



**WANSEMI**  
万芯半导体

**WX017D04Q3**

# Enhancement Mode N+P-Channel Power MOSFET

PDFN3x3/N+PMOS/40V/ $\pm 20$ V/1.6V/10A/17.4m $\Omega$

-40V/ $\pm 20$ V/-1.6V/-10A/40.4m $\Omega$

Rev0.6

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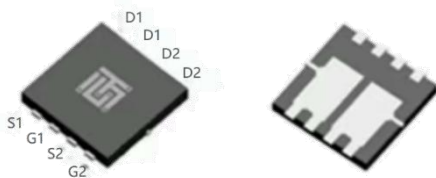
## 40V N+P-Channel MOSFET

### 1.Features

- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Fast switching
- ◆ Surface mount package
- ◆ 100% RG Tested
- ◆ 100% UIS Tested

### 2.Applications

- ◆ BLDC Motor driver
- ◆ PWM applications



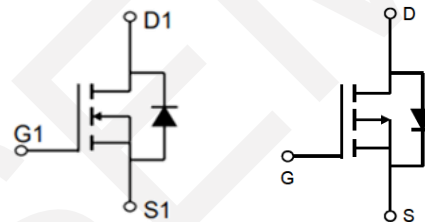
PDFN3x3  
Pin Description

#### ◆ N-Channel

$V_{DS}$	$R_{DS(on)}$ Typ.	$I_D$
40V	17.4m $\Omega$ @ 10V	10A
	22m $\Omega$ @ 4.5V	

#### ◆ P-Channel

$V_{DS}$	$R_{DS(on)}$ Typ.	$I_D$
-40V	40.4m $\Omega$ @ -10V	-10A
	52m $\Omega$ @ -4.5V	



N-Channel      P-Channel

Schematic Diagram

### 3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Tube	PCS/CTN.
WX017D04Q3	017D04	PDFN3x3	5,000	50,000

### 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	$V_{GSS}$	$\pm 20$	$\pm 20$	V
Drain Current (DC)	$I_D$	10	-10	A
Drain Current (Pulse), $PW \leq 300\mu s$	$I_{DM}$	40	-40	A
Avalanche Energy, Single Pulsed	$E_{AS}$	30.25	42.25	mJ
Total Dissipation	$P_D$	2	3.2	W
Junction Temperature	$T_j$	-55 to +155		°C
Storage Temperature	$T_{stg}$			

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	N-channel	P-channel	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	62.5	39	$^{\circ}C/W$

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. Electrical Characteristics at  $T_a=25^{\circ}C$  (Note 3)**
**N-Channel**

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	$\mu A$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.2	1.6	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 8A, V_{GS} = 10V$	-	17.4	23	m $\Omega$
		$I_D = 5A, V_{GS} = 4.5V$	-	22	30	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V,$	-	837	-	pF
Output Capacitance	$C_{oss}$	$V_{DS}=20V,$	-	59	-	pF
Reverse Transfer Capacitance	$C_{rss}$	Frequency=1.0MHz	-	43	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 20V$ $V_{GS} = 10V$ $R_{GEN} = 3\Omega$ $R_L = 2.5\Omega$	-	4	-	ns
Rise Time	$t_r$		-	3	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	15	-	ns
Fall Time	$t_f$		-	2	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = 20V,$	-	12	-	nC
	$Q_{gs}$	$V_{GS} = 10V,$	-	3.2	-	nC
	$Q_{gd}$	$I_D = 8A$	-	3.1	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_S = 8A, V_{GS} = 0V$	0.5	-	1.2	V

