

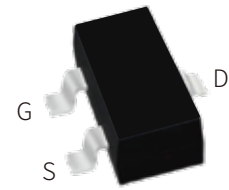
## FEATURES

|  $V_{DS}=30V, R_{DS(ON)} \leq 63m\Omega @ V_{GS}=4.5V, I_D=3.4A$

| For PWM application

| For Load switch application

| Surface Mount device



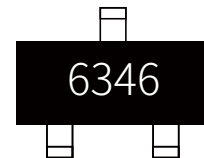
SOT-23

## APPLICATION

| Case: SOT-23

| Case Material: Molded Plastic. UL flammability

| Classification Rating: 94V-0

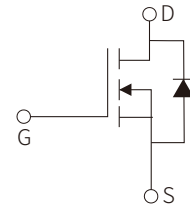


Marking

## APPROVALS

**RoHS** Compliance with 2011/65/EU

**HF** Compliance with IEC61249-2-21:2003




Schematic Symbol

## ABSOLUTE MAXIMUM RATINGS( $T_a=25^\circ C$ )

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Drain Current-Continuous	$I_D$	3.4	A
Drain Current-Continuous	$I_D$	2.7	A
Pulsed Drain Voltage	$I_{DM}$	17	A
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Total Power Dissipation	$P_D$	1.3	W
Total Power Dissipation	$P_D$	0.8	W
Linear Derating Factor		0.01	W/°C
Thermal Resistance.Junction- to-Ambient (Note.1)	$R_{thJA}$	100	°C/W
		99	°C/W
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C

Note.1: Surface mounted on 1 in square Cu board

## ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C)

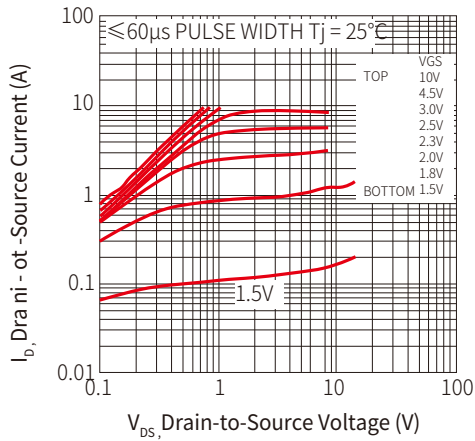
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS} / \Delta T_j$	Reference to 25, I <sub>D</sub> =1mA		0.02		V/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V			1.0	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>j</sub> =125°C			150	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =10μA	0.5	0.8	1.1	V
Static Drain-Source On-Resistance(Note1)	R <sub>DS(on)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.4A		46	63	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =2.7A		59	80	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =3.4A	9.5			S
Gate resistance	R <sub>g</sub>			3.9		Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, f=1.0MHz		270		pF
Output Capacitance	C <sub>oss</sub>			32		
Reverse Transfer Capacitance	C <sub>rss</sub>			21		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> =4.5V, R <sub>g</sub> =6.8Ω V <sub>DS</sub> =15V, I <sub>D</sub> =1.0A		3.3		ns
Turn-On Rise Time	t <sub>r</sub>			4.0		
Turn-Off Delay Time	t <sub>d(off)</sub>			12		
Turn-Off Fall Time	t <sub>f</sub>			4.9		
Diode forward voltage	V <sub>SD</sub>	I <sub>S</sub> =3.4A, V <sub>GS</sub> =0V, T <sub>j</sub> =25°C			1.2	V
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =3.4A		2.9		nC
Gate Source Charge	Q <sub>gs</sub>			0.13		
Gate Drain Charge	Q <sub>gd</sub>			1.1		
Diode forward current(Body Diode)	I <sub>S</sub>	MOSFET symbol showing the integral rever p-n junction diod 			1.3	A
Pulsed Source Current(Body Diode)	I <sub>SM</sub>				17	A
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =1.3A, V <sub>R</sub> =24V dI/dt=100A/μs, T <sub>j</sub> =25°C, (Note.1)		8.8	13	ns
Reverse Recovery Charge	Q <sub>rr</sub>			2.7	4.1	nC

Note.1: Pulse test ; Pulse width ≤400μs, Duty cycle ≤ 2%

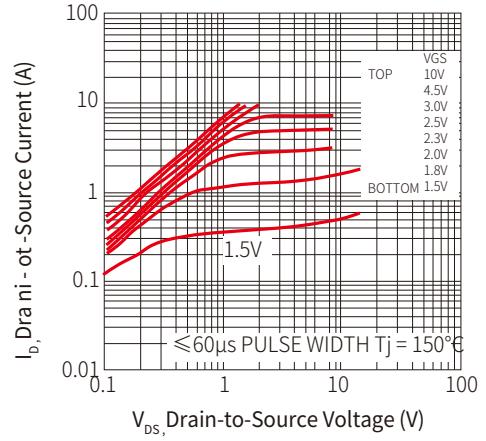
Note.2: Repetitive rating; pulse width limited by max. junction temperature.

