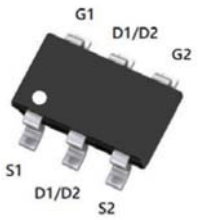
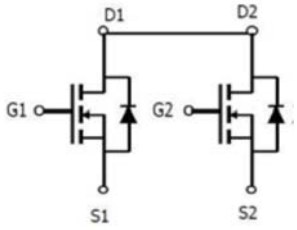
SG2015M

20V Common-Drain Dual N-Channel Power MOSFET

Parameter	Value	Unit
V_{DSS}	20	V
$R_{DS(ON)\ max.}$ V_{GS}=4.5V	23	mΩ
$R_{DS(ON)\ max.}$ V_{GS}=2.5V	30	mΩ
I_D	5.8	A
Q_g	6.4	nC
Q_{gd}	2	nC
Q_{SW}	2.6	nC

SOT-23-6L





Features

- Low On-Resistance
- Low Input Capacitance
- Low Miller Charge
- Fully Characterized Capacitance and Avalanche
- Pb-free lead plating; RoHS compliant

Application

- Battery protection

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SG2015M	Halogen-Free	SOT-23-6L	M	Tape & Reel	3,000

Absolute Maximum Ratings (T_J=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	V
Drain Current-Continuous Note 1	T_A=25°C	I_D	5.8	A
	T_A=70°C		4.6	A
Drain Current-Pulsed Note 2	T_A=25°C	I_{DM}	33.9	A
Avalanche Current		I_{AR}	3	A
Single Pulse Avalanche Energy Note 3		E_{AS}	0.45	mJ
Maximum Power Dissipation	T_A=25°C	P_D	1.1	W
	T_A=70°C		0.7	W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-to-Ambient Note 4	$R_{\theta JA}$	Steady State	-	-	106.7	°C/W
Thermal resistance, Junction-to-Case Note 4	$R_{\theta JC}$	Steady State	-	-	44.83	°C/W

Notes:

1. Limited by silicon chip capability and junction-to-ambient thermal resistance.
2. Must be ensure junction temperature does not exceed 150-degree C. (Pulse Width≦100uS, Duty≦2%)
3. Limited by T_{Jmax}, starting T_J=25°C, L=0.1mH, R_g=25Ω, I_D=3A, V_{GS}=10V.
4. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 in still air.

Electrical Characteristics (T_J=25°C unless otherwise noted)

STATIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_{DS}=250μA	20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
		V_{DS}=20V, V_{GS}=0V, T_J=125°C	-	-	100	μA
Gate-Body Leakage	I_{GSS}	V_{GS}=±8V, V_{DS}=0V	-	-	±100	nA

STATIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_{DS}=250μA	0.5	0.7	1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_{DS}=4A	-	18	23	mΩ
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=2.5V, I_{DS}=3A	-	25	30	mΩ
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	3.6		Ω
Forward Transconductance	g_{fs}	V_{DS}=5V, I_{DS}=2A	-	6.8	-	S

DYNAMIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Capacitance	C_{iss}	V_{DS}=10V, V_{GS}=0V, f=1MHz	-	456	-	pF
Output Capacitance	C_{oss}	V_{DS}=10V, V_{GS}=0V, f=1MHz	-	97	-	pF
Reverse Transfer Capacitance	C_{rss}	V_{DS}=10V, V_{GS}=0V, f=1MHz	-	87	-	pF
Turn-On Delay Time	$T_{d(on)}$	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=4A, R_{GEN}=3Ω	-	8.6	-	ns
Rise Time	t_r	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=4A, R_{GEN}=3Ω	-	59.2	-	ns
Turn-Off Delay Time	$T_{d(off)}$	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=4A, R_{GEN}=3Ω	-	28.4	-	ns
Fall Time	t_f	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=4A, R_{GEN}=3Ω	-	6.8	-	ns