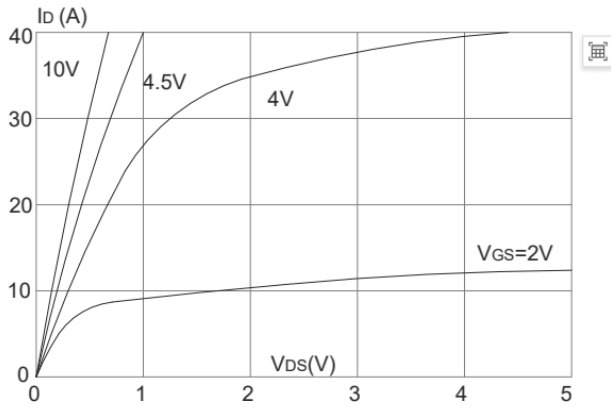
**P-Channel**

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	$\mu A$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.0	-1.6	-2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = -6A, V_{GS} = -10V$	-	40.4	52	m $\Omega$
		$I_D = -4A, V_{GS} = -4.5V$	-	52	75	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V,$ $V_{DS}=-20V,$ Frequency=1.0MHz	-	936	-	pF
Output Capacitance	$C_{oss}$		-	73	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	57	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = -20V$ $V_{GS} = -10V$ $R_{GEN} = 6\Omega,$ $R_L = 2.3\Omega,$	-	7.5	-	ns
Rise Time	$t_r$		-	55	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	19	-	ns
Fall Time	$t_f$		-	7	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = -20V,$ $V_{GS} = -10V,$ $I_D = -6A$	-	13	-	nC
	$Q_{gs}$		-	3.8	-	nC
	$Q_{gd}$		-	3.1	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_S = -6A, V_{GS} = 0V$	0.5	-	-1.2	V

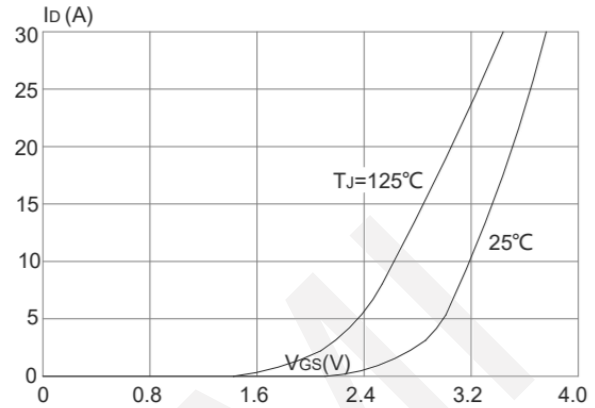
Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## 7. Typical electrical and thermal characteristics

