



WANSEMI
万芯半导体

WP4012

Enhancement Mode N+P-Channel Power MOSFET

SOP8/N+PMOS/40V/ $\pm 20V$ /1.75V/10A/13.6m Ω

-40V/ $\pm 20V$ /-1.5V/-10A/13.6m Ω

Rev0.5

40V N+P-Channel MOSFET

1.Features

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

◆ N-Channel

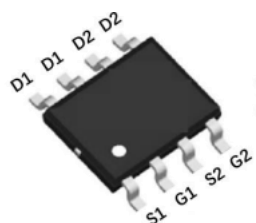
V_{DS}	$R_{DS(on)}$ Typ.	I_D
40V	13.6mΩ @ 10V	10A
	19mΩ @ 4.5V	

◆ P-Channel

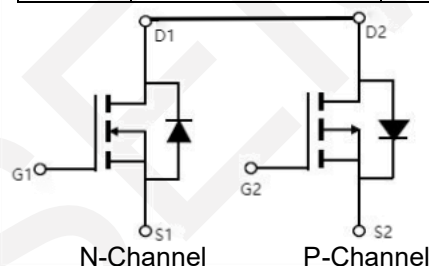
V_{DS}	$R_{DS(on)}$ Typ.	I_D
-40V	13.6mΩ @ -10V	-10A
	16.4mΩ @ -4.5V	

2.Applications

- ◆ Power Switching Application
- ◆ Load Switching



SOP8
Pin Description



Schematic Diagram

3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP4012	4012	SOP8	4,000	48,000

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

Parameter	Symbol	N-channel	P-channel	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	10	A
	TA=100 °C	I_D	6	A
Drain Current (Pulse), PW≤300μs	I_{DM}	40	-40	A
Total Dissipation	P_D	1.6	3.5	W
Junction Temperature	T_j	150	150	°C
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)

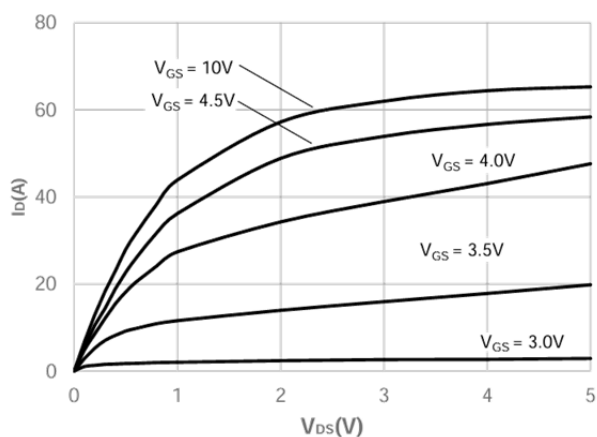
Parameter	Symbol	Value (N)	Value (P)	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	77	36	$^{\circ}\text{C/W}$

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

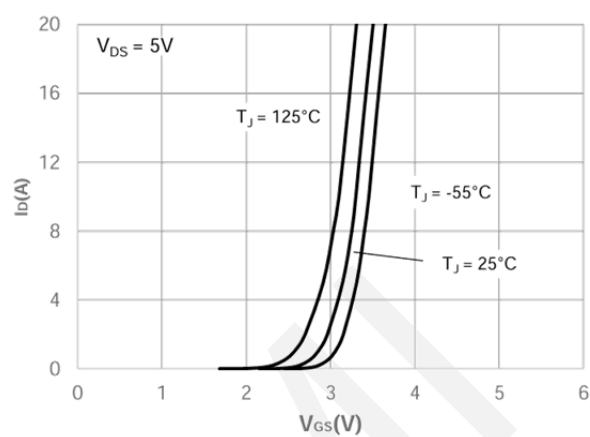
6.NMOS Electrical Characteristics at $T_a=25^{\circ}\text{C}$ (Note 3)

