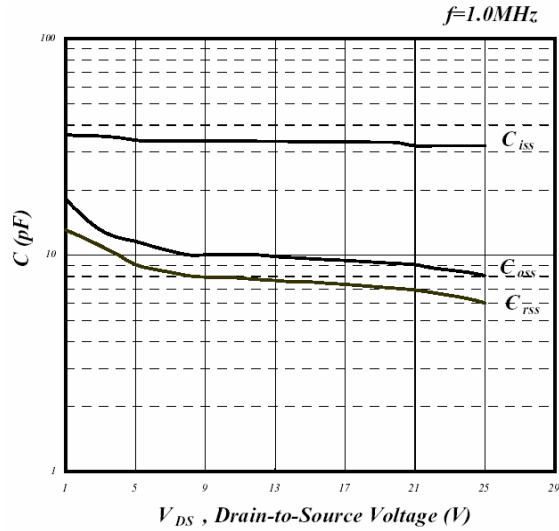


Fig 8. Typical Capacitance Characteristics

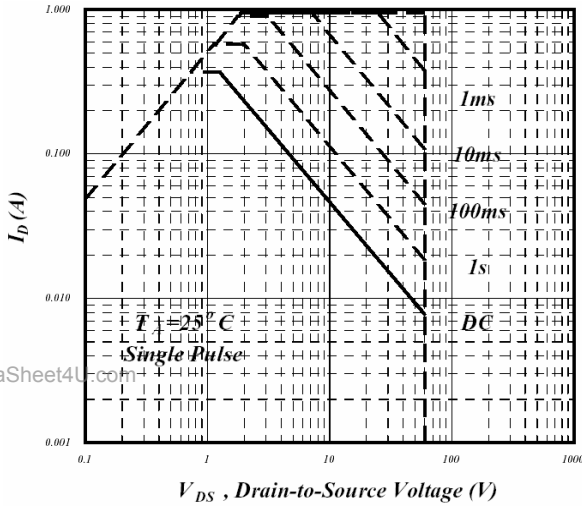


Fig 9. Maximum Safe Operating Area

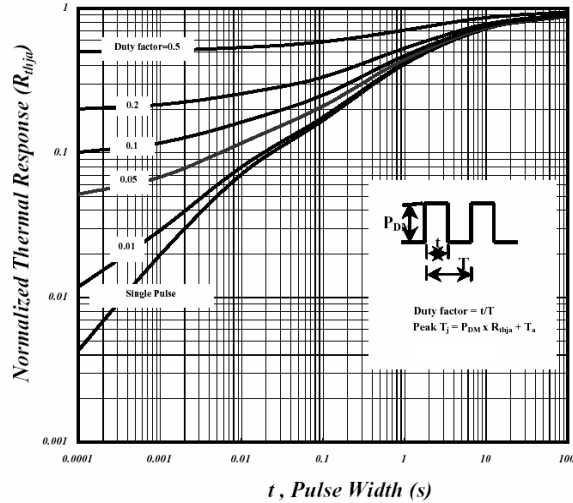


Fig 10. Effective Transient Thermal Impedance

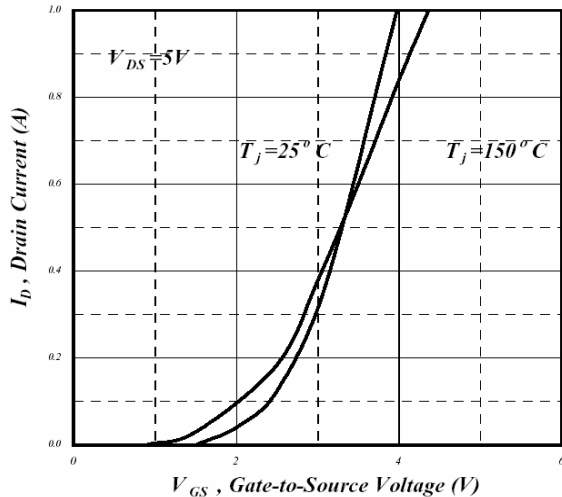


Fig 11. Transfer Characteristics

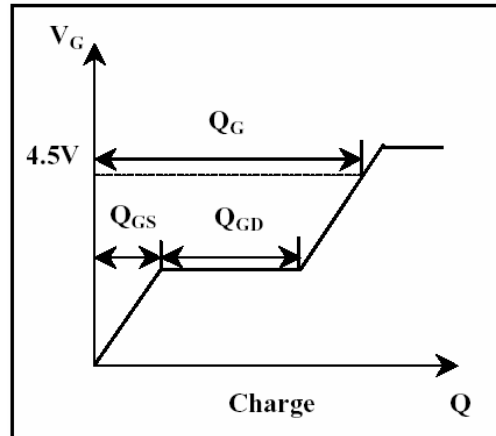


Fig 12. Gate Charge Waveform