



**WANSEMI**  
万芯半导体

**WP3024**

# **Enhancement Mode N+P-Channel Power MOSFET**

**TO-252-4L/N+PMOS/30V/ $\pm$ 20V/1.7V/18A/9m $\Omega$**

**-30V/ $\pm$ 20V/-1.7V/-14A/22m $\Omega$**

**Rev0.8**

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## 30V N+P-Channel MOSFET

### 1.Features

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

#### ◆ N-Channel

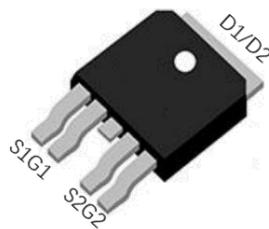
V <sub>DS</sub>	R <sub>DS(on)</sub> Typ.	I <sub>D</sub>
30V	9mΩ @ 10V	18A
	13.5mΩ @ 4.5V	

#### ◆ P-Channel

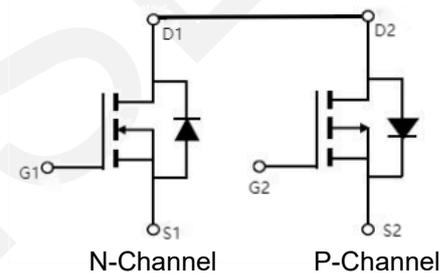
V <sub>DS</sub>	R <sub>DS(on)</sub> Typ.	I <sub>D</sub>
-30V	22mΩ @ -10V	-14A
	30mΩ @ -4.5V	

### 2.Applications

- ◆ DC motor
- ◆ PWM applications



TO-252-4L  
Pin Description



Schematic Diagram

### 3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP3024	WP3024	TO-252-4L	2500	25000

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

Parameter	Symbol	N-chanel	P-chanel	Units
Drain to Source Voltage	V <sub>DSS</sub>	30	-30	V
Gate to Source Voltage	V <sub>GSS</sub>	±20	±20	V
Drain Current (DC)	I <sub>D</sub>	18	-14	A
Drain Current (Pulse), PW≤300μs	I <sub>DM</sub>	50	-36	A
Total Dissipation	P <sub>D</sub>	15.5	27	W
Avalanche Energy, Single Pulsed	EAS	42	42	mJ
Junction Temperature	T <sub>J</sub>	150	150	°C
Storage Temperature	T <sub>stg</sub>	-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	N-chanel	P-chanel	Unit
Maximum Junction-to-Ambient	R <sub>θJA</sub>	8	4.6	°C/W

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

**6. Electrical Characteristics at Ta=25°C (Note 3)**
**N-Channel**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	30	-	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$	-	-	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	1.7	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 8A, V_{GS} = 10V$	-	9	14	m $\Omega$
		$I_D = 6A, V_{GS} = 4.5V$	-	13.5	20	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V,$ $V_{DS}=15V,$ Frequency=1.0MHz	-	450	-	pF
Output Capacitance	$C_{oss}$		-	150	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	90	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 15V$ $V_{GS} = 10V$ $R_L = 2.5\Omega$ $R_G = 3\Omega$	-	5	-	ns
Rise Time	$t_r$		-	12	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	19	-	ns
Fall Time	$t_f$		-	6	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = 15V,$	-	9.5		nC
	$Q_{gs}$	$V_{GS} = 10V,$	-	2.0		nC
	$Q_{gd}$	$I_D = 6A$	-	1.9		nC
Diode Forward Voltage	$V_{FSD}$	$I_S = 8A, V_{GS} = 0V$	0.5	0.83	1.2	V

