



WANSEMI
万芯半导体

WP0406

Enhancement Mode N+P-Channel Power MOSFET

SOT23-6/N+PMOS/40V/ \pm 20V/1.5V/4A/45.8m Ω

-40V/ \pm 20V/-1.75V/-4A/98.8m Ω

Rev0.6

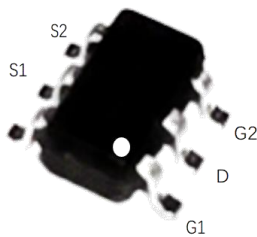
40V N+P-Channel MOSFET

1.Features

- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Fast switching
- ◆ Surface mount package

2.Applications

- ◆ Power Switching Application
- ◆ Load Switching
- ◆ BLDC Motor driver



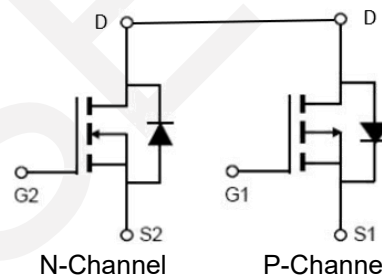
SOT23-6
Pin Description

◆ N-Channel

V_{DS}	$R_{DS(on)}$ Typ.	I_D
40V	45.8m Ω @ 10V	4A
	61.5m Ω @ 4.5V	

◆ P-Channel

V_{DS}	$R_{DS(on)}$ Typ.	I_D
-40V	98.8m Ω @ -10V	-4A
	138.5m Ω @ -4.5V	



Schematic Diagram

3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP0406	0406	SOT23-6	3,000	180,000

4.Absolute Max Ratings at Ta=25°C (Note1)

Parameter	Symbol	N-chanel	P-chanel	Units	
Drain to Source Voltage	V_{DSS}	40	-40	V	
Gate to Source Voltage	V_{GSS}	± 20	± 20	V	
Drain Current (DC),	TA=25 °C	I_D	-4	A	
	TA=70 °C	I_D	-2.8	A	
Drain Current (Pulse), PW \leq 300 μ s	I_{DM}	16	-16	A	
Avalanche Energy, Single Pulsed	E_{AS}	6.7	10.3	mJ	
Total Dissipation	TA=25 °C	P_D	0.6	0.6	W
Junction Temperature	T_j	150	150	°C	

Parameter	Symbol	N-channel	P-channel	Units
Storage Temperature	T_{stg}	-55 to +150	-55 to +150	°C

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

5. Thermal Resistance Ratings (Note 2)

Parameter	Symbol	Value	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	192	°C/W

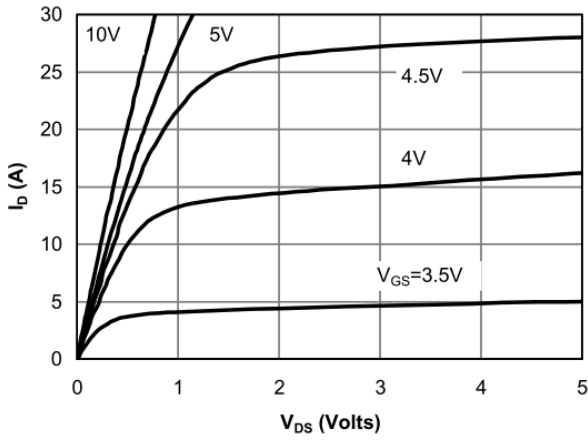
Note 2: When mounted on 1 inch square copper board $t \leq 10$ sec The value in any given application depends on the user's specific board design.

