

40V N+P-Channel Enhancement Mode MOSFET

Description

The AP8G04BS uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 40V$ $I_D = 8.8A$

$R_{DS(ON)} < 37m\Omega$ @ $V_{GS}=10V$ (Type: 28m Ω)

$V_{DS} = -40V$ $I_D = -7.2A$

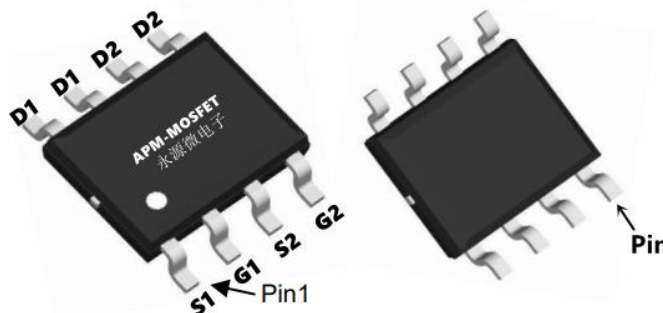
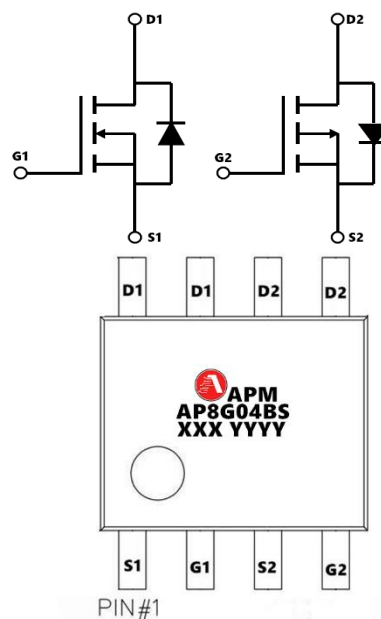
$R_{DS(ON)} < 50m\Omega$ @ $V_{GS}=-10V$ (Type: 42m Ω)

Application

Wireless charging

Boost driver

Brushless motor



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP8G04BS	SOP-8L	AP8G04BS XXX YYYY	3000

Absolute Maximum Ratings ($T_C=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Value		Unit
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_{D@T_A=25^{\circ}C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	8.8	-7.2	A
$I_{D@T_A=70^{\circ}C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	5.0	-4.1	A
IDM	Pulsed Drain Current ²	20	-19	A
EAS	Single Pulse Avalanche Energy ³	15	32	mJ
$P_D@T_A=25^{\circ}C$	Total Power Dissipation ⁴	1.65		W
TSTG	Storage Temperature Range	-55 to 150		$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150		$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	85		$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	35		$^{\circ}C/W$

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N-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	44	---	V
$\Delta BVDSS/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	0.032	---	V/ $^\circ\text{C}$
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=4A$	---	28	37	m Ω
		$V_{GS}=4.5V, I_D=3A$	---	40	50	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.5	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4.5	---	mV/ $^\circ\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=32V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	uA
		$V_{DS}=32V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=5V, I_D=4A$	---	8	---	S
R _g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	2.4	4.8	Ω
Q _g	Total Gate Charge (4.5V)	$V_{DS}=15V, V_{GS}=4.5V, I_D=3A$	---	5	---	nC
Q _{gs}	Gate-Source Charge		---	1.54	---	
Q _{gd}	Gate-Drain Charge		---	1.84	---	
Td(on)	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=1A$	---	7.8	---	ns
T _r	Rise Time		---	2.1	---	
Td(off)	Turn-Off Delay Time		---	29	---	
T _f	Fall Time		---	2.1	---	
Ciss	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1MHz$	---	452	---	pF
Coss	Output Capacitance		---	51	---	
Crss	Reverse Transfer Capacitance		---	38	---	
IS	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	4.5	A
ISM	Pulsed Source Current ^{2,4}		---	---	14	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The power dissipation is limited by 150°C junction temperature
- 4、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