# PARAMETER CHARACTERISTIC CURVE

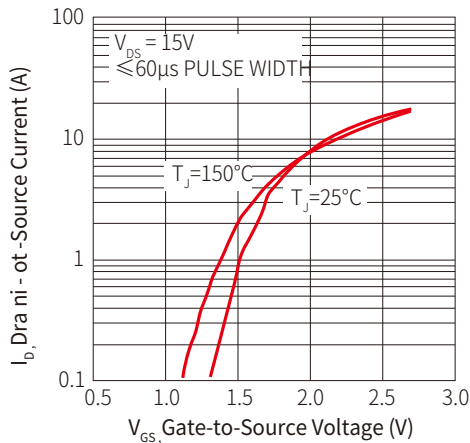
**Fig 1: Typical Output Characteristics**



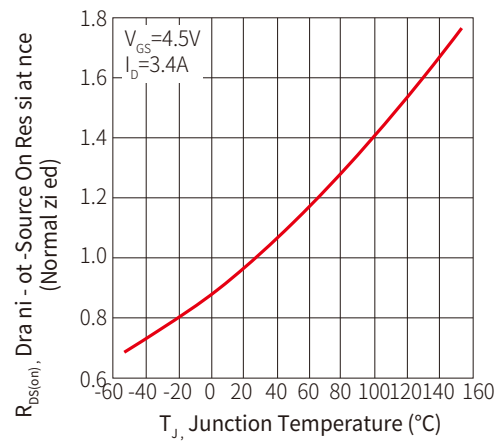
**Figure 2: Typical Output Characteristics**



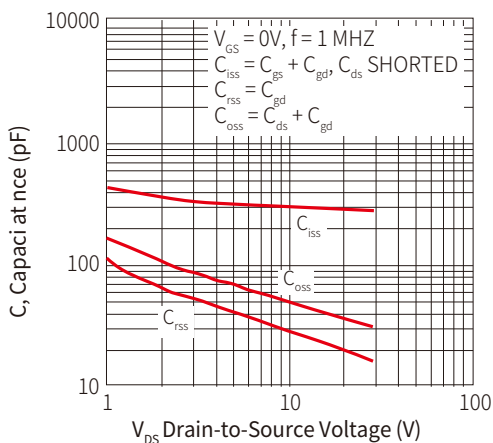
**Figure 3: Typical Transfer Characteristics**



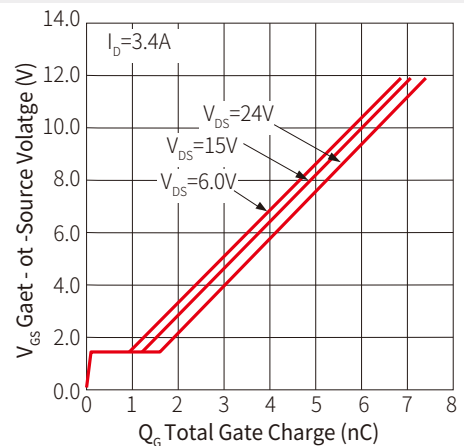
**Figure 4: Normalized On-Resistance Vs. Temperature**



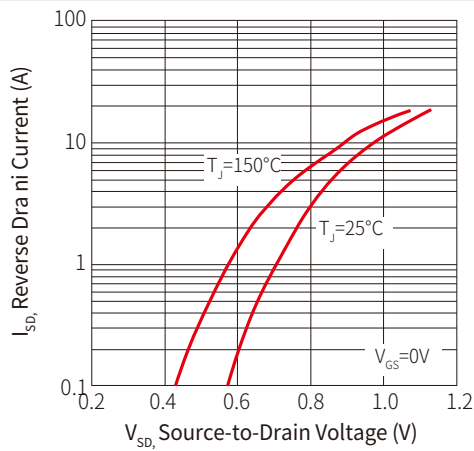
**Figure 5: Typical Capacitance Vs. Drain-to-Source Voltage**