GATE CHARGE CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate to Source Gate Charge	Q_{gs}	V_{DD}=10V, I_D=5A, V_{GS}=0 to 4.5V	-	1.1	-	nC
Gate charge at threshold	$Q_{g(th)}$	V_{DD}=10V, I_D=5A, V_{GS}=0 to 4.5V	-	0.5	-	nC
Gate to Drain Charge	Q_{gd}	V_{DD}=10V, I_D=5A, V_{GS}=0 to 4.5V	-	2	-	nC
Switching charge	Q_{SW}	V_{DD}=10V, I_D=5A, V_{GS}=0 to 4.5V	-	2.6	-	nC
Gate charge total	Q_g	V_{DD}=10V, I_D=5A, V_{GS}=0 to 4.5V	-	6.4	-	nC
Gate plateau voltage	$V_{plateau}$	V_{DD}=10V, I_D=5A, V_{GS}=0 to 4.5V	-	1.9	-	V
Gate charge total, sync. FET (Q_g- Q_{gd})	$Q_{g(sync)}$	V_{DS}=0.1V, V_{GS}=0 to 4.5V	-	4.4	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Diode continuous forward current (Body Diode)	I_S	T_A=25°C	-	5.8		A
Diode pulse current (Body Diode)	I_{SM}	T_A=25°C	-	33.9		A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1A	-	0.75	1	V
Body Diode Reverse Recovery Time	t_{rr}	V_{DD}=16V, I_F=5A, di/dt=200A/μs	-	15.7	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}	V_{DD}=16V, I_F=5A, di/dt=200A/μs	-	7.7	-	nC