6. NMOS Electrical Characteristics at $T_a=25^\circ\text{C}$ (Note 3)

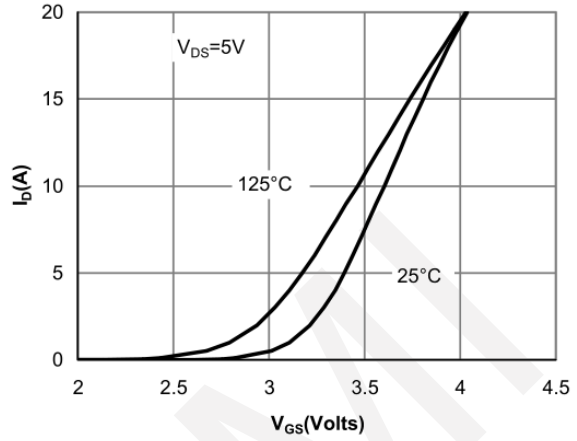
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	40	-	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu\text{A}$	1.0	1.5	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 3\text{A}, V_{GS} = 10\text{V}$	-	45.8	60	m Ω
		$I_D = 3\text{A}, V_{GS} = 4.5\text{V}$	-	61.5	81	m Ω
Input Capacitance	C_{iss}	$V_{GS}=0\text{V},$ $V_{DS}=15\text{V},$ Frequency=1.0MHz	-	371	-	pF
Output Capacitance	C_{oss}		-	170	-	pF
Reverse Transfer Capacitance	C_{rss}		-	58	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{V}$ $V_{GS} = 10\text{V}$ $R_{GEN} = 2.5\Omega$ $I_D = 4\text{A}$	-	6.8	-	ns
Rise Time	t_r		-	40.6	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	13.4	-	ns
Fall Time	t_f		-	2.7	-	ns
Total Gate Charge	Q_g	$V_{DS} = 20\text{V},$	-	5.1	-	nC
	Q_{gs}	$V_{GS} = 10\text{V},$	-	1.3	-	nC
	Q_{gd}	$I_D = 4\text{A}$	-	1.5	-	nC
Diode Forward Voltage	V_{FSD}	$I_S = 4\text{A}, V_{GS} = 0\text{V}$	-	0.85	1.2	V



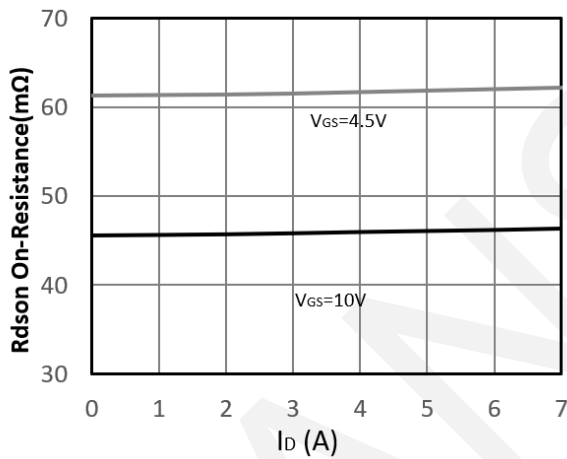
NMOS Typical electrical and thermal characteristics



