

**Features**

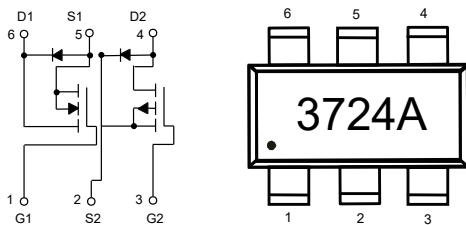
- High Density Cell Design for Low  $R_{DS(on)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings**

- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 62.5°C/W Junction to Case

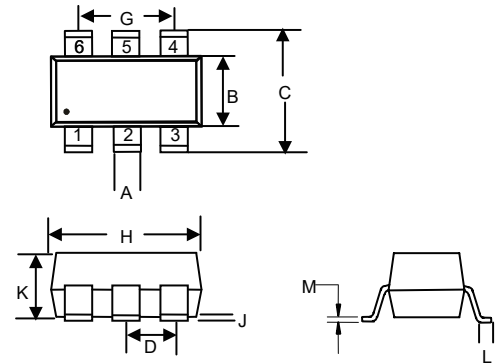
Parameter	Symbol	Rating	Unit
Total Power Dissipation	$P_D$	2	W
<b>N-Channel</b>			
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	4.5	A
<b>P-Channel</b>			
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	-3.5	A

**Internal Structure and Marking Code**



**Dual  
N&P-Channel  
MOSFET**

**SOT23-6L**



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.012	0.020	0.30	0.50	
B	0.051	0.070	1.30	1.80	
C	0.087	0.126	2.20	3.20	
D	0.037		0.95		TYP.
G	0.074		1.90		TYP.
H	0.106	0.122	2.70	3.10	
J	0.002	0.006	0.05	0.15	
K	0.030	0.051	0.75	1.30	
L	0.012	0.024	0.30	0.60	
M	0.003	0.008	0.08	0.22	

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**
**N-Channel**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
Drain-Source On-Resistance <sup>(Note1)</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=3A$			35	m $\Omega$
		$V_{GS}=4.5V, I_D=2A$			50	m $\Omega$
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note1)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=1A$			1.2	V
Reverse Recovery Time	$t_{rr}$	$I_{SD}=3.6 A, dI_{SD}/dt=100A/\mu s$		17.3		nS
Reverse Recovery Charge	$Q_{rr}$			1.66		nC
<b>Dynamic Characteristics<sup>(Note2)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V, f=1MHz$		315		pF
Output Capacitance	$C_{oss}$			59		
Reverse Transfer Capacitance	$C_{rss}$			48		
Total Gate Charge	$Q_g$	$V_{DS}=10V, V_{GS}=15V, I_D=3.6A$		6.08		nC
Gate-Source Charge	$Q_{gs}$			1.26		
Gate-Drain Charge	$Q_{gd}$			1.32		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V, V_{DS}=15V, R_{GEN}=3\Omega, R_L=4.1\Omega$		3.8		ns
Turn-On Rise Time	$t_r$			23.2		
Turn-Off Delay Time	$t_{d(off)}$			7		
Turn-Off Fall Time	$t_f$			18.6		

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**
**P-Channel**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$			-1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.5	V
Drain-Source On-Resistance <sup>(Note1)</sup>	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-3A$			90	m $\Omega$
		$V_{GS}=-4.5V, I_D=-2A$			115	m $\Omega$
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note1)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-1A$			-1.2	V
Reverse Recovery Time	$t_{rr}$	$I_{SD}=-3A, dI_{SD}/dt=100A/\mu s$		25		nS
Reverse Recovery Charge	$Q_{rr}$			3.8		nC
<b>Dynamic Characteristics<sup>(Note2)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$		365		pF
Output Capacitance	$C_{oss}$			59		
Reverse Transfer Capacitance	$C_{rss}$			45		
Total Gate Charge	$Q_g$	$V_{DS}=-10V, V_{GS}=-15V, I_D=-3A$		7.5		nC
Gate-Source Charge	$Q_{gs}$			1.7		
Gate-Drain Charge	$Q_{gd}$			1.2		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=-10V, V_{DS}=-15V, R_{GEN}=2.5\Omega, I_{DS}=-1A$		3.2		ns
Turn-On Rise Time	$t_r$			17.8		
Turn-Off Delay Time	$t_{d(off)}$			18		
Turn-Off Fall Time	$t_f$			23.5		