Typical Operating Characteristics

Fig.1 Output Characteristics

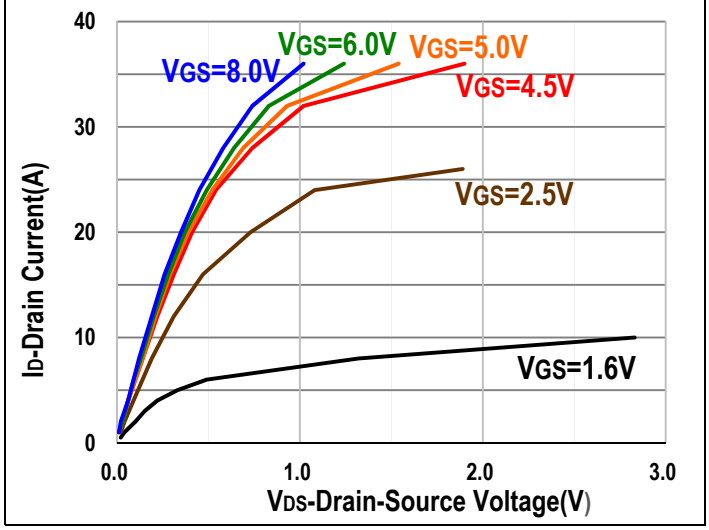


Fig.2 Gate Threshold Voltage Vs. Ta

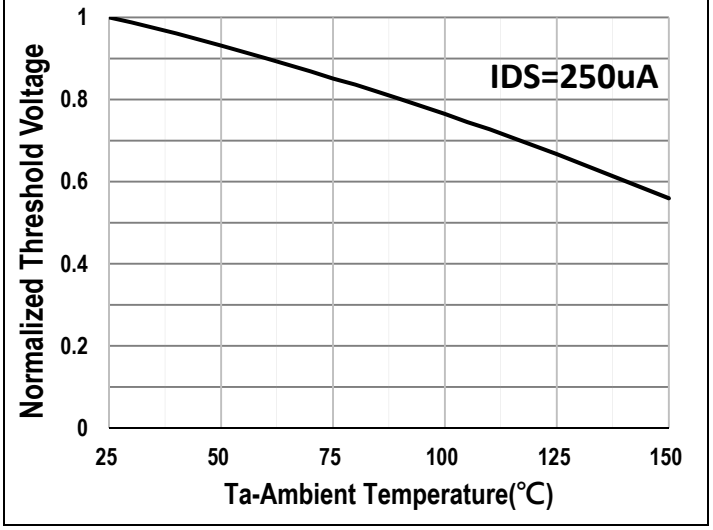


Fig.3 Drain-Source On Resistance

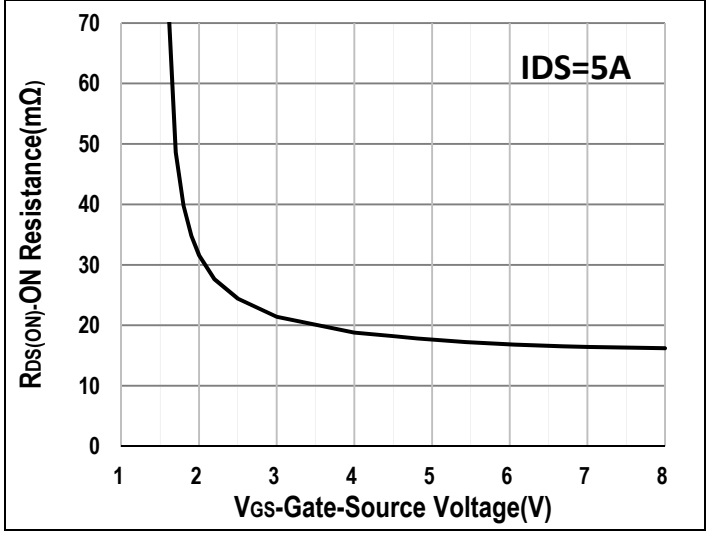