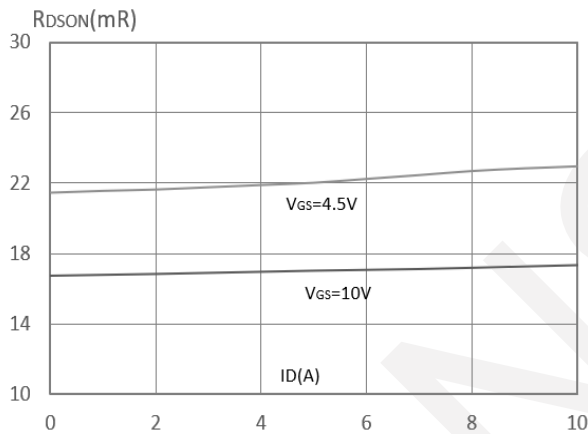
### N-Channel



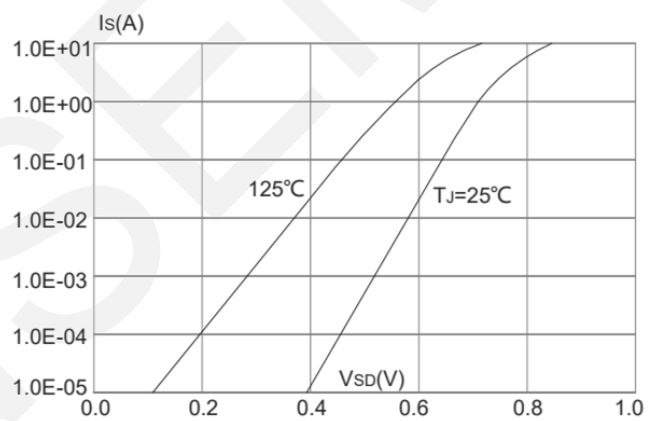
Output Characteristics



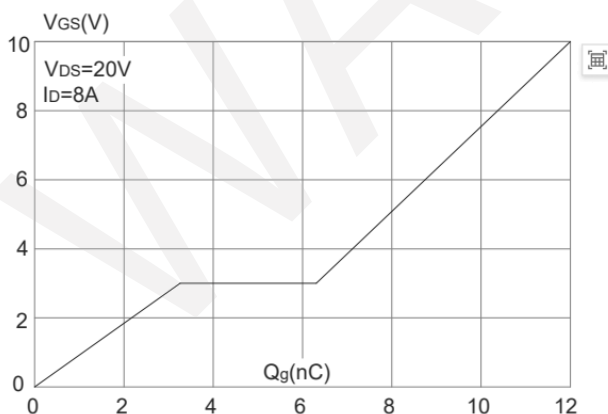
Transfer Characteristics



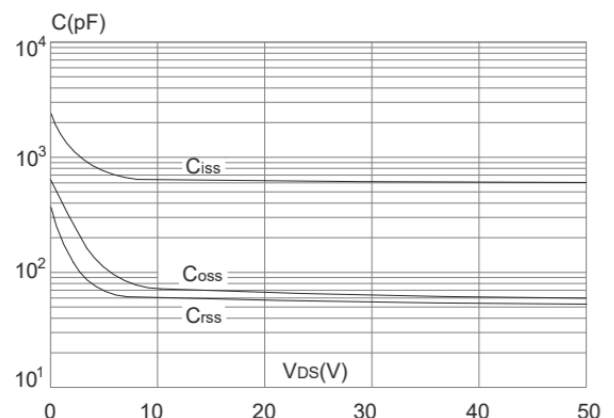
Rdson- Drain Current



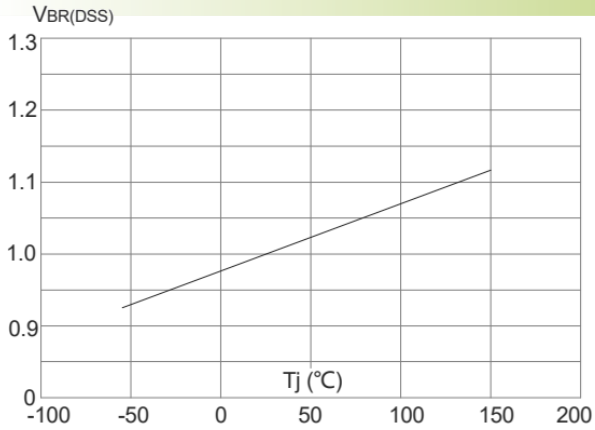
Body Diode Characteristics