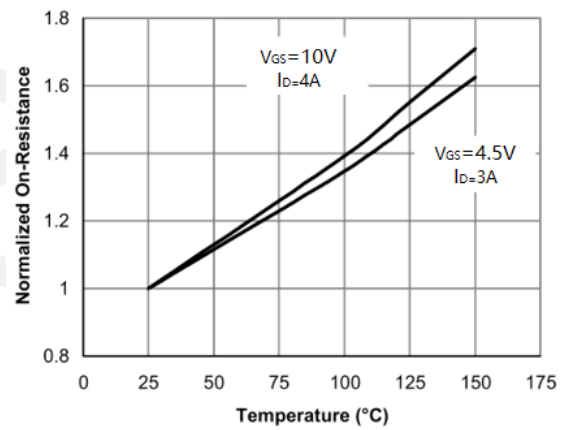
Output Characteristics



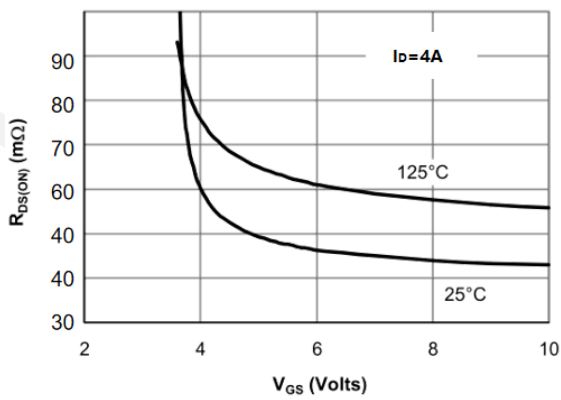
Transfer Characteristics



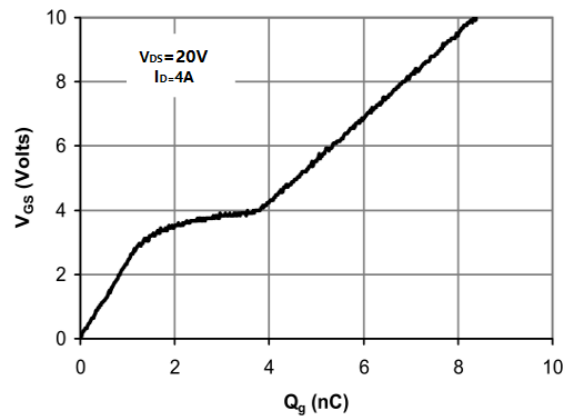
Drain-Source On-Resistance



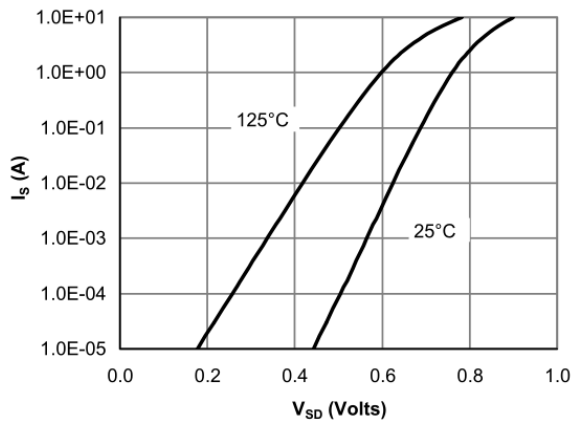
Drain-Source On-Resistance



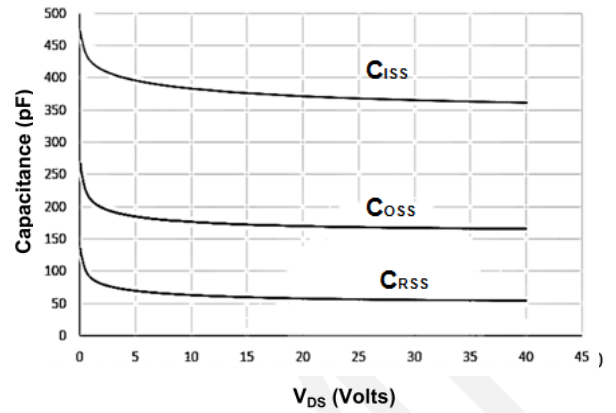