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	1.75	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 10\text{A}$, $V_{GS} = 10\text{V}$	-	13.6	18	$\text{m}\Omega$
		$I_D = 8\text{A}$, $V_{GS} = 4.5\text{V}$	-	19	26	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, Frequency=1.0MHz	-	1342	-	pF
Output Capacitance	C_{oss}		-	87	-	pF
Reverse Transfer Capacitance	C_{rss}		-	72	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{V}$ $V_{GS} = 10\text{V}$ $R_{GEN} = 3\Omega$ $I_D = 10\text{A}$	-	7	-	ns
Rise Time	t_r		-	11	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	26	-	ns
Fall Time	t_f		-	5	-	ns
Total Gate Charge	Q_g	$V_{DS} = 20\text{V}$, $V_{GS} = 0 \text{ to } 10\text{V}$, $I_D = 10\text{A}$	-	26	-	nC
	Q_{gs}		-	6	-	nC
	Q_{gd}		-	5	-	nC
Diode Forward Voltage	V_{FSD}	$I_S = 10\text{A}$, $V_{GS} = 0\text{V}$	-	-	1.2	V

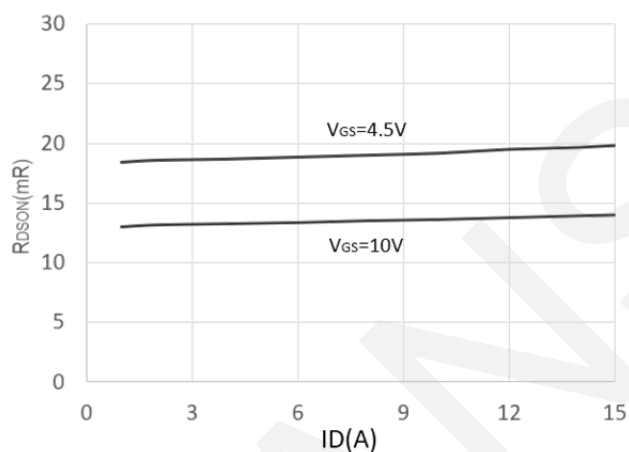
NMOS Typical electrical and thermal characteristics