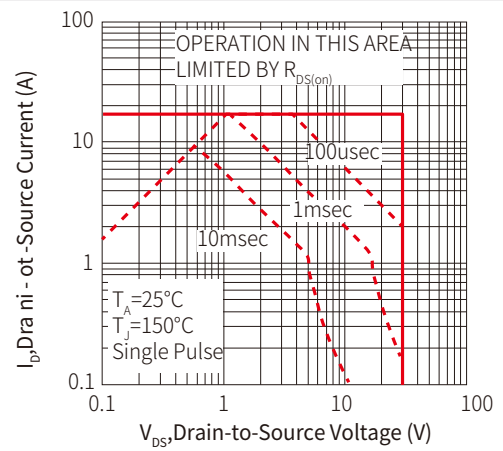
**Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage**



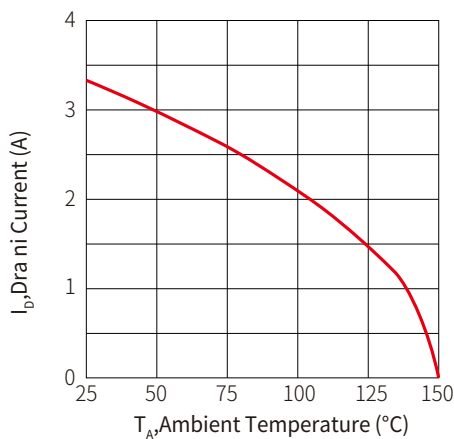
**Figure 7: Typical Source-Drain Diode Forward Voltage**



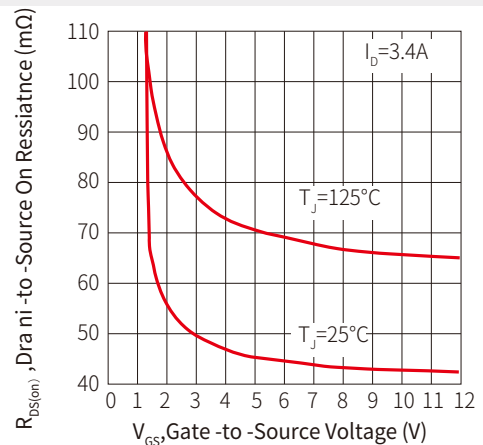
**Figure 8: Maximum Safe Operating Area**



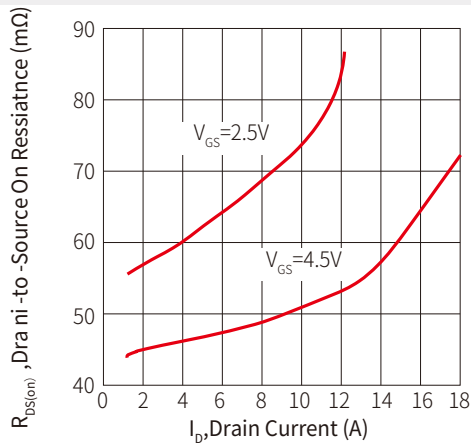
**Figure 9: Maximum Drain Current Vs. Ambient Temperature**