Rdson vs Vgs



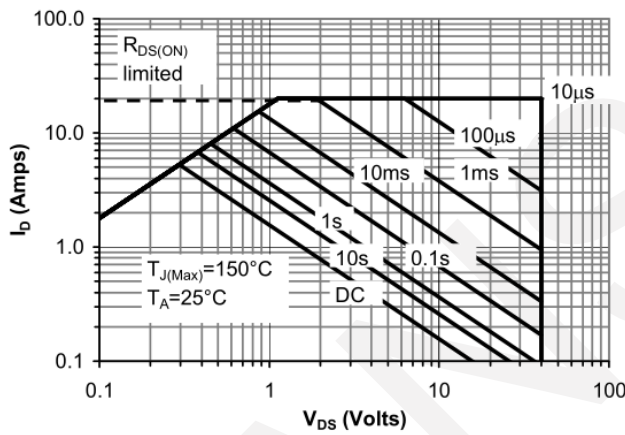
Gate Charge



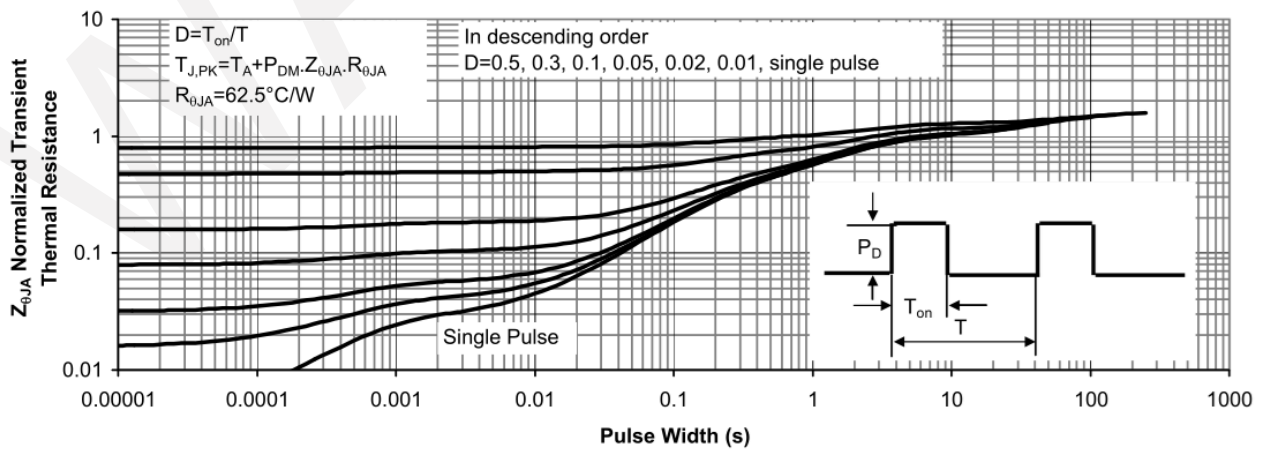
Source- Drain Diode Forward



Capacitance vs Vds



Safe Operating Area



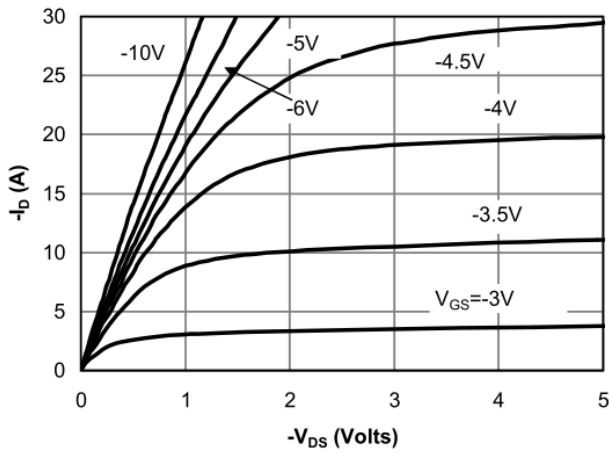
Normalized Maximum Transient Thermal Impedance

7.PMOS Electrical Characteristics at Ta=25°C(Note 3)