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P-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	$I_D = -250\text{mA}$, $V_{GS} = 0\text{V}$	-40	-	-	V
IDSS	Zero Gate Voltage Drain Current	$V_{DS} = -40\text{V}$, $V_{GS} = 0\text{V}$	-	-	1.0	mA
IGSS	Gate-Body Leakage Current	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
VGS(th)	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250\text{mA}$	-1.1	-1.6	-2.1	V
RDS(ON)	Static Drain-Source ON-Resistance ⁽⁵⁾	$V_{GS} = -10\text{V}$, $I_D = -3\text{A}$	-	42	50	mW
		$V_{GS} = -4.5\text{V}$, $I_D = -2\text{A}$	-	60	78	mW
R _g	Gate Resistance	$f = 1\text{MHz}$	-	8	-	W
C _{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = -20\text{V}$, $f = 1\text{MHz}$	-	546	-	pF
C _{oss}	Output Capacitance		-	52	-	pF
C _{rss}	Reverse Transfer Capacitance		-	43	-	pF
Q _g	Total Gate Charge	$V_{GS} = 0$ to -10V , $V_{DS} = -20\text{V}$, $I_D = -2\text{A}$	-	11	-	nC
Q _{gs}	Gate Source Charge		-	1.8	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	1.9	-	nC
td(on)	Turn-On DelayTime	$V_{GS} = -10\text{V}$, $V_{DD} = -20\text{V}$, $I_D = -2\text{A}$, $R_{GEN} = 3\text{W}$	-	8.1	-	ns
t _r	Turn-On Rise Time		-	13	-	ns
td(off)	Turn-Off DelayTime		-	16	-	ns
t _f	Turn-Off Fall Time		-	6	-	ns
IS	Maximum Continuous Body Diode Forward Current		-	-	-5	A
ISM	Maximum Pulsed Body Diode Forward Current		-	-	-19	A
VSD	Body Diode Forward Voltage	$V_{GS} = 0\text{V}$, $I_S = -3\text{A}$	-		-1.2	V
trr	Body Diode Reverse Recovery Time	$I_F = -2\text{A}$, $di/dt = 100\text{A/us}$	-	10	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	4.8	-	nC

Note :