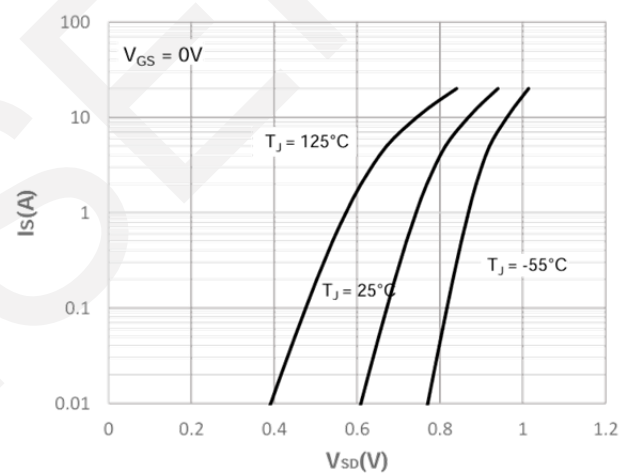
Output Characteristics



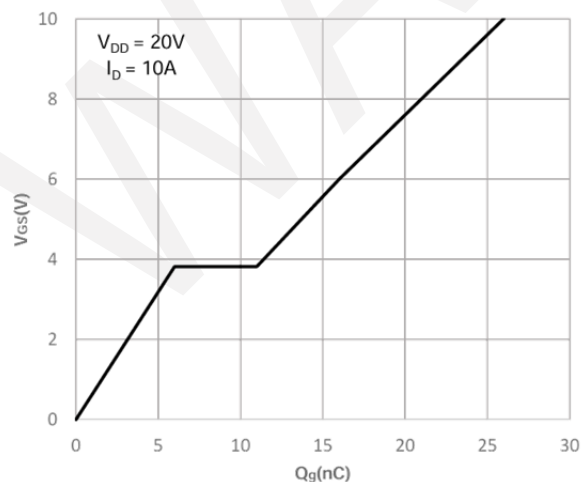
Transfer Characteristics



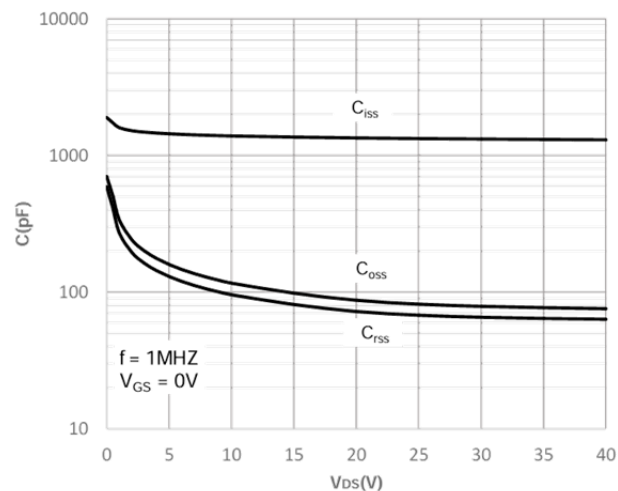
Drain-Source On-Resistance



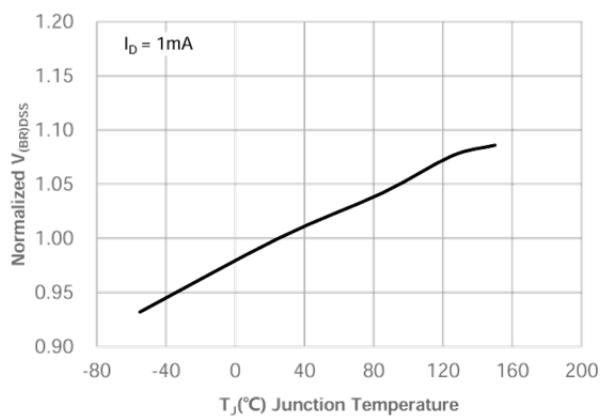
Body Diode Characteristics



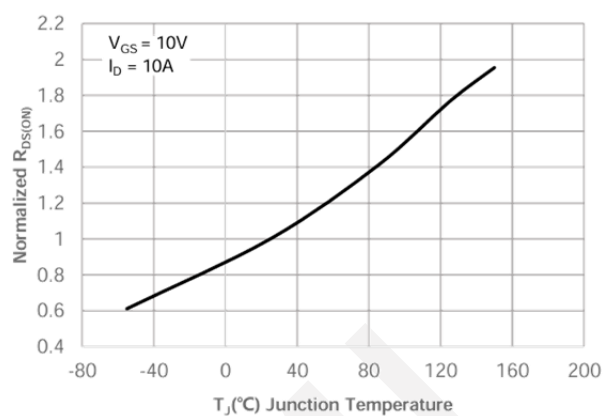
Gate Charge Characteristics



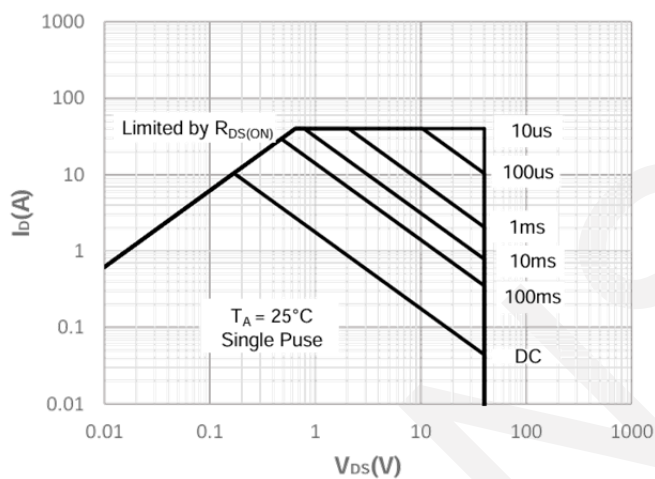
Capacitance Characteristics



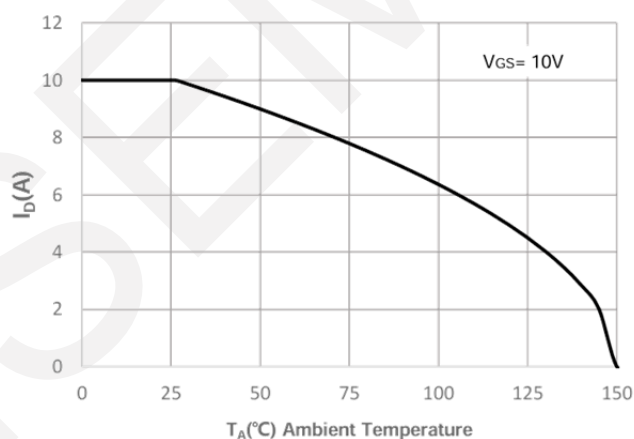
Normalized Breakdown voltage vs. Junction Temperature