**Notes:**

1. Pulse Test: Pulse Width=300 $\mu s$ , Duty Cycle $\leq 2\%$ .
2. These Parameters Have No Way To Verify.

**Curve Characteristics (N-Channel)**

Fig. 1 - Output Characteristics

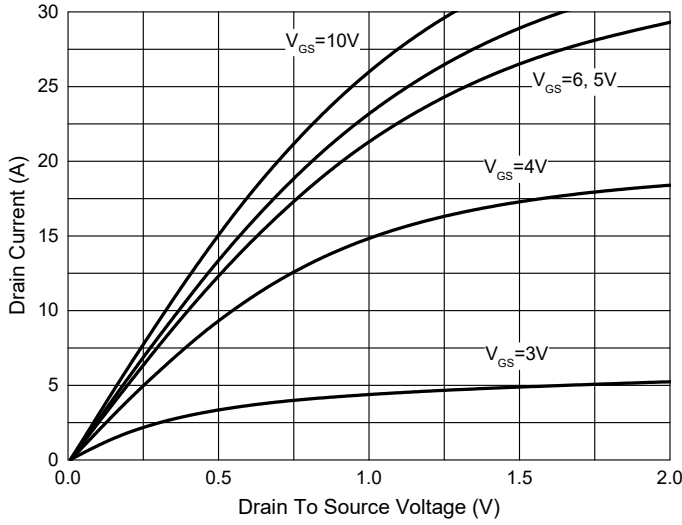


Fig. 2 - Transfer Characteristics

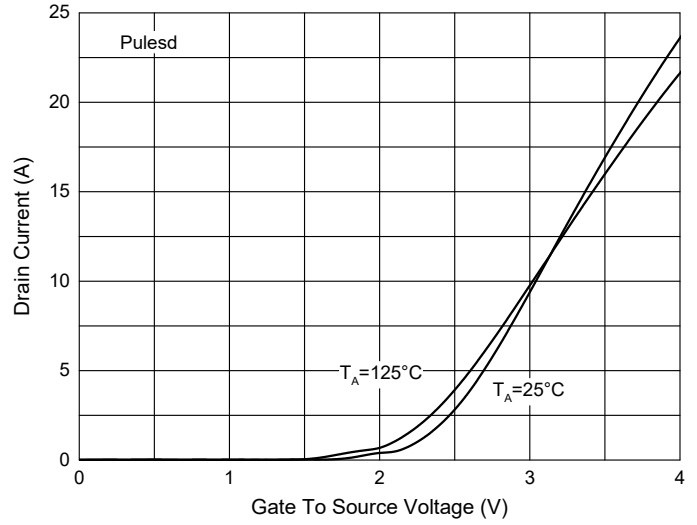