**P-Channel**

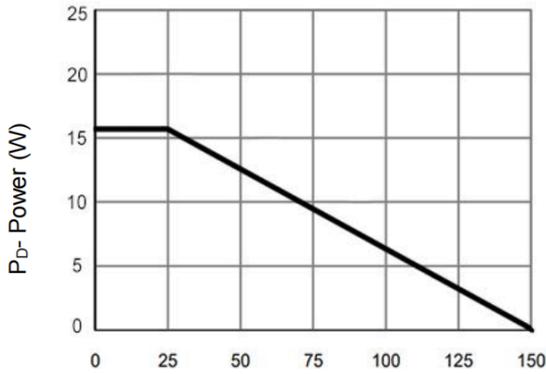
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -250\mu A, V_{GS} = 0V$	-40			V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V$			1	$\mu A$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.0	-1.7	-2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = -7A, V_{GS} = -10V$		22	29	m $\Omega$
		$I_D = -5A, V_{GS} = -4.5V$		30	43	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V,$ $V_{DS}=-30V,$ Frequency=1.0MHz		950	-	pF
Output Capacitance	$C_{oss}$			140	-	pF
Reverse Transfer Capacitance	$C_{rss}$			90	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = -15V$ $V_{GS} = -10V$ $R_{GEN} = 3\Omega,$ $R_L = 2.5\Omega,$		8	-	ns
Rise Time	$t_r$			30	-	ns
Turn-OFF Delay Time	$t_{d(off)}$			22	-	ns
Fall Time	$t_f$			26	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = -15V,$		16.2		nC
	$Q_{gs}$	$V_{GS} = -10V,$		2.9		nC
	$Q_{gd}$	$I_D = -4A$		3.6		nC
Diode Forward Voltage	$V_{FSD}$	$I_S = -7A, V_{GS} = 0V$	-5	-0.87	-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.



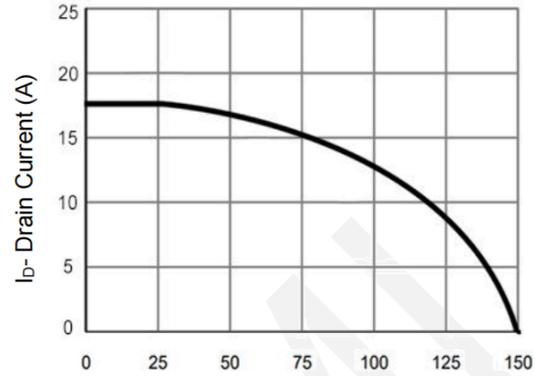
## 7. Typical electrical and thermal characteristics

### N-Channel



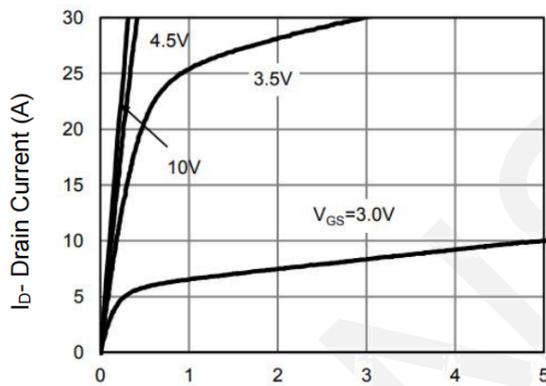
$T_J$ -Junction Temperature (°C)

Power De-rating



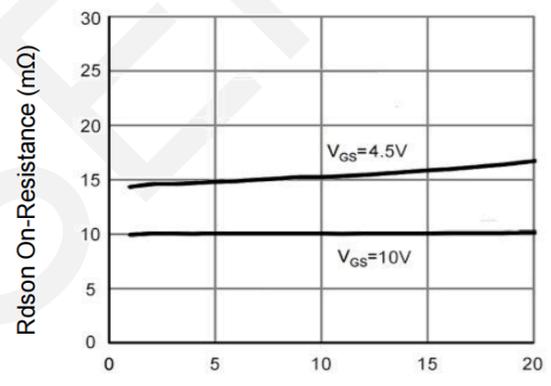
$T_J$ -Junction Temperature (°C)

Drain Current



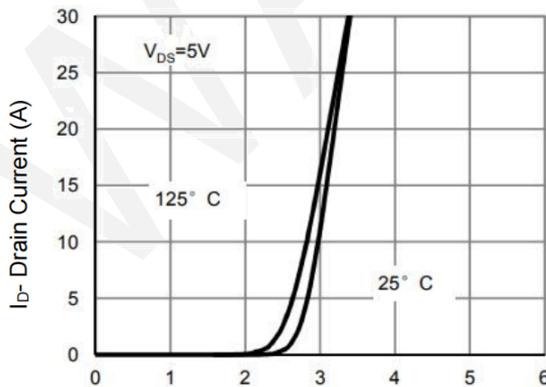
$V_{DS}$  Drain-Source Voltage (V)