Fig.4 Normalized On Resistance Vs. Ta

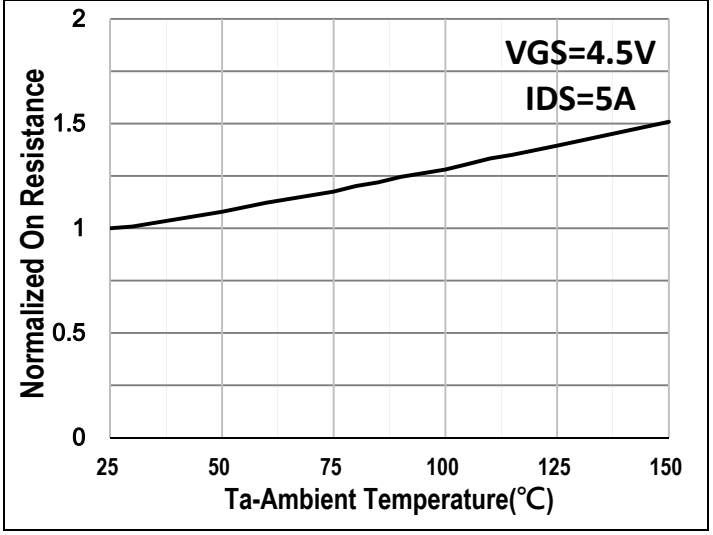


Fig.5 Drain-Source On Resistance

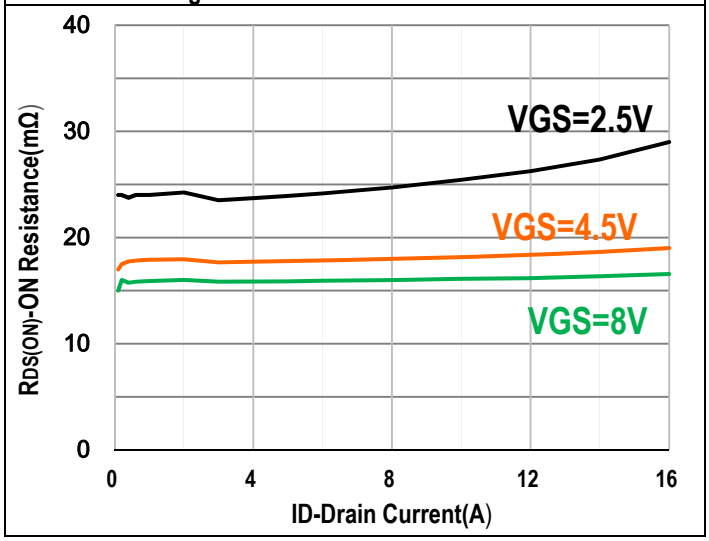
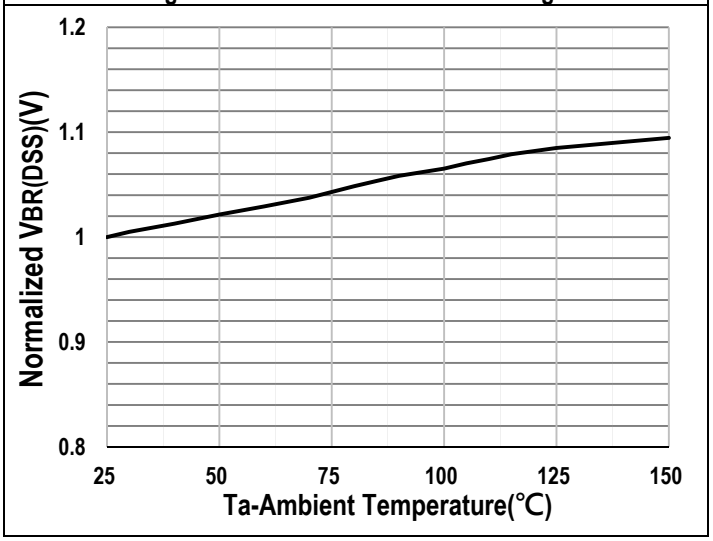


Fig.6 Drain-source Breakdown Voltage



Typical Operating Characteristics (Cont.)