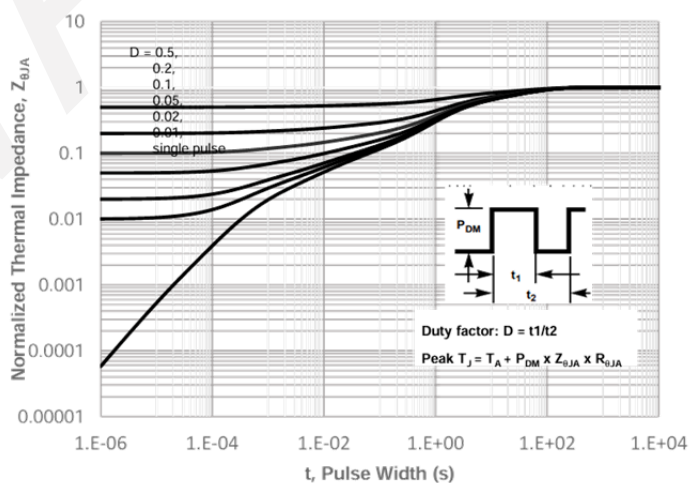
Normalized on Resistance vs. Junction Temperature



Maximum Safe Operating Area



Maximum Continuous Drain Current vs. Ambient Temperature



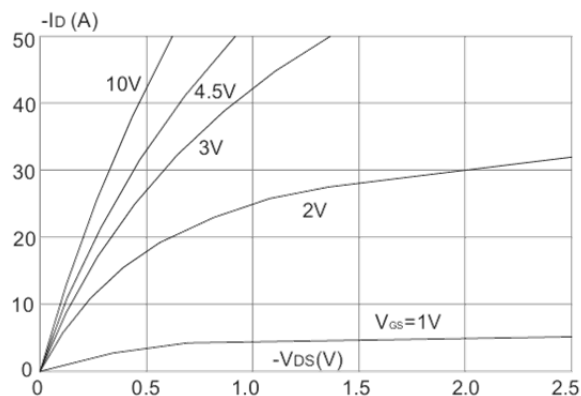
Normalized Maximum Transient Thermal Impedance

7.PMOS Electrical Characteristics at Ta=25°C

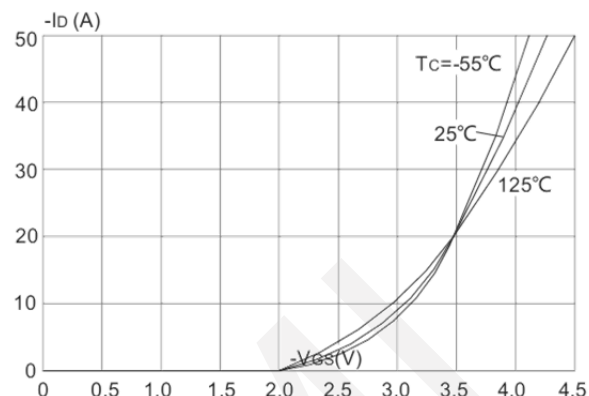
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -250\mu A, V_{GS} = 0V$	-40	-	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40V, V_{GS} = 0V$	-	-	1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.0	-1.5	-2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = -10A, V_{GS} = -10V$	-	13.6	17	m Ω
		$I_D = -8A, V_{GS} = -4.5V$	-	16.4	22	m Ω
Input Capacitance	C_{iss}	$V_{GS}=0V,$ $V_{DS}=-20V,$ Frequency=1.0MHz	-	3800	-	pF
Output Capacitance	C_{oss}		-	329	-	pF
Reverse Transfer Capacitance	C_{rss}		-	289	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = -20V$ $V_{GS} = -10V$ $R_{GEN}=2.5\Omega,$ $I_D=-10A,$	-	10	-	ns
Rise Time	t_r		-	21	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	53	-	ns
Fall Time	t_f		-	29	-	ns
Total Gate Charge	Q_g	$V_{DS} = -20V,$ $V_{GS} = -10V,$ $I_D = -10A$	-	42	-	nC
	Q_{gs}		-	7.3	-	nC
	Q_{gd}		-	8.5	-	nC
Diode Forward Voltage	V_{FSD}	$I_S = -10A, V_{GS} = 0V$	-	-	-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.