Output Characteristics



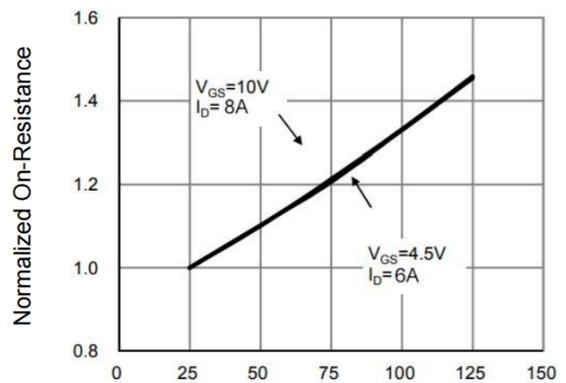
$I_D$ - Drain Current (A)

$R_{dson}$  vs Drain Current



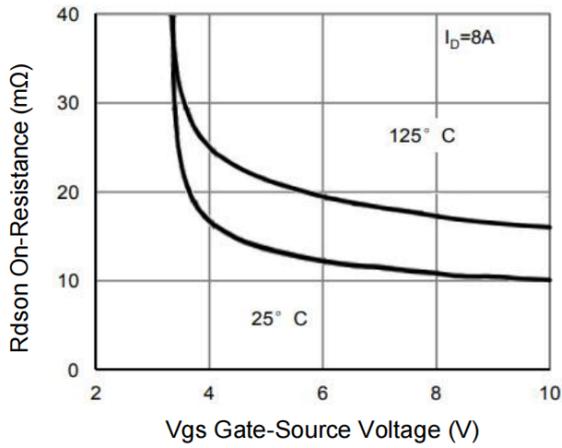
$V_{GS}$  Gate-Source Voltage (V)

Transfer Characteristics

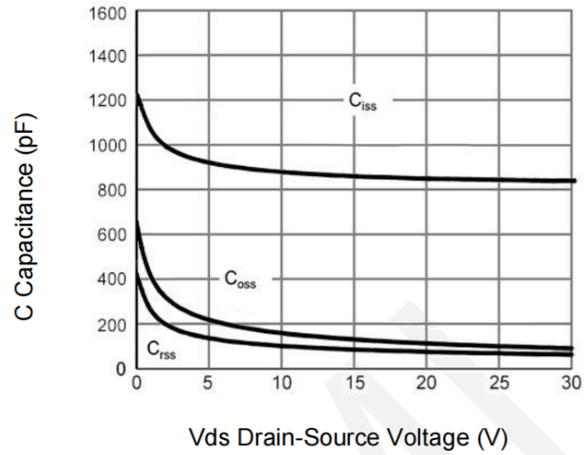


$T_J$ -Junction Temperature(°C)