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N-Typical Characteristics

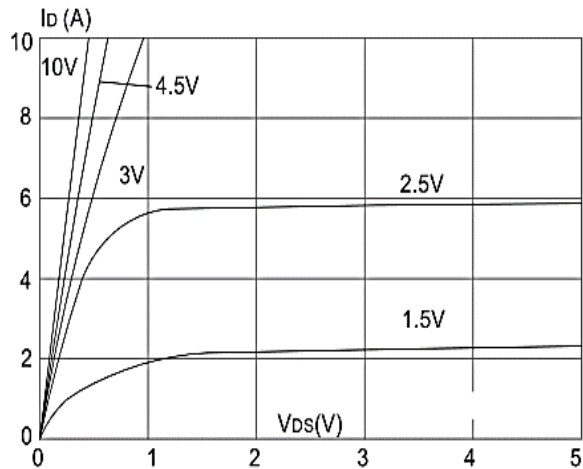


Figure1: Output Characteristics

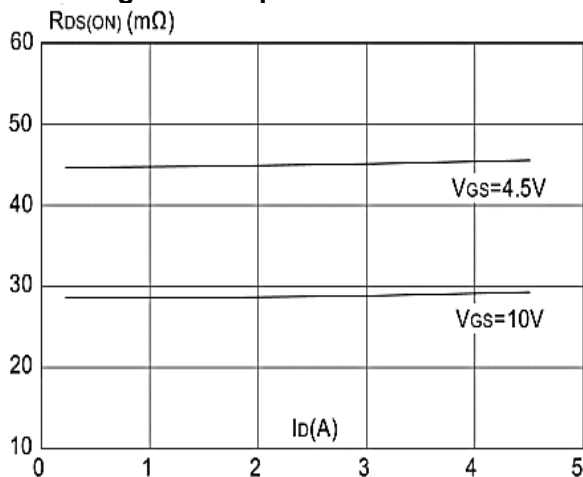


Figure 3: On-resistance vs. Drain Current

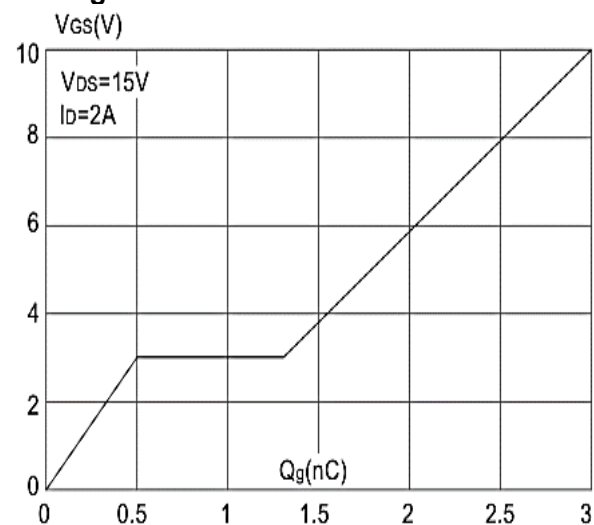


Figure 5: Gate Charge Characteristics