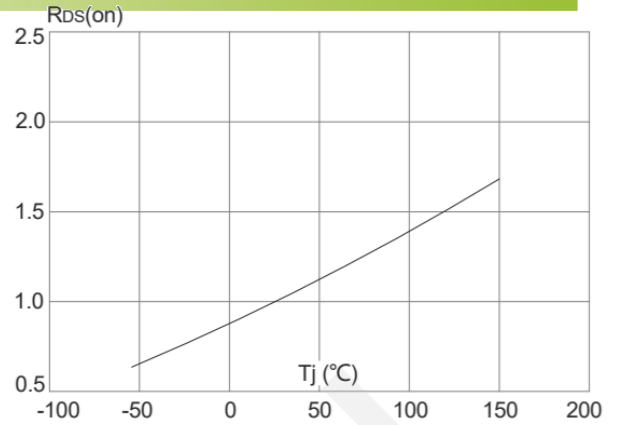
Gate Charge



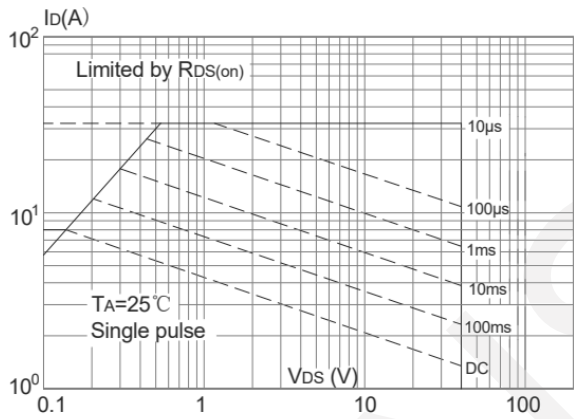
Capacitance Characteristics



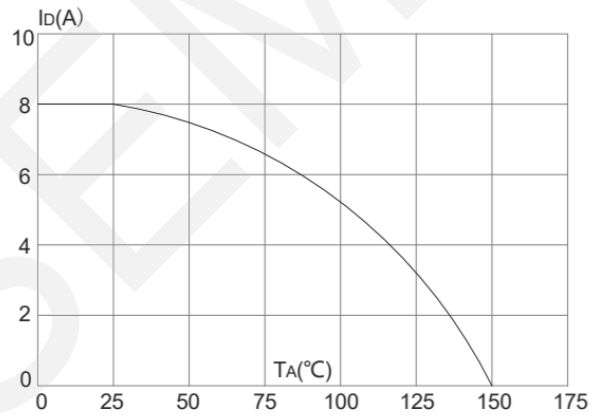
Normalized Breakdown Voltage vs. Junction Temperature



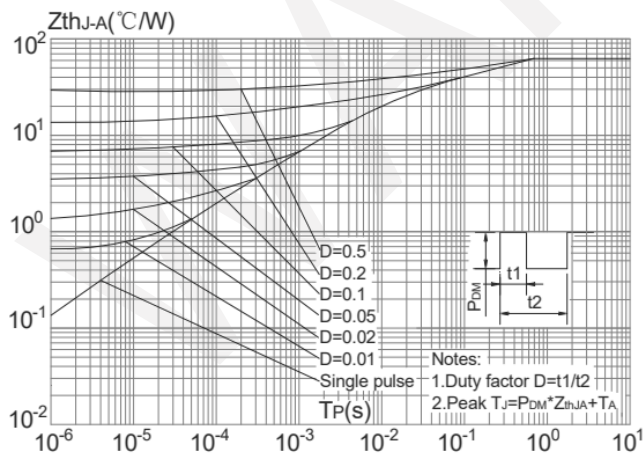
Normalized on Resistance vs. Junction Temperature