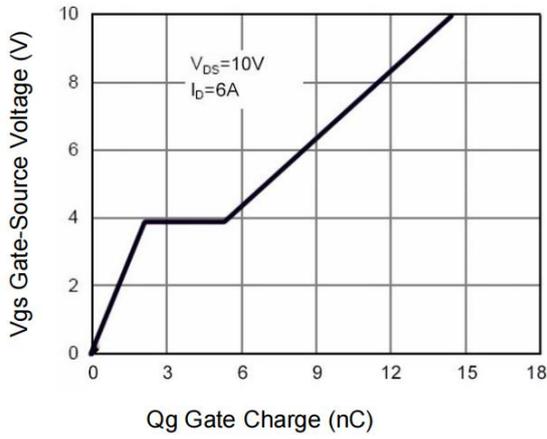
$R_{dson}$  vs Junction Temperature



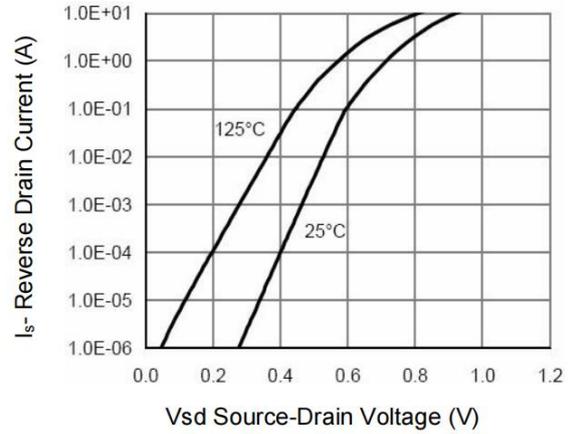
Rdson vs Vgs



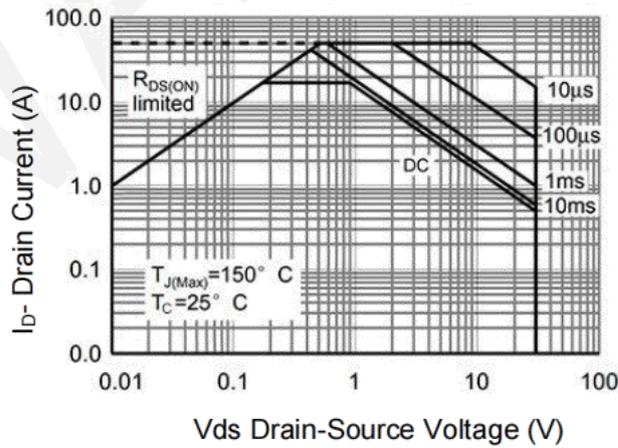
Capacitance vs Vds



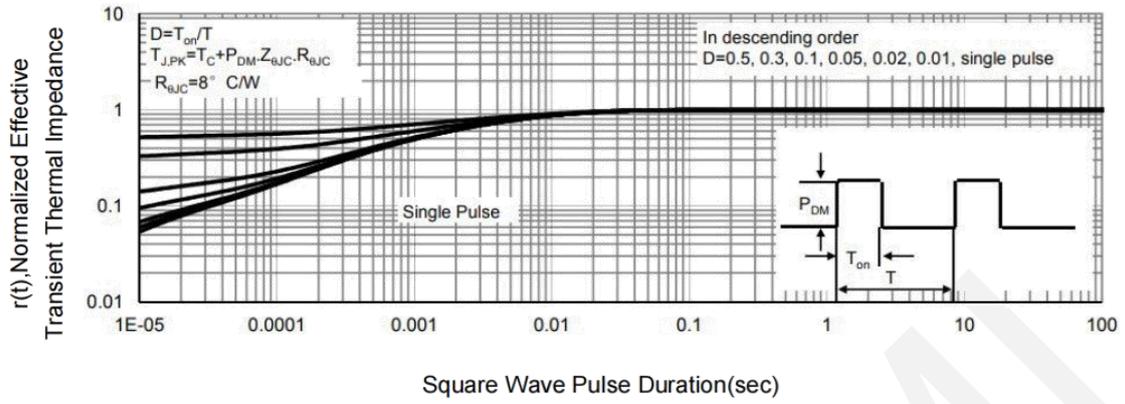
Gate Charge



Source- Drain Diode Forward



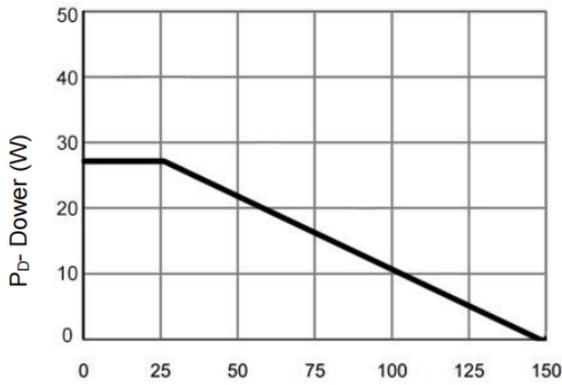
Safe Operating Area



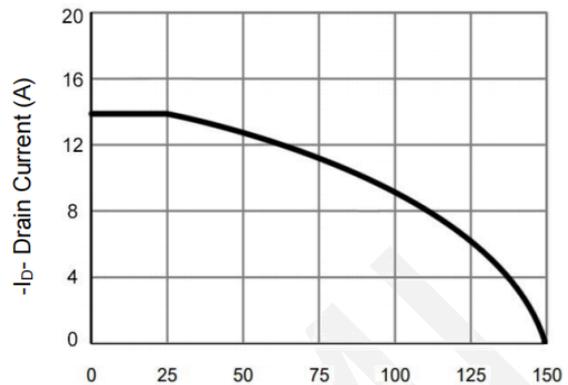
Normalized Maximum Transient Thermal Impedance