Fig. 3 -  $R_{DS(ON)} - I_D$

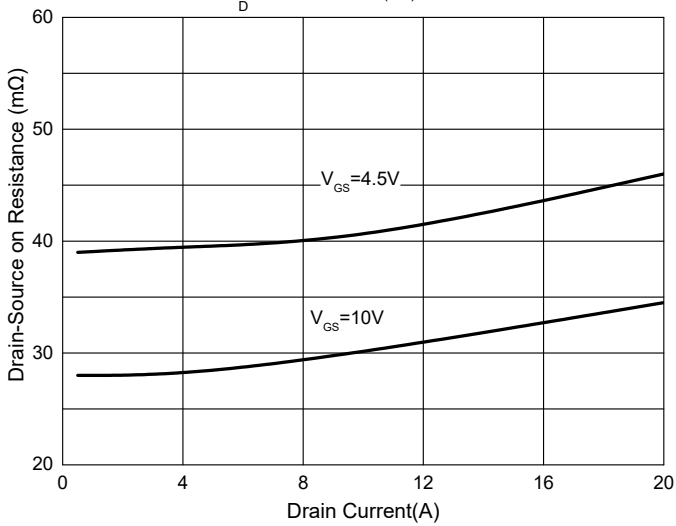


Fig. 4 - Normalized On Resistance Characteristics

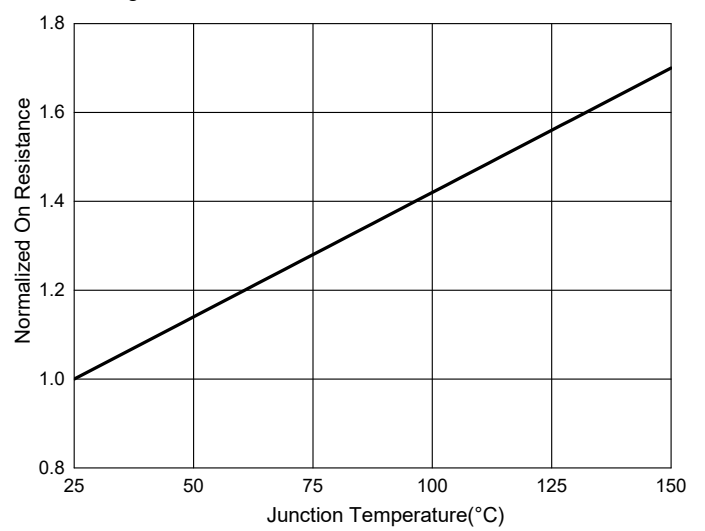


Fig. 5 - Gate Charge

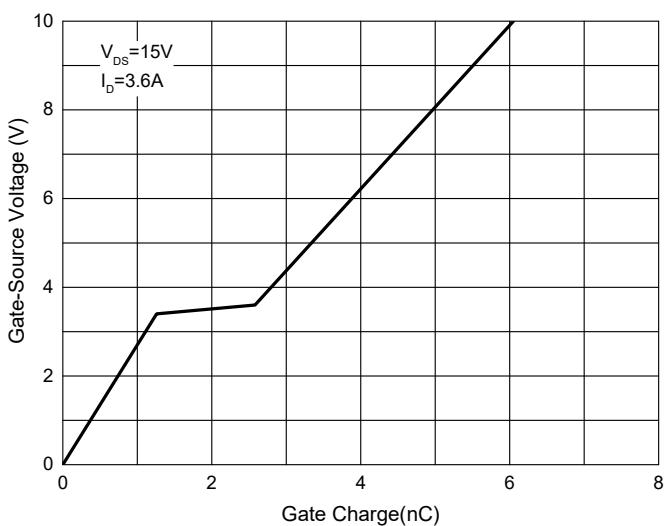
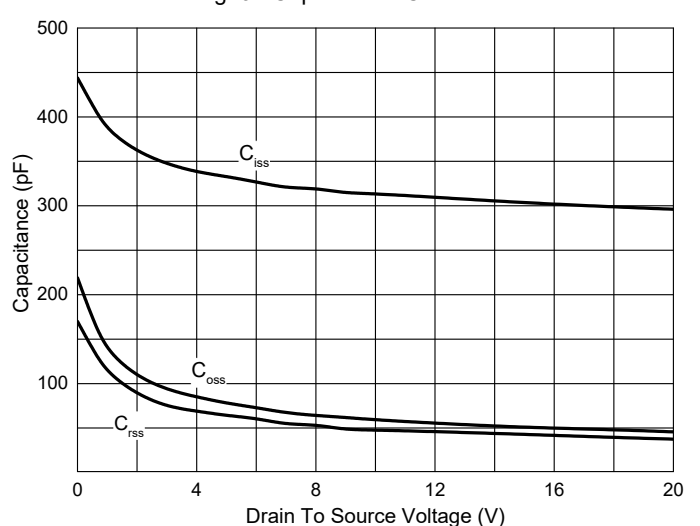