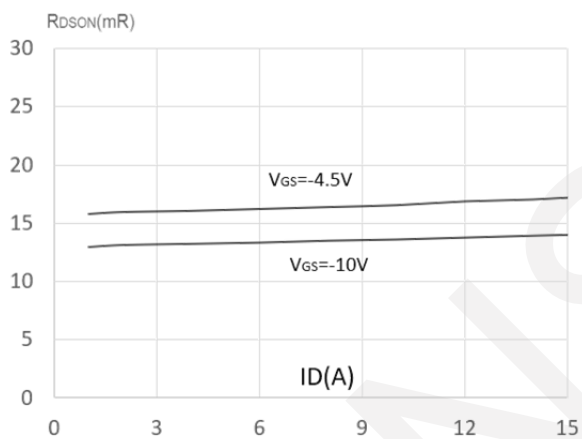
PMOS Typical electrical and thermal characteristics



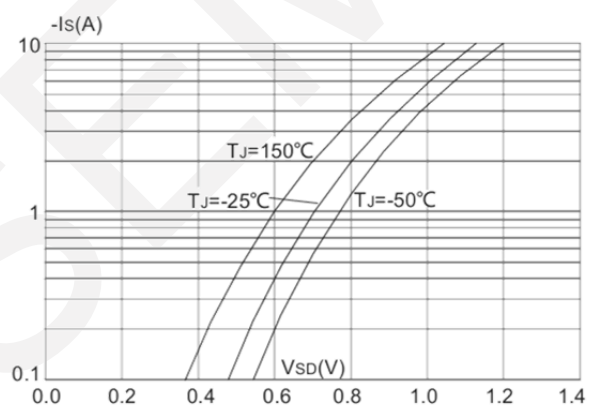
Output Characteristics



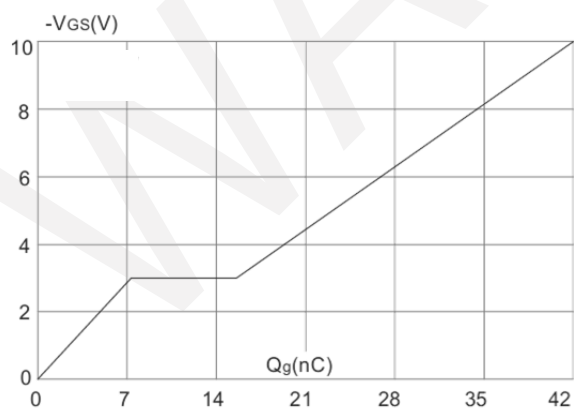
Transfer Characteristics



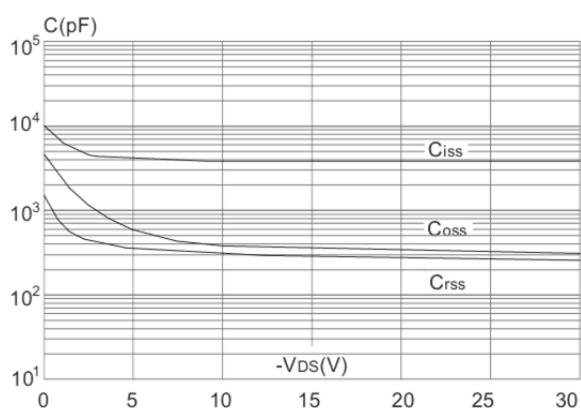
Drain-Source On-Resistance



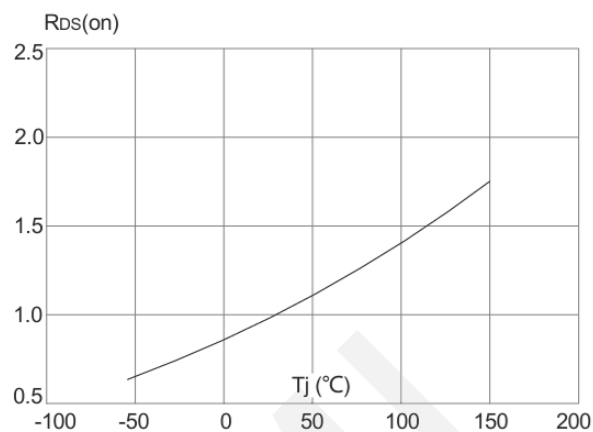