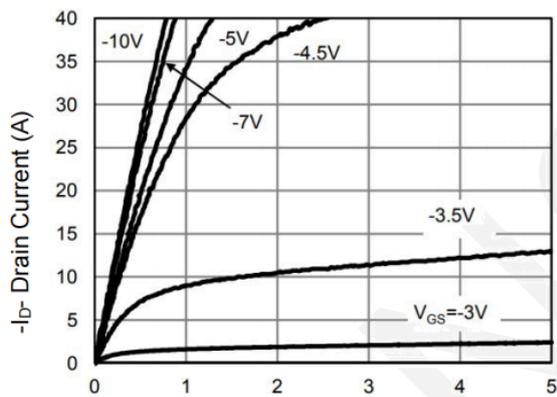
P-Channel



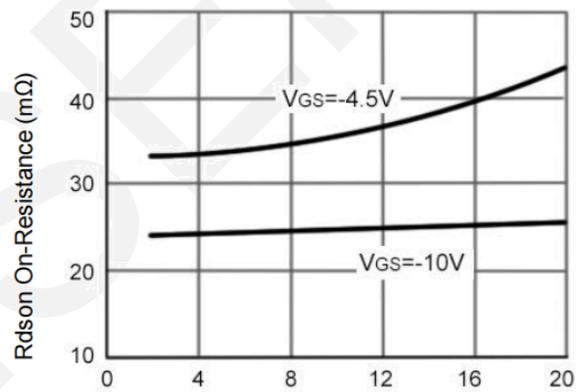
T<sub>J</sub>-Junction Temperature (°C)  
Power De-rating



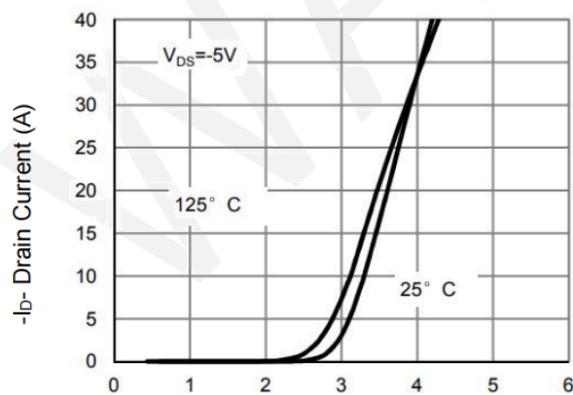
T<sub>J</sub>-Junction Temperature (°C)  
Drain Current



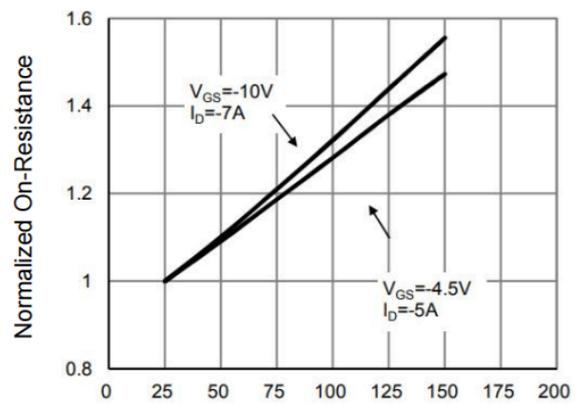
-V<sub>DS</sub> Drain-Source Voltage (V)  
Output Characteristics