Fig. 6 - Capacitance Characteristics



**Curve Characteristics (P-Channel)**

Fig. 7 - Output Characteristics

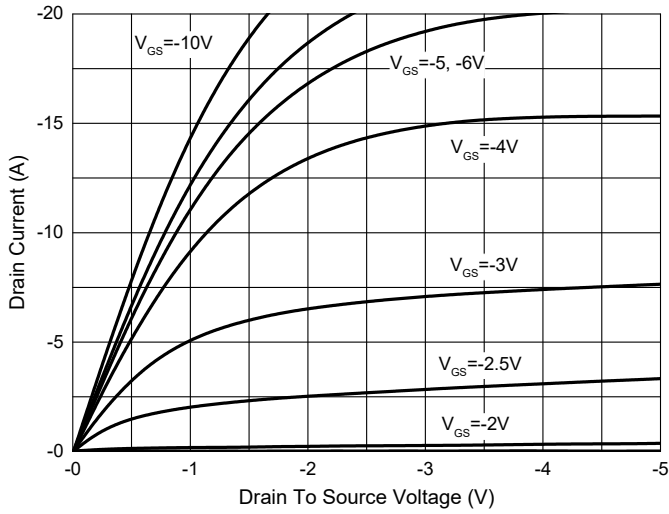


Fig. 8 - Transfer Characteristics

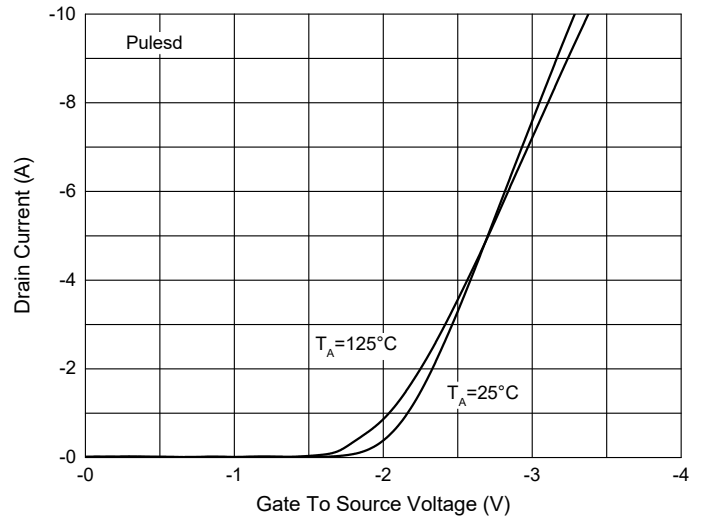


Fig. 9 -  $R_{DS(ON)} - I_D$

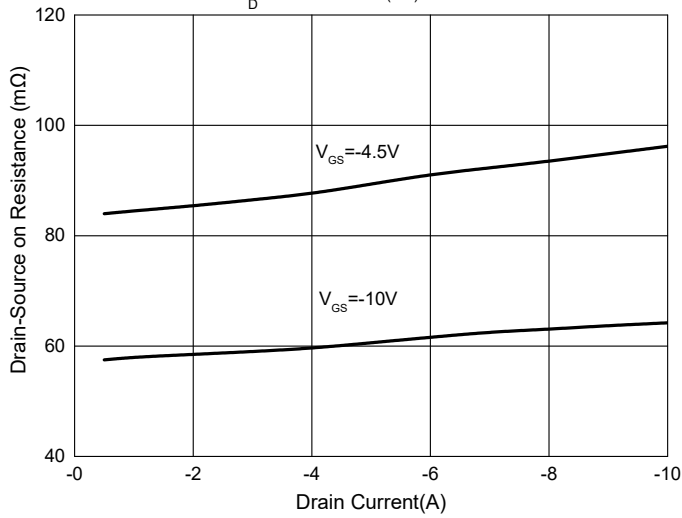


Fig. 10 - Normalized On Resistance Characteristics

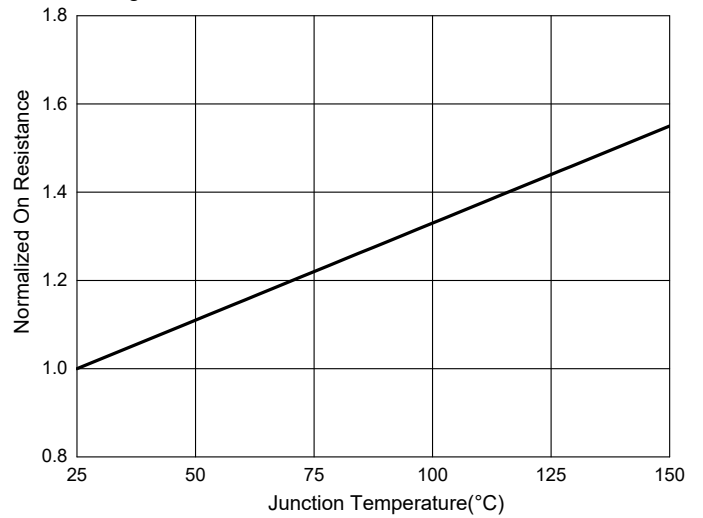


Fig. 11 - Gate Charge

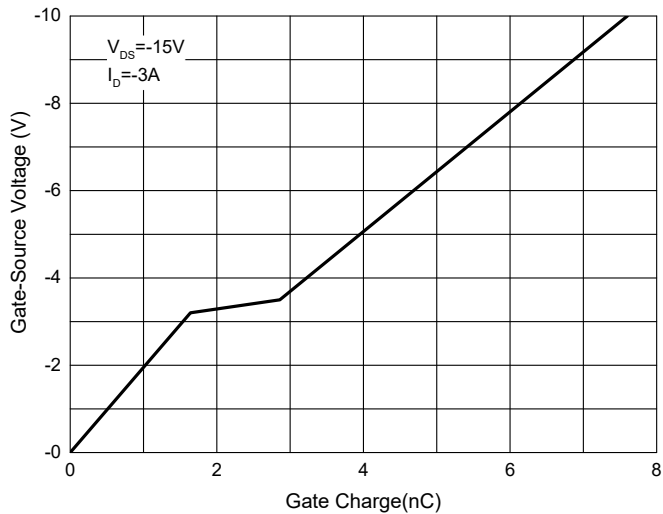