Maximum Safe Operating Area

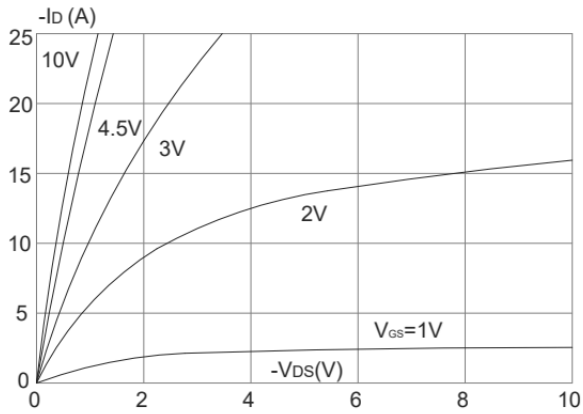


Maximum Continuous Drain Current vs. Ambient Temperature

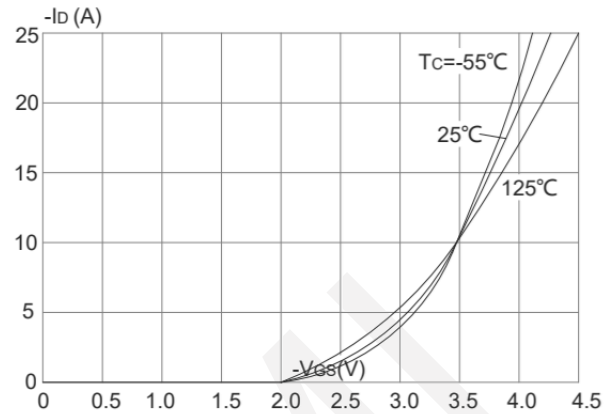


Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

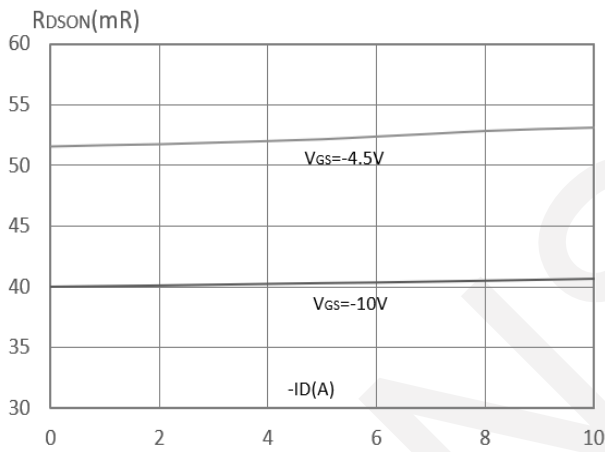
**P-Channel**



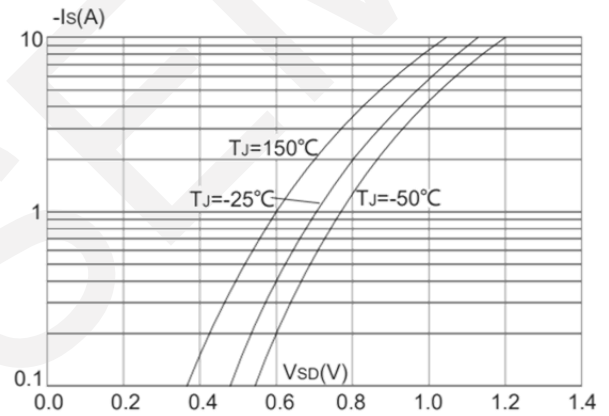
Output Characteristics



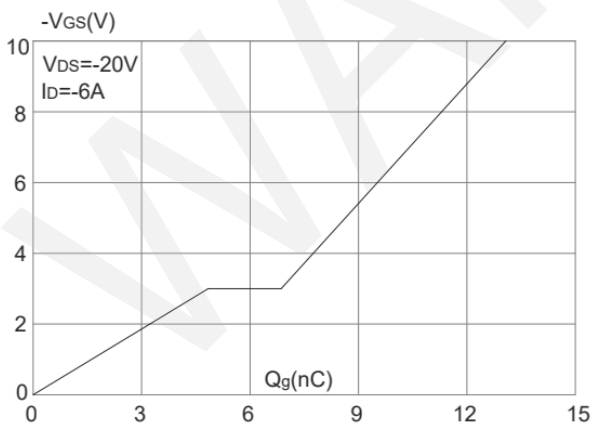