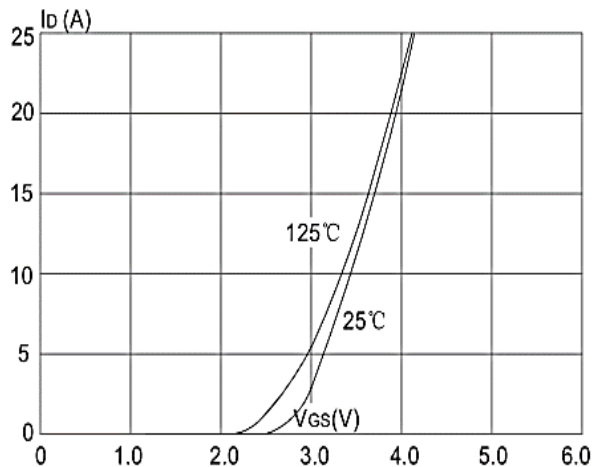


Figure 2: Typical Transfer Characteristics

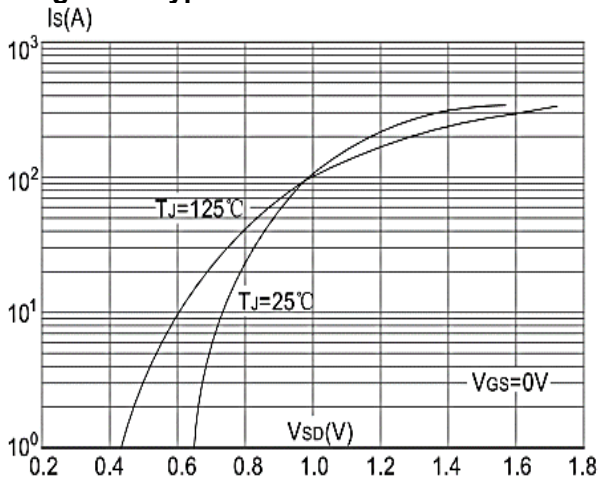


Figure 4: Body Diode Characteristics

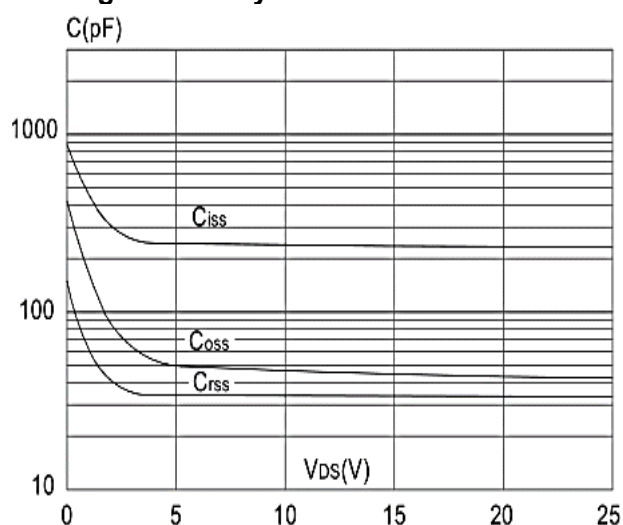


Figure 6: Capacitance Characteristics

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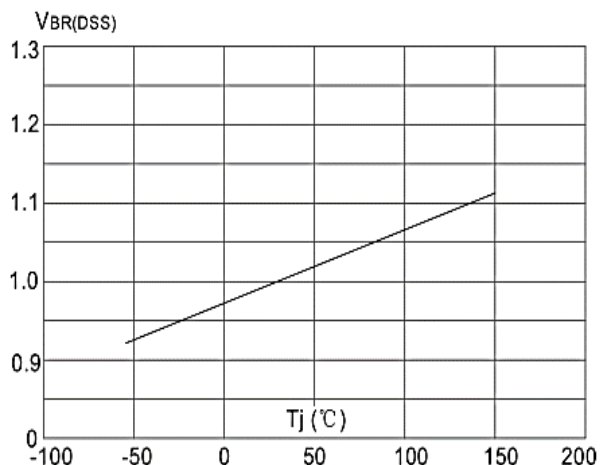