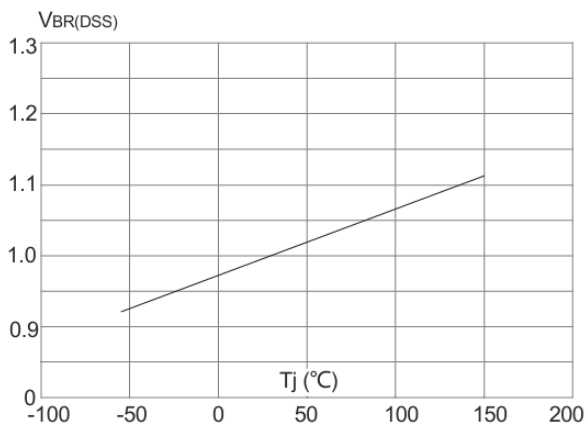
Body Diode Characteristics



Gate Charge Characteristics

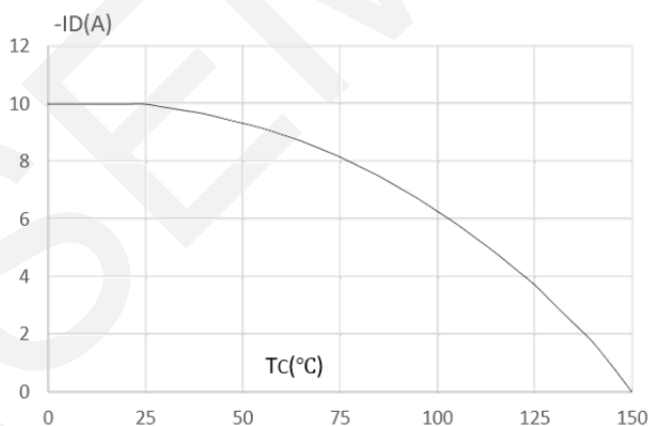
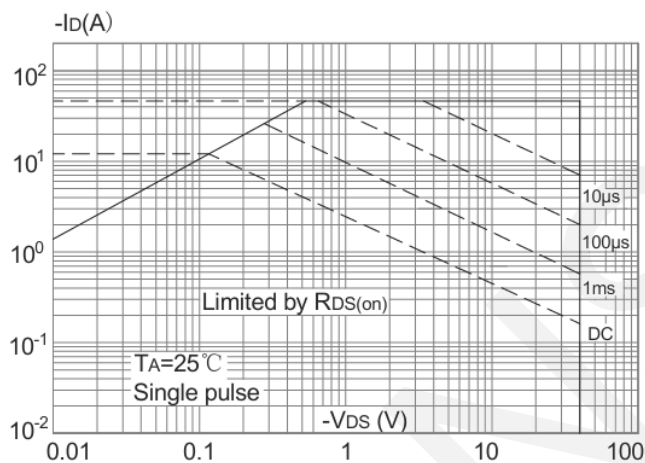


Capacitance Characteristics



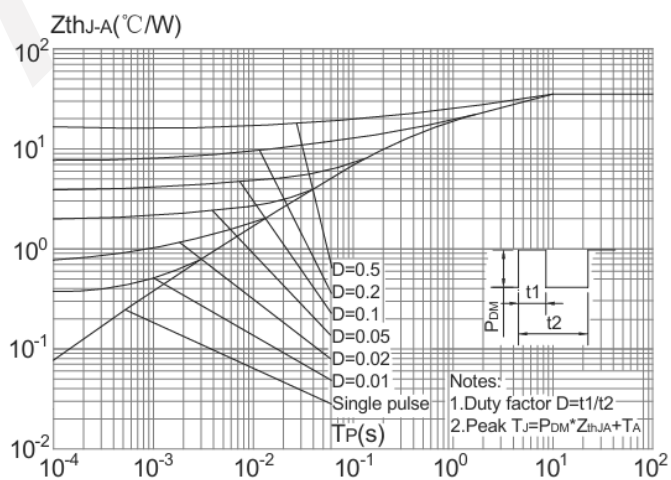
Normalized Breakdown voltage vs. Junction Temperature