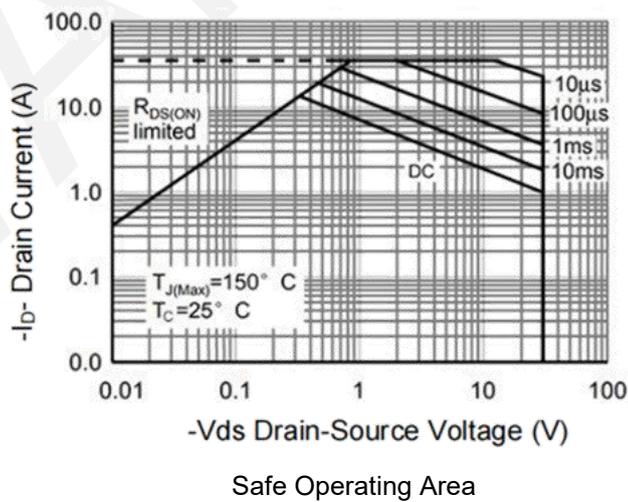
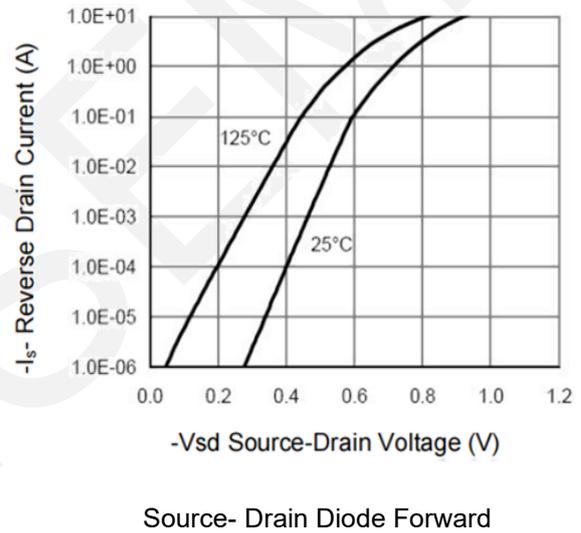
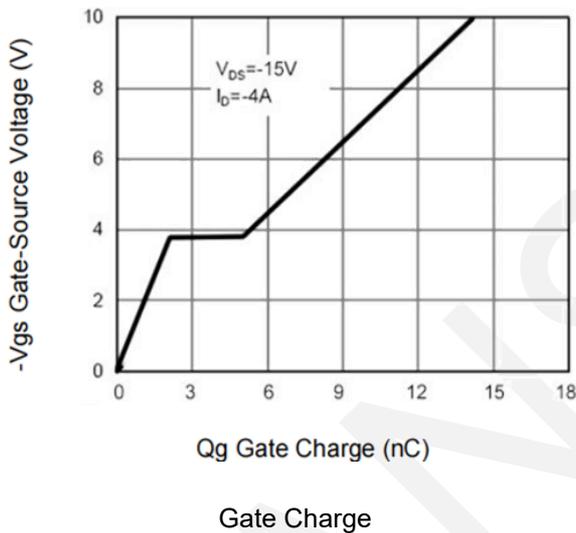
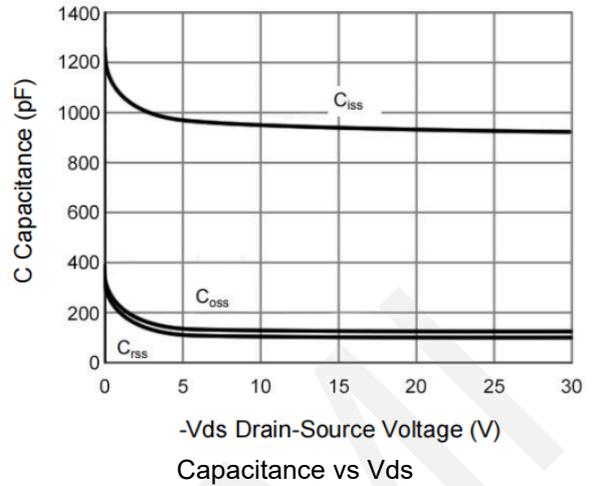
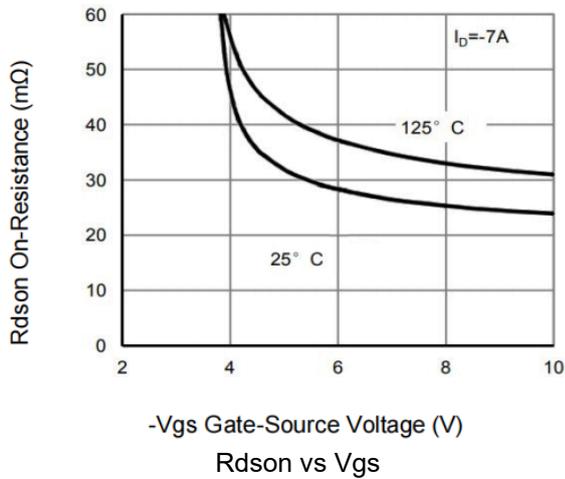
-I<sub>D</sub>- Drain Current (A)  
R<sub>dson</sub> vs Drain Current