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

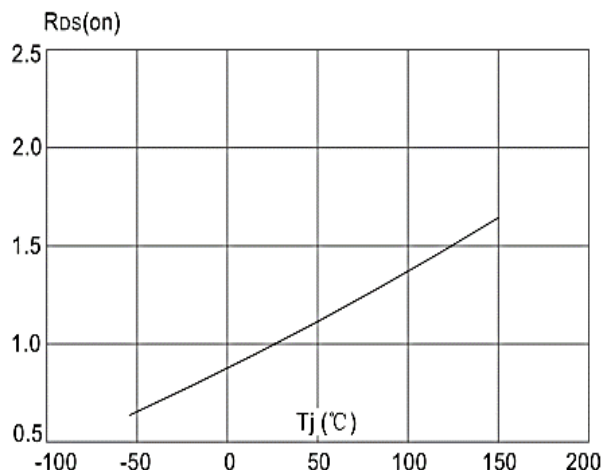


Figure 8: Normalized on Resistance vs. Junction Temperature

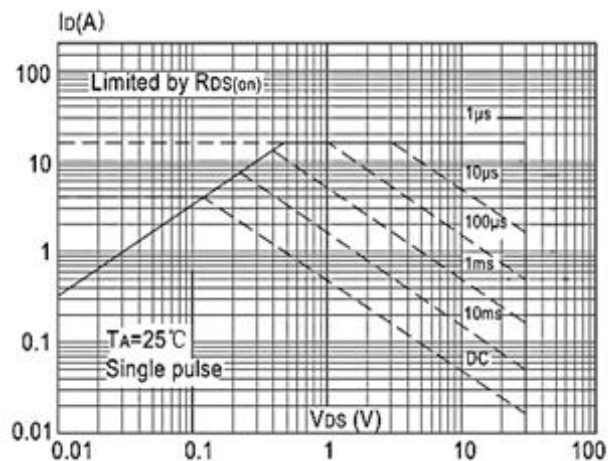


Figure 9: Maximum Safe Operating Area vs. Case Temperature

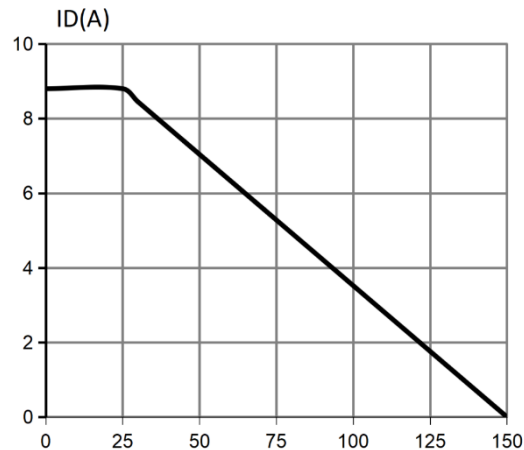


Figure 10: Maximum Continuous Drain Current vs. Junction Temperature