Normalized on Resistance vs. Junction Temperature



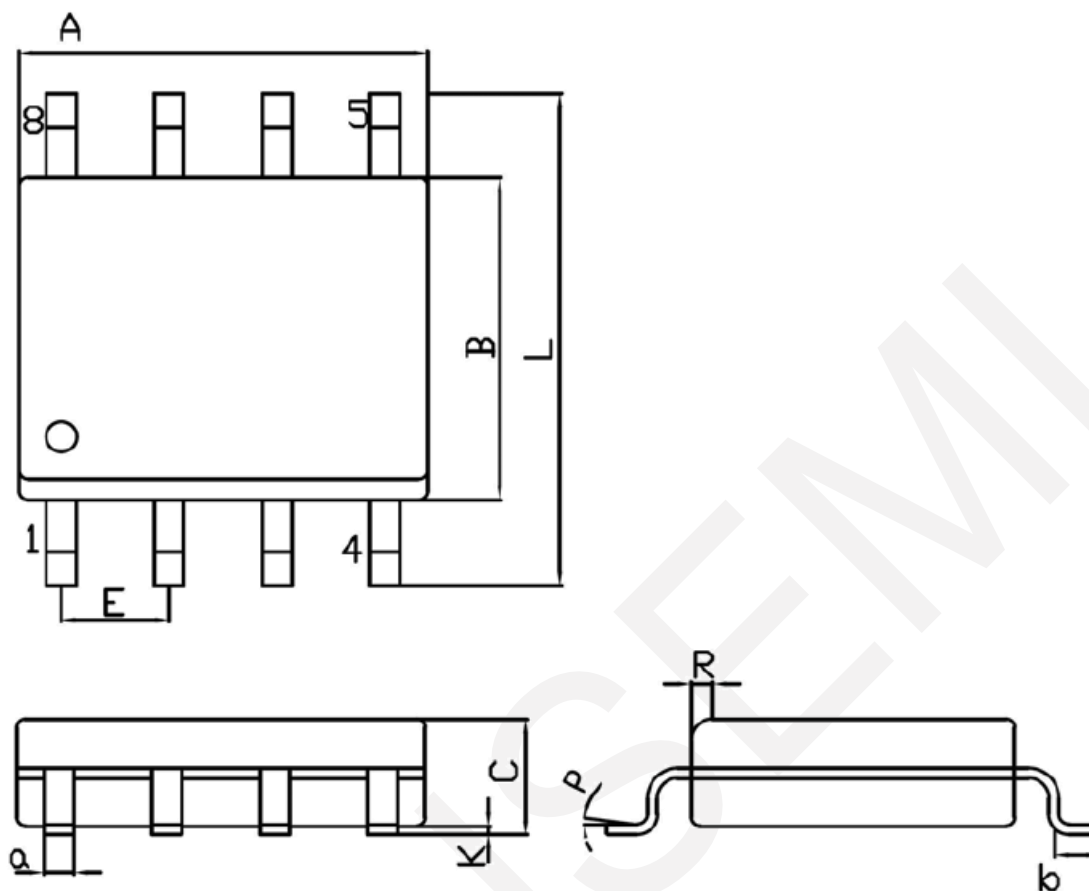
Maximum Safe Operating Area

Maximum Continuous Drain Current vs. Ambient Temperature



Normalized Maximum Transient Thermal Impedance

8.Package Dimensions



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	4.70	5.10	C	1.35	1.75
B	3.70	4.10	a	0.35	0.49
L	5.80	6.20	R	0.30	0.60
E	1.27BSC		P	0°	7°
K	0.12	0.22	b	0.40	1.25

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