Fig.7 Capacitance

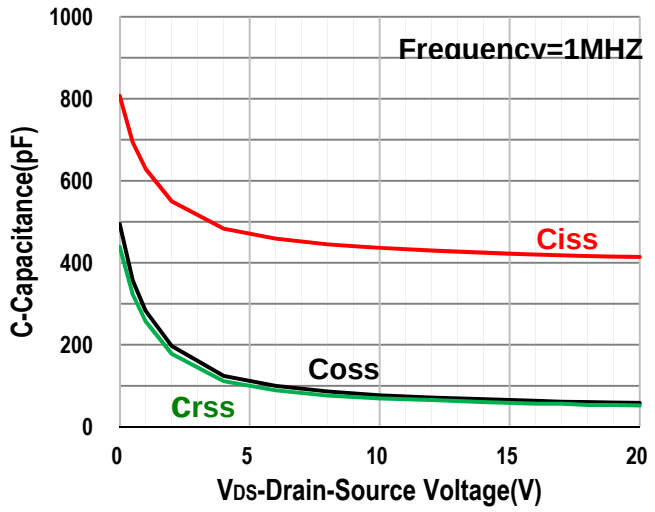


Fig.8 Gate Charge

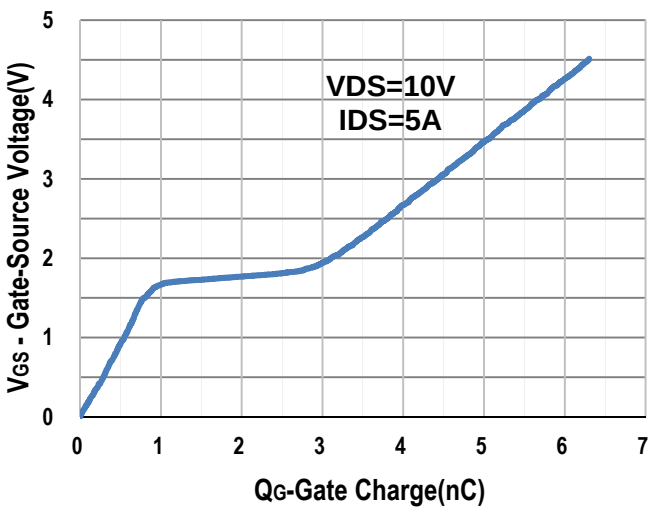


Fig.9 Power Dissipation Vs. TA

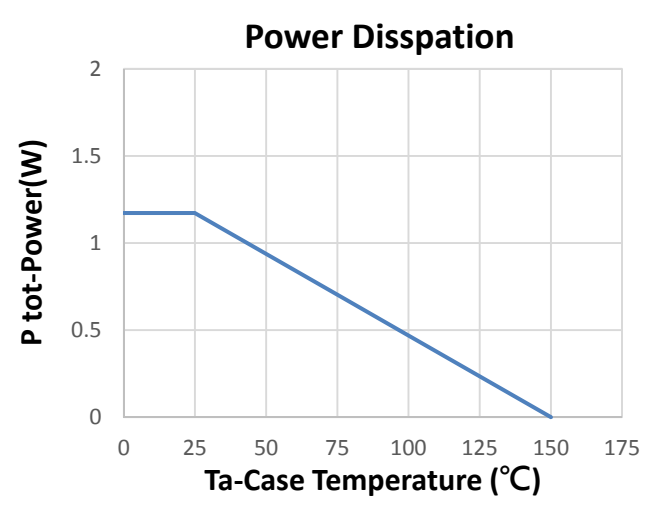


Fig.10 Drain Current Vs. TA

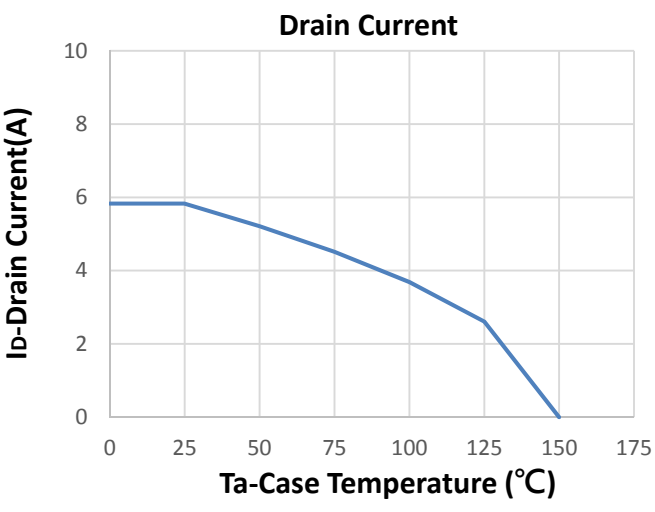


Fig.11 Safe Operation Area

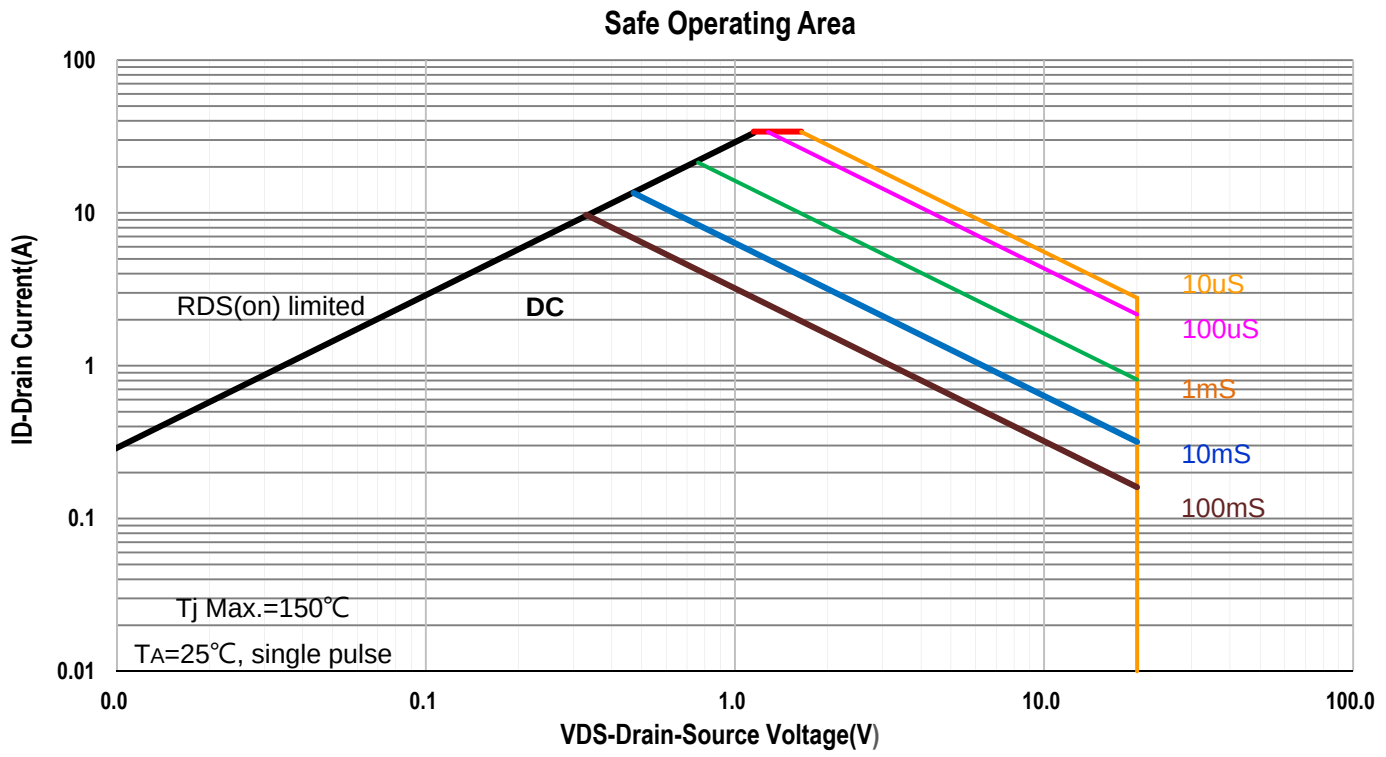