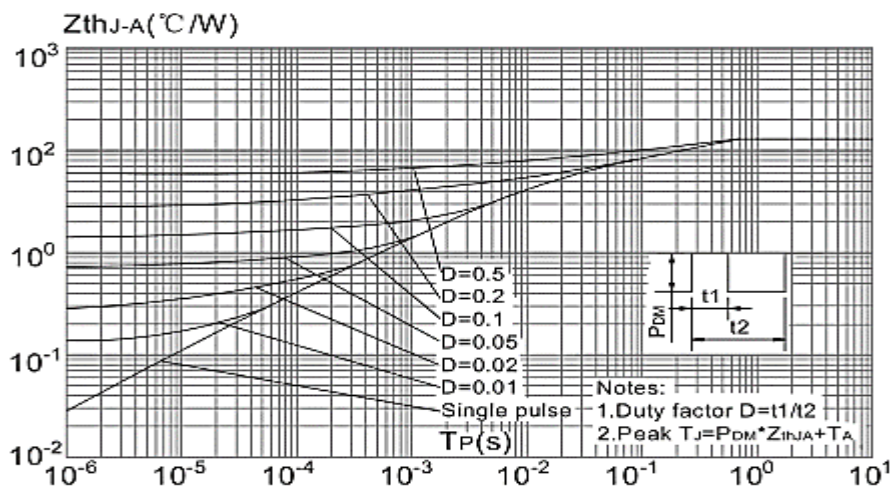


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

P-Typical Characteristics

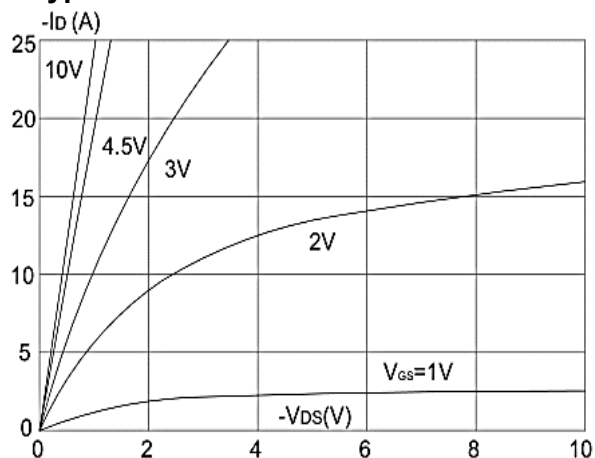


Figure1: Output Characteristics

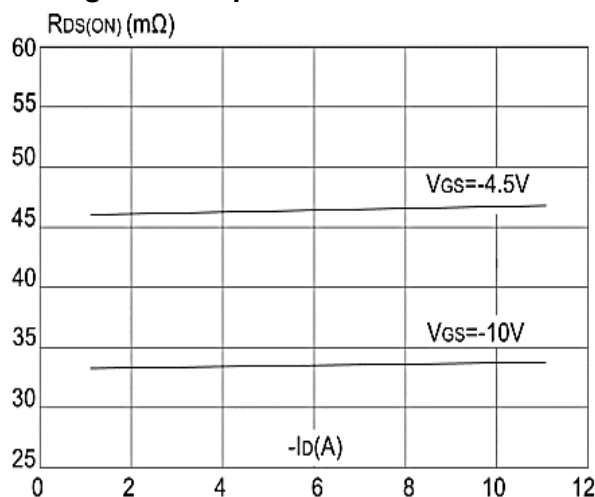


Figure 3: On-resistance vs. Drain Current

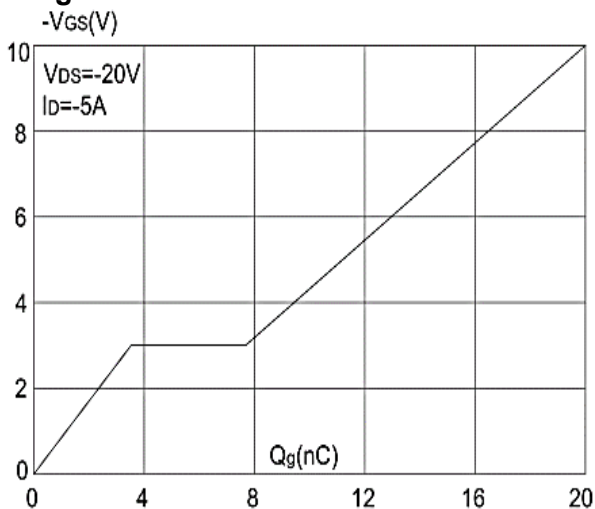


Figure 5: Gate Charge Characteristics