**Figure 10: Typical On-Resistance Vs. Gate Voltage**



**Figure 11: Typical On-Resistance Vs. Drain Current**



**Figure 12: Typical Threshold Voltage Vs. Junction Temperature**

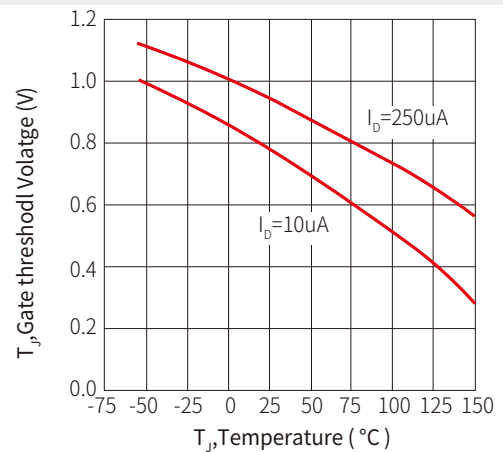


Figure 13: Typical Power Vs. Time

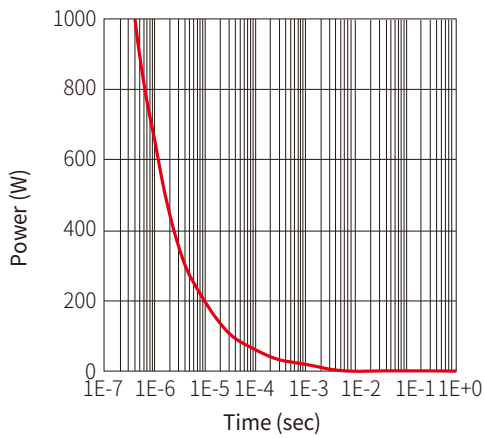


Figure 14: Typical Effective Transient Thermal Impedance, Junction-to-Ambient

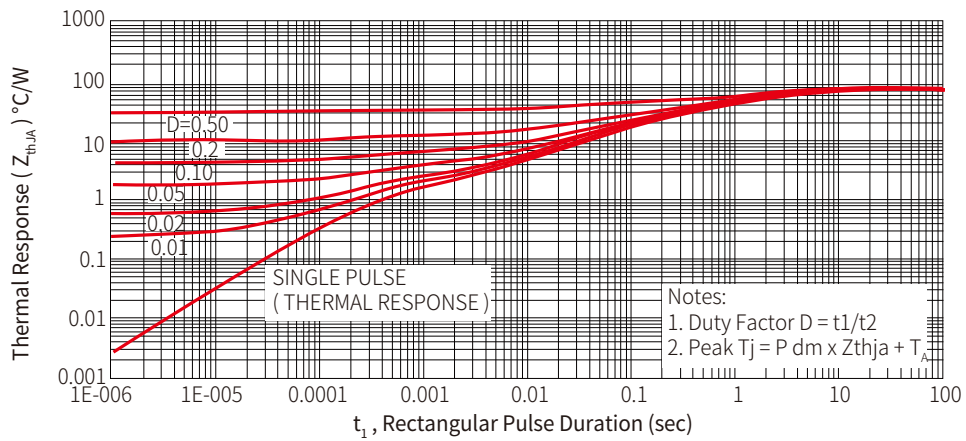
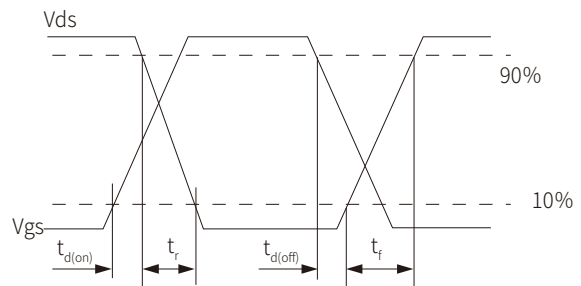
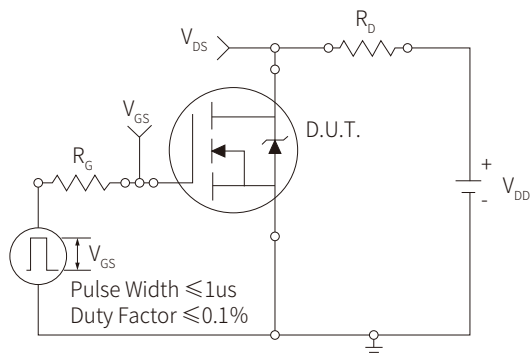
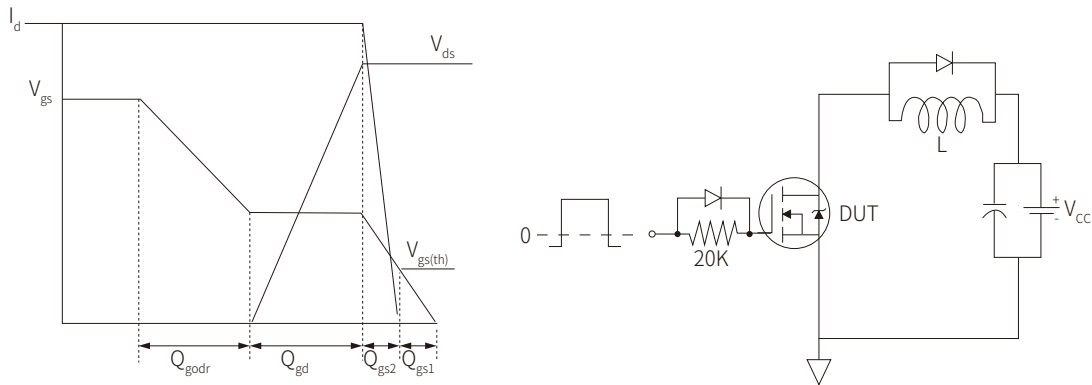