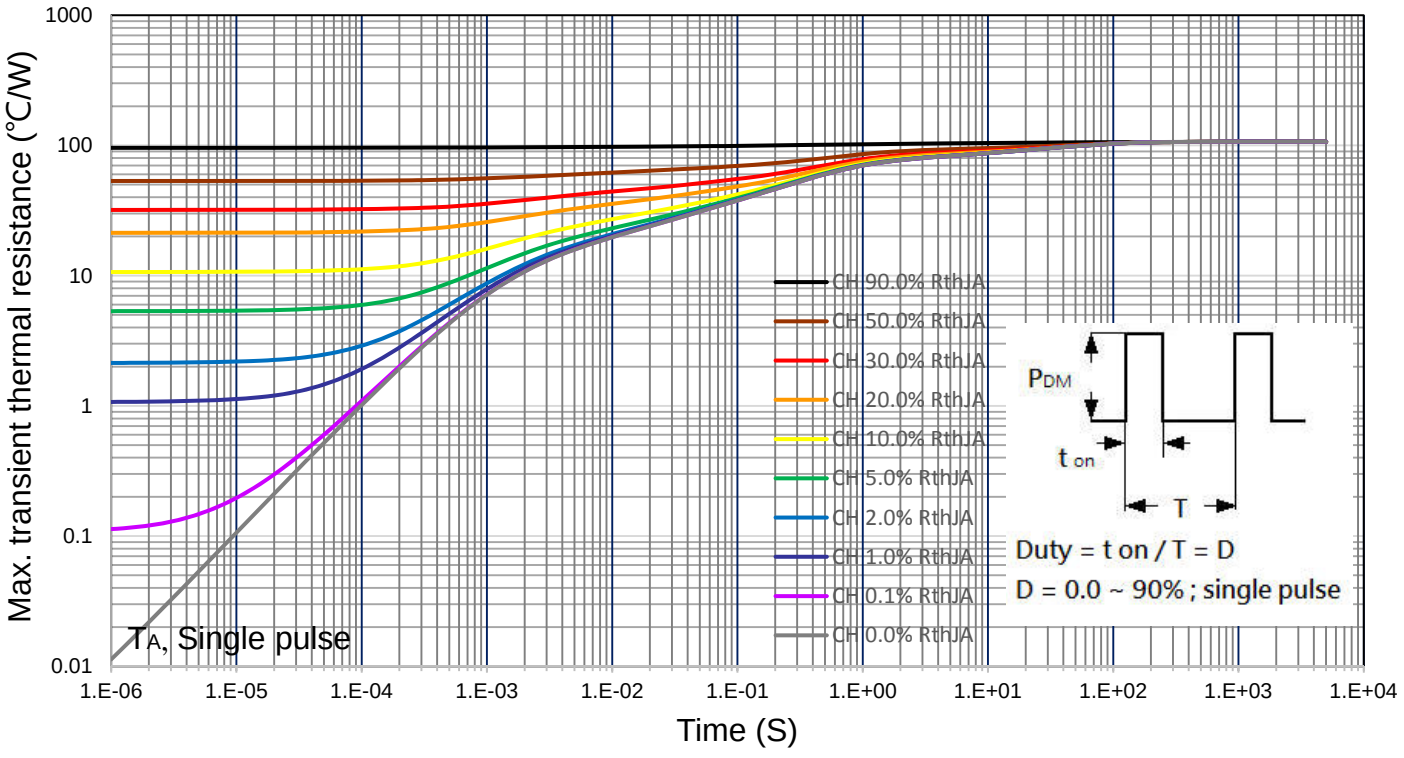
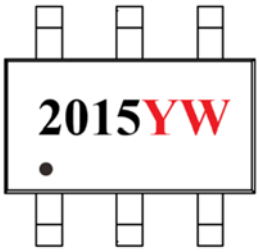


Fig.12 Transient Thermal Impedance



Marking Information

SOT-23-6L (M)	Marking Rule
Laser Marking  Diagram	Line 1： 2015YW SSSS：Product Code Y：Year Code W：Week Code

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