Transfer Characteristics



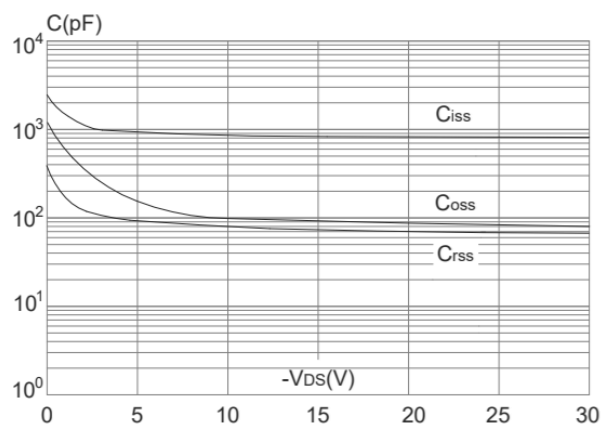
Rdson- Drain Current



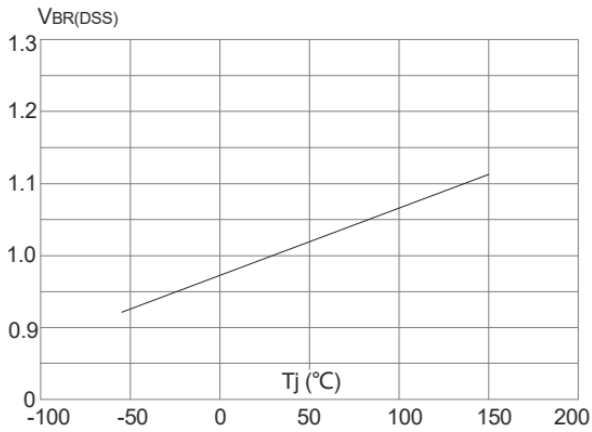
Body Diode Characteristics



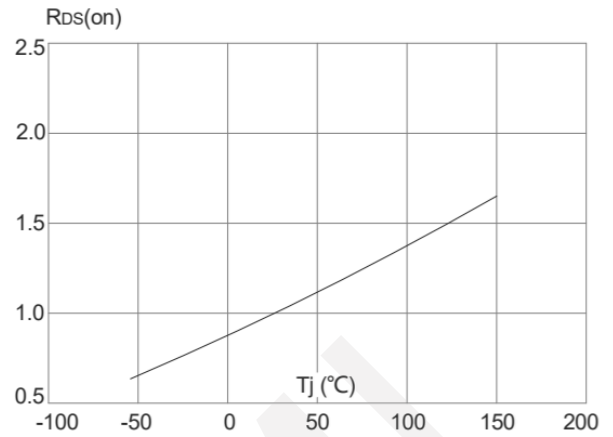
Gate Charge



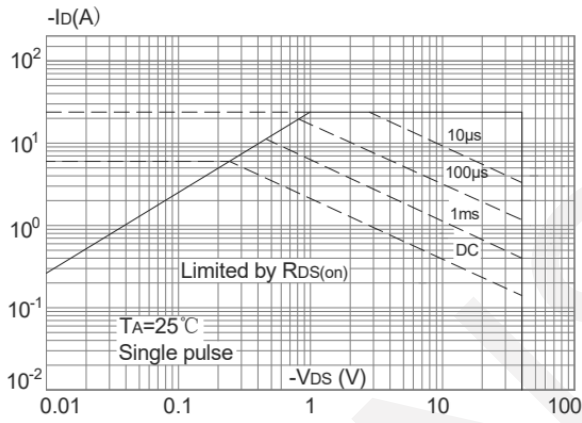
Capacitance Characteristics



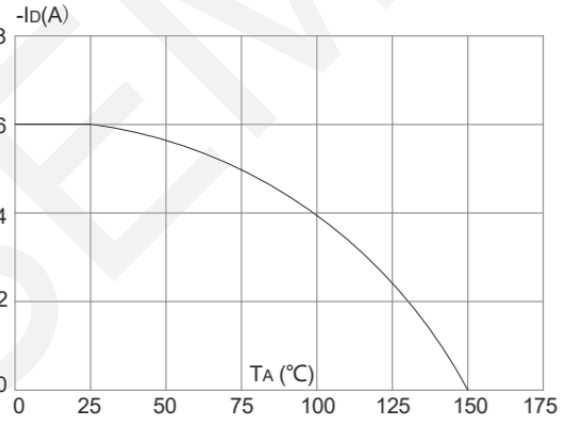
Normalized Breakdown Voltage vs. Junction Temperature