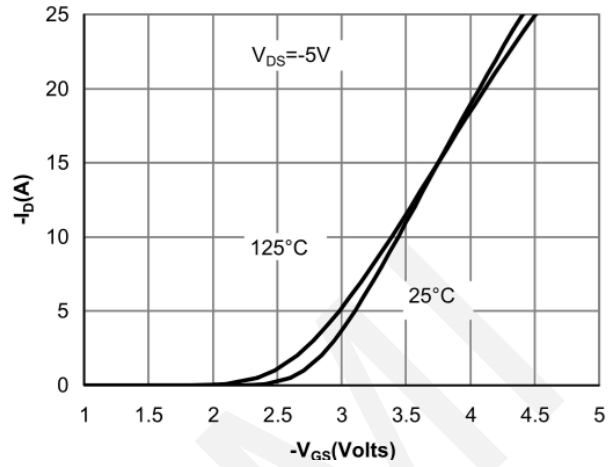
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -250\mu A, V_{GS} = 0V$	-40			V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40V, V_{GS} = 0V$			1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.0	-1.75	-2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = -3A, V_{GS} = -10V$		98.8	125	m Ω
		$I_D = -3A, V_{GS} = -4.5V$		138.5	170	m Ω
Input Capacitance	C_{iss}	$V_{GS}=0V,$ $V_{DS}=-15V,$ Frequency=1.0MHz		647	-	pF
Output Capacitance	C_{oss}			433	-	pF
Reverse Transfer Capacitance	C_{rss}			280	-	pF
Turn-ON Delay Time	$t_{d(on)}$			6.5	-	ns
Rise Time	t_r	$V_{DD} = -20V$ $I_D = -4A$		14	-	ns
Turn-OFF Delay Time	$t_{d(off)}$	$V_{GS} = -10V$		34	-	ns
Fall Time	t_f	$R_{GEN} = 2.5\Omega$		18	-	ns
Total Gate Charge	Q_g	$V_{DS} = -20V,$		13.5		nC
	Q_{gs}	$V_{GS} = -10V,$		1.5		nC
	Q_{gd}	$I_D = -4A$		1.8		nC
Diode Forward Voltage	V_{FSD}	$I_S = -4A, V_{GS} = 0V$		-0.9	-1.2	V

Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

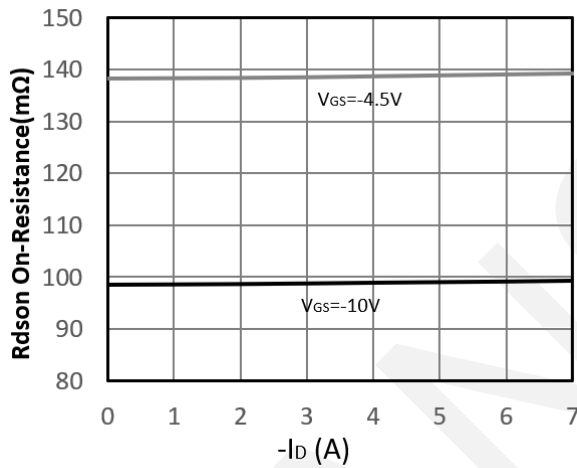
PMOS Typical electrical and thermal characteristics