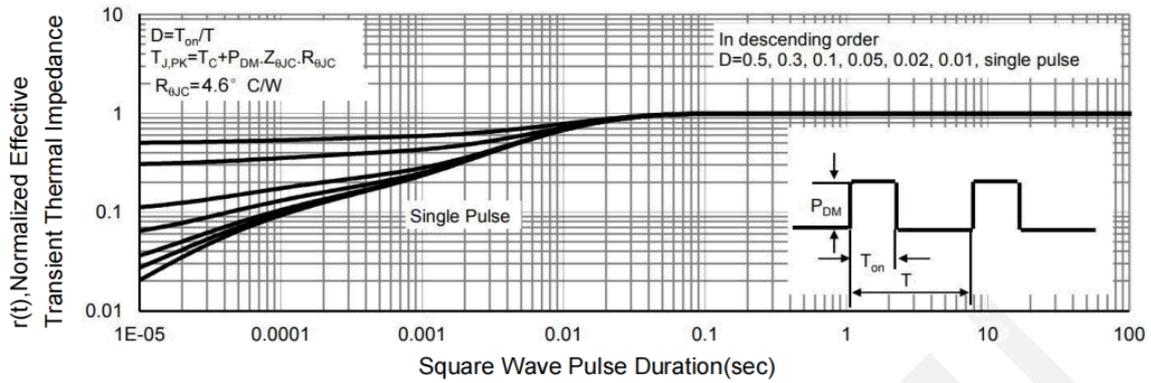


-V<sub>GS</sub> Gate-Source Voltage (V)  
Transfer Characteristics



T<sub>J</sub>-Junction Temperature (°C)  
R<sub>dson</sub> vs Junction Temperature

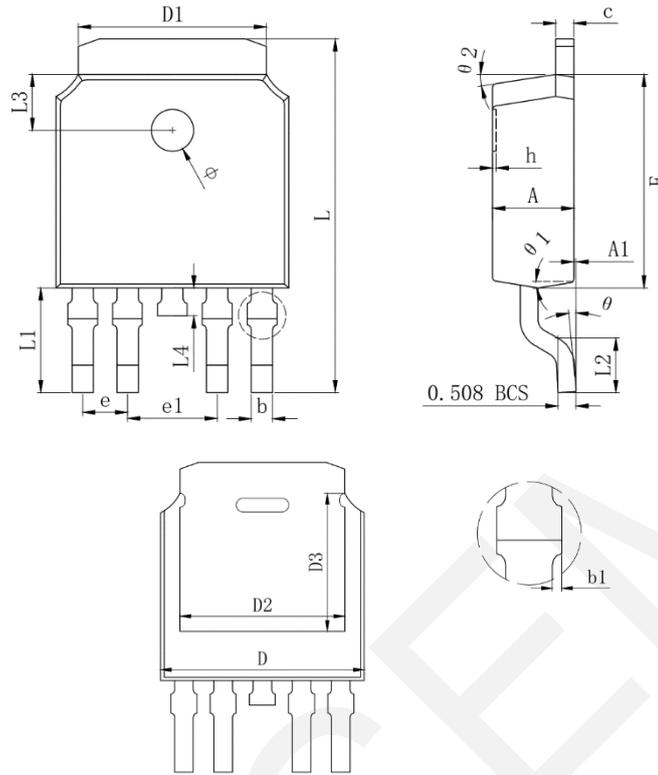




Normalized Maximum Transient Thermal Impedance



### 8.Package Dimensions



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.550	0.600	0.650
b1	0.000		0.120
c (电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	5.346 REF		
D3	4.490 REF		
E	6.000	6.100	6.200
e	1.270 TYP		
e1	2.540 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.700	0.800	0.900
$\phi$	1.100	1.200	1.300
$\theta$	0°		8°
$\theta 1$	9° TYP		
$\theta 2$	9° TYP		

## 9. Important Notice

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