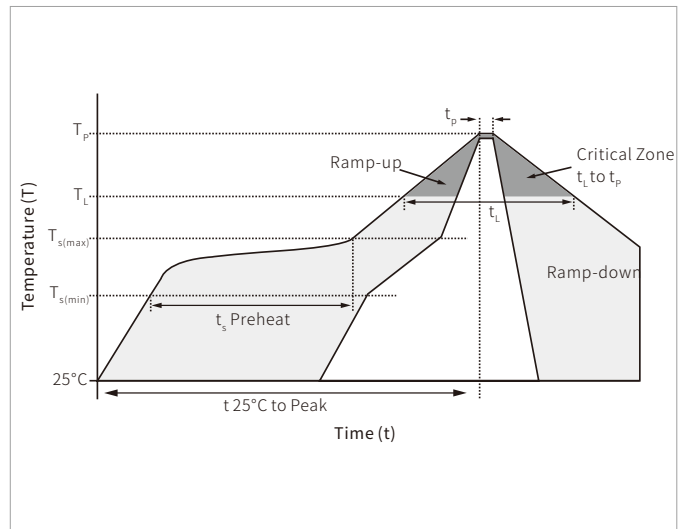
Figure 15: Switching Time Test Circuit & Waveforms



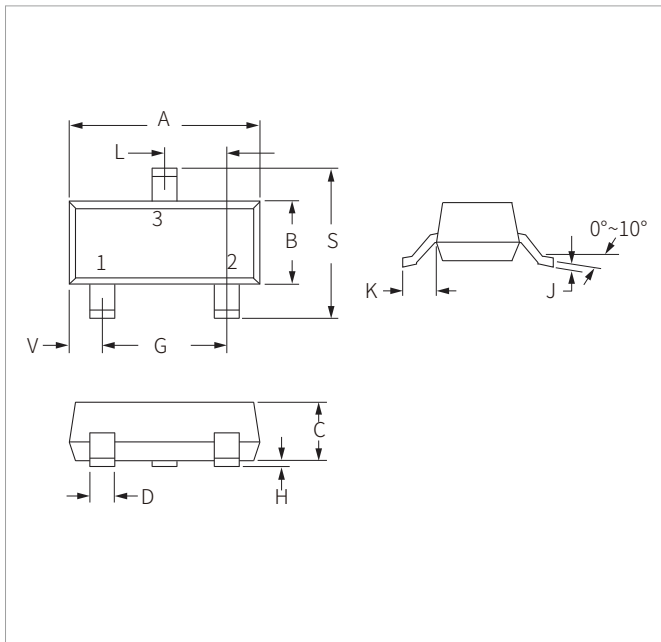
**Figure 16: Basic Gate Charge Waveform & Test Circuit**


## SOLDERING PARAMETERS

Reflow Condition		Lead-free assembly
Pre Heat	Temperature Max ( $T_{s(min)}$ )	150°C
	Temperature Max ( $T_{s(max)}$ )	200°C
	Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	Temperature ( $T_L$ ) (Liquidus)	217°C
	Time (min to max) ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260°C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes max.
Do not exceed		260°C

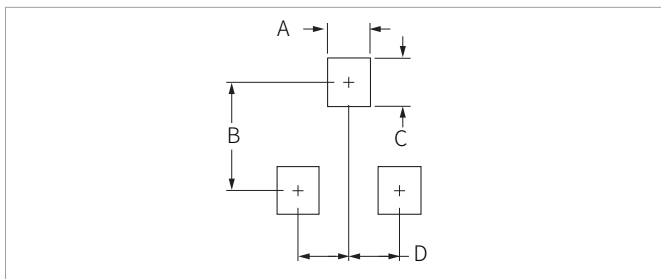


## SOT-23 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.80	3.05	0.110	0.120
B	1.20	1.40	0.047	0.055
C	0.90	1.15	0.035	0.045
D	0.37	0.50	0.015	0.020
G	1.75	2.05	0.069	0.081
H	0.01	0.100	0.001	0.004
J	0.085	0.180	0.003	0.007
K	0.35	0.69	0.014	0.029
L	0.89	1.02	0.035	0.040
S	2.10	2.65	0.083	0.104
V	0.45	0.60	0.018	0.024

## RECOMMENDED PAD LAYOUT DIMENSIONS



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.71	0.97	0.028	0.038
B	1.88	2.13	0.074	0.084
C	0.71	0.97	0.028	0.038
D	0.81	1.07	0.032	0.042

## ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
SNM6346S	SOT-23	3000PCS	7"

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