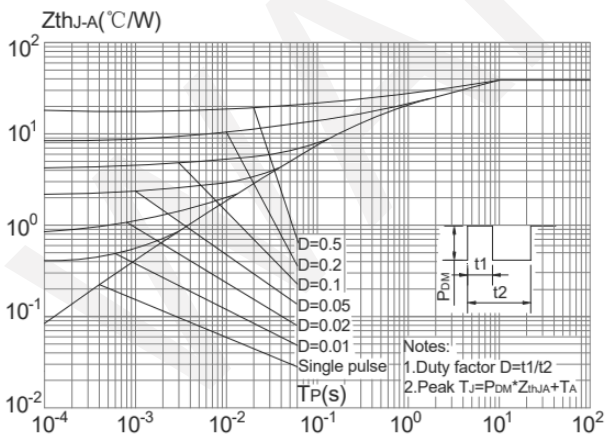
Normalized on Resistance vs. Junction Temperature



Maximum Safe Operating Area



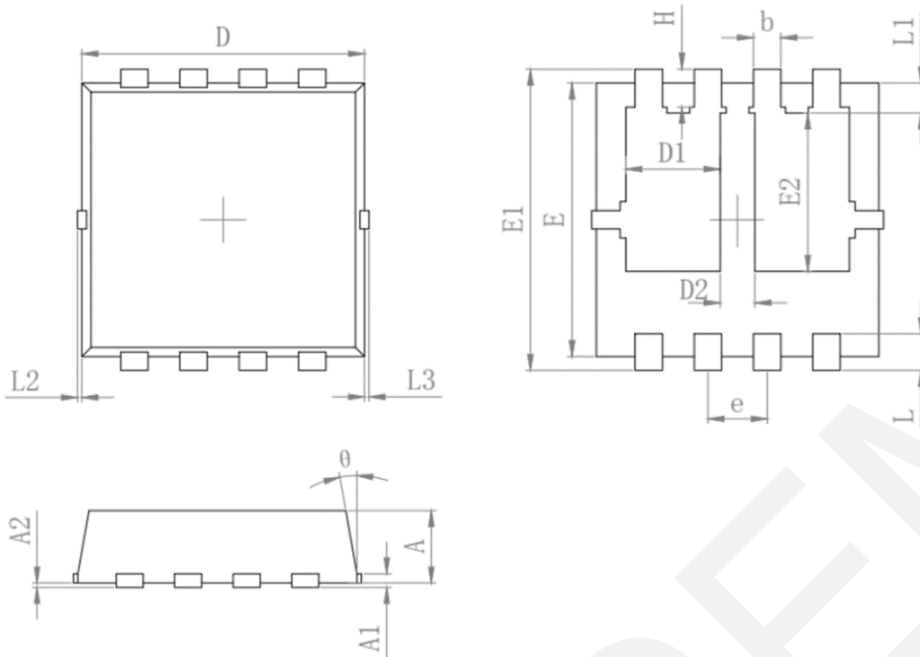
Maximum Continuous Drain Current vs. Ambient Temperature



Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



**8.Package Dimensions**



SYMBOL	MILLIMETER	
	MIN	MAX
A	0.700	0.900
A1	0.152 REF.	
A2	0 <sup>~</sup> 0.05	
D	3.000	3.200
D1	0.935	1.135
D2	0.280	0.480
E	2.900	3.100
E1	3.150	3.450
E2	1.535	1.935
b	0.200	0.400
e	0.550	0.750
L	0.300	0.500
L1	0.180	0.480
L2	0 <sup>~</sup> 0.100	
L3	0 <sup>~</sup> 0.100	
H	0.315	0.515
$\theta$	8°	12°

## 9. Important Notice

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