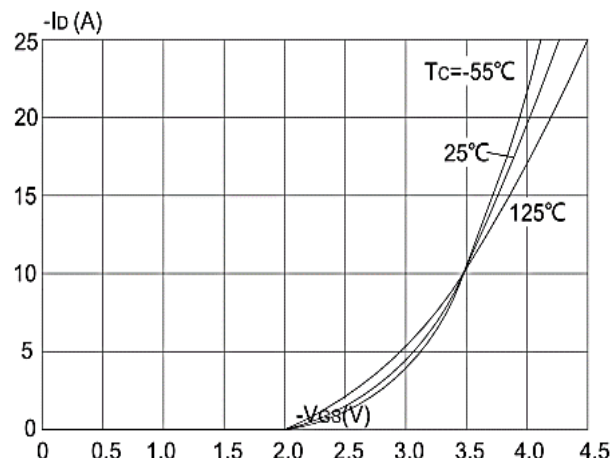


Figure 2: Typical Transfer Characteristics

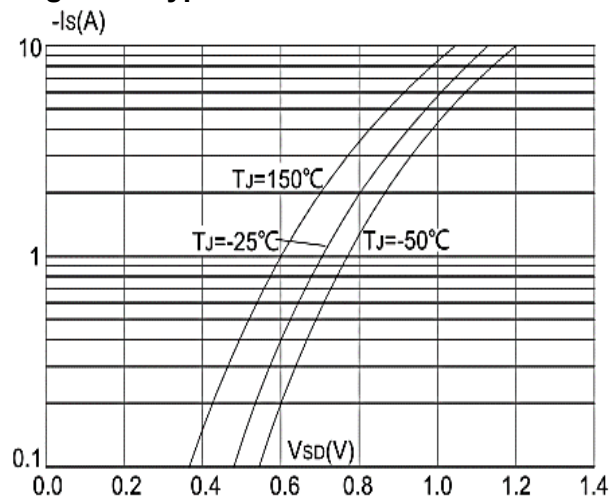


Figure 4: Body Diode Characteristics

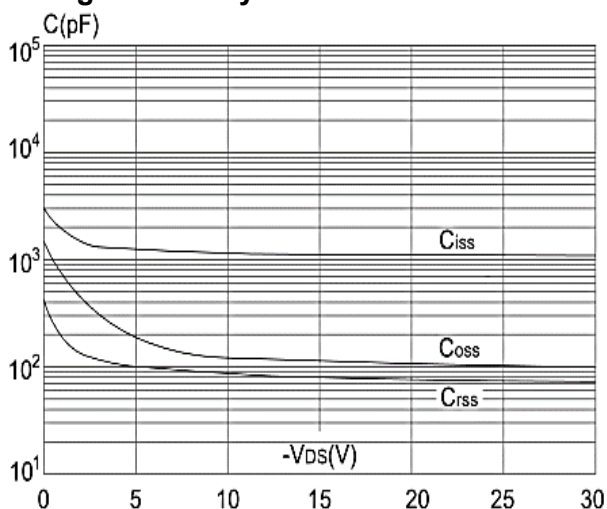


Figure 6: Capacitance Characteristics

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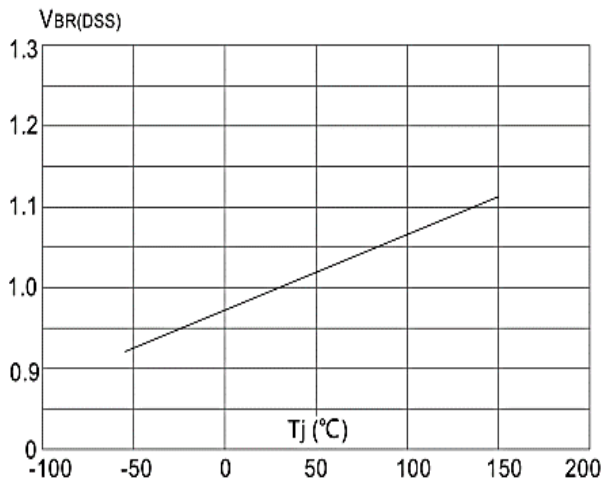