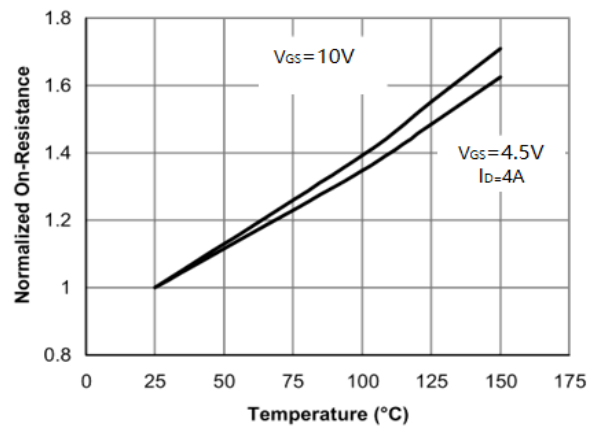
Output Characteristics



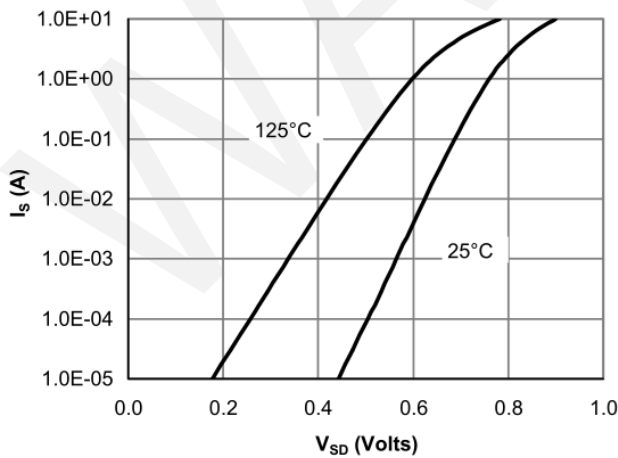
Transfer Characteristics



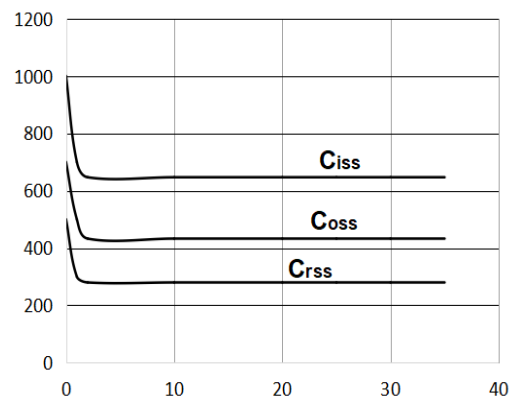
Rdson- Drain Current



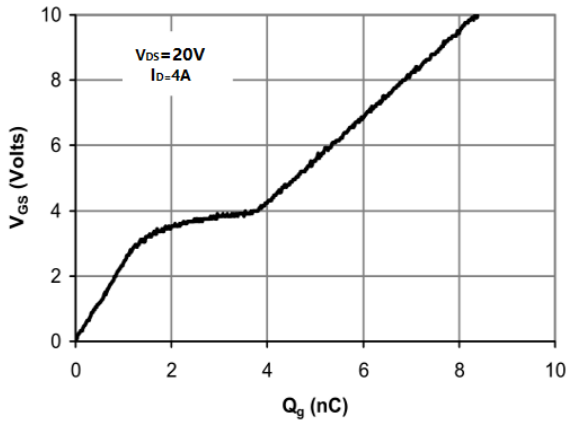
Rdson-Junction Temperature



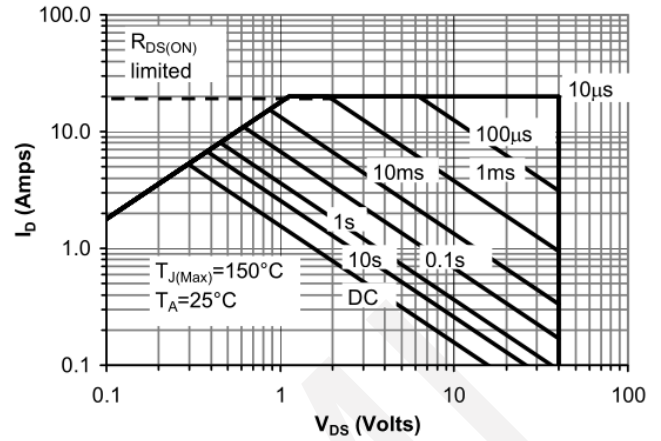
Source- Drain Diode Forward



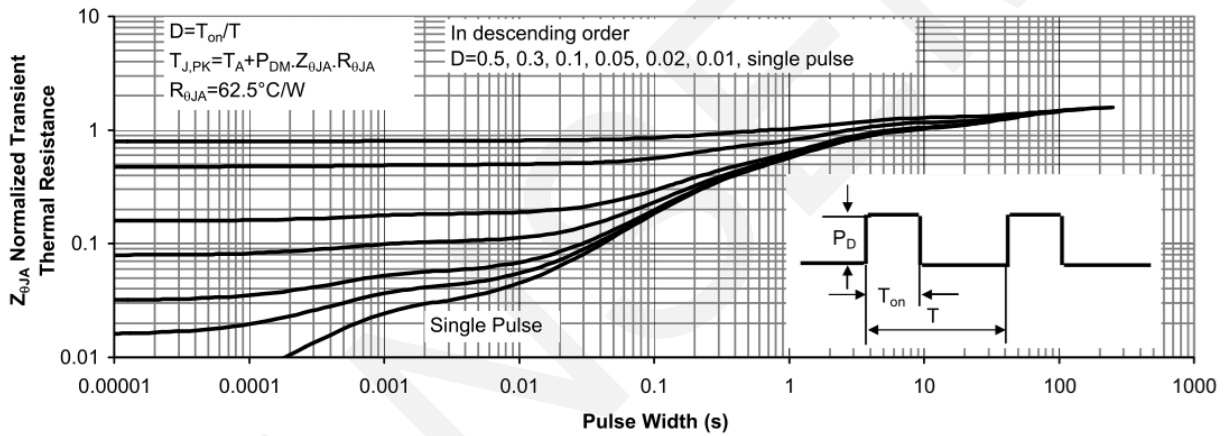
Capacitance vs V_{DS}



Gate-Charge



Safe Operation Area

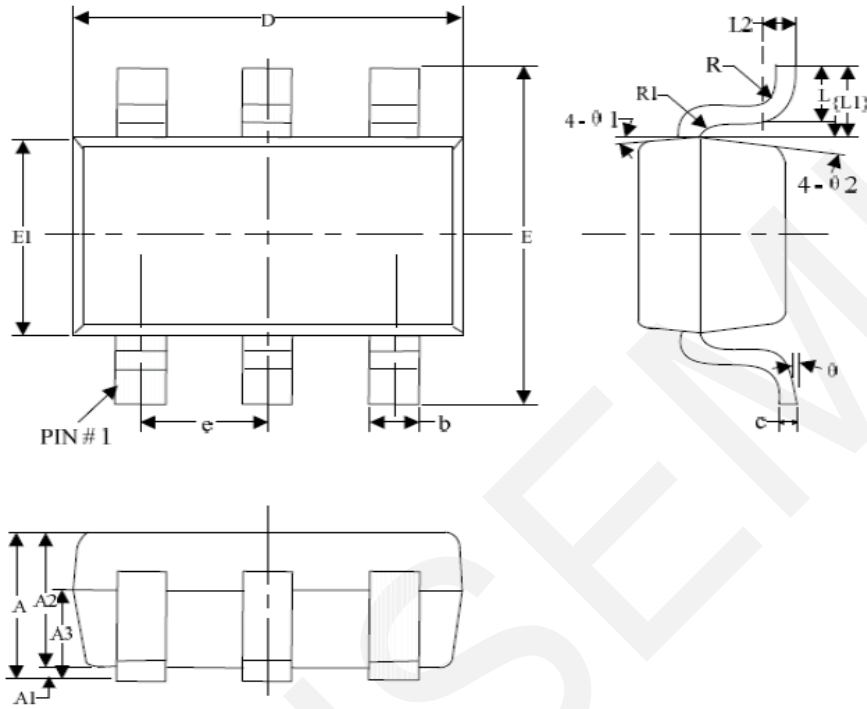


Normalized Maximum Transient Thermal Impedance



8.Package Dimensions

SOT23-6



Dimensions (unit: mm)

SYMBOL	MIN	NOM	MAX	SYMBOL	MIN	NOM	MAX
A	-	-	1.30	e	0.85	0.95	1.05
A1	0	-	0.15	L	0.35	0.45	0.60
A2	0.90	1.10	1.30	L1	0.59REF		
A3	0.60	0.65	0.70	L2	0.25BSC		
b	0.39	-	0.49	R	0.05	-	-
c	0.12	-	0.19	R1	0.05	-	0.02
D	2.85	2.95	3.15	θ	0°	-	8°
E	2.60	2.80	3.00	θ1	3°	5°	7°
E1	1.55	1.65	1.75	θ2	6°	8°	10°

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