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

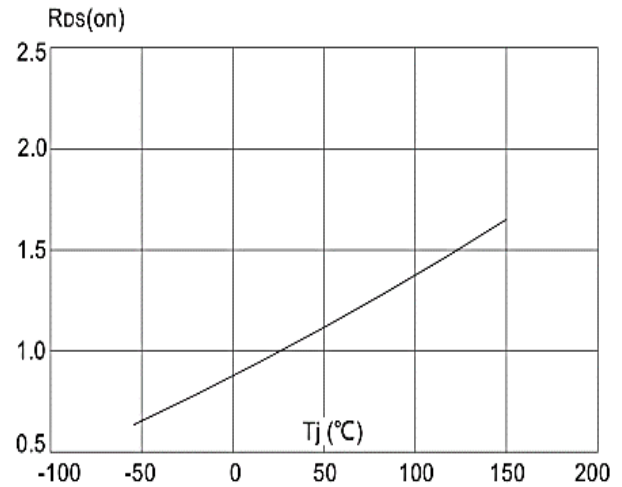


Figure 8: Normalized on Resistance vs. Junction Temperature

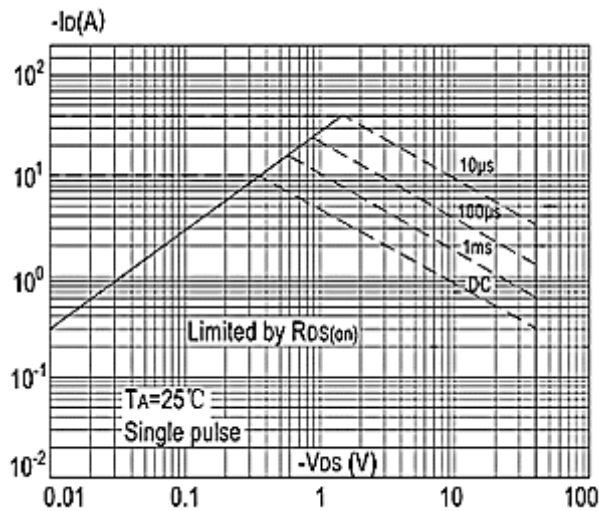


Figure 9: Maximum Safe Operating Area

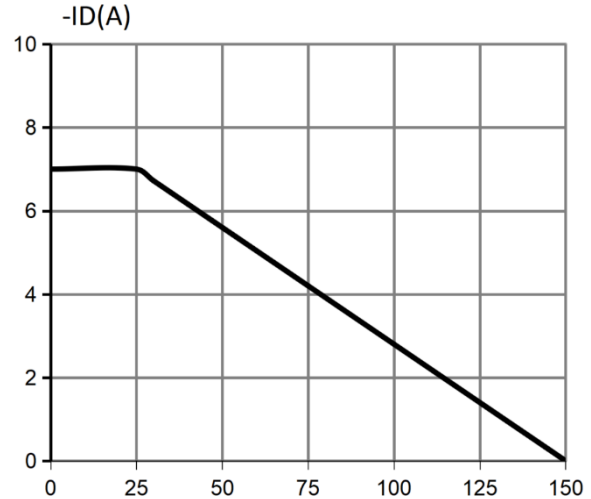


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

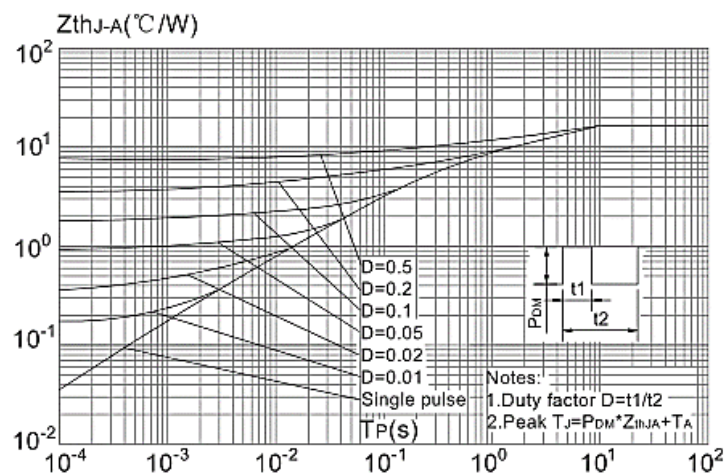
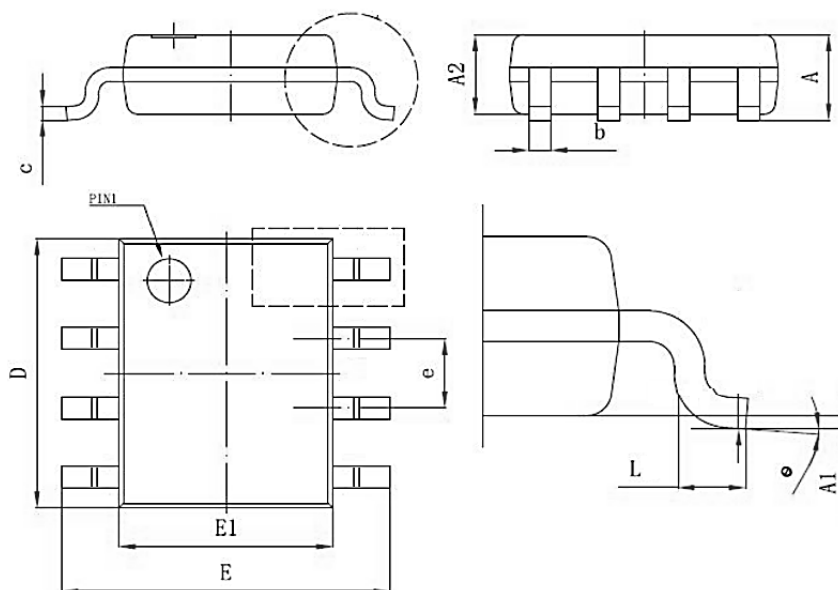


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

Package Mechanical Data-SOP-8L



Symbol	Dimensions In Millimeters		
	min.	typ.	max.
A	1.35	1.55	1.75
A1	0.02	0.15	0.25
A2	1.33	1.45	1.55
b	0.30	0.40	0.50
c	0.15	0.20	0.25
D	4.80	5.00	5.20
E	5.80	6.00	6.20
E1	3.80	4.00	4.20
e	1.27BSC		
L	0.40		1.27
θ	0°		8°

40V N+P-Channel Enhancement Mode MOSFET**Attention**

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Edition	Date	Change
REV1.0	2023/5/31	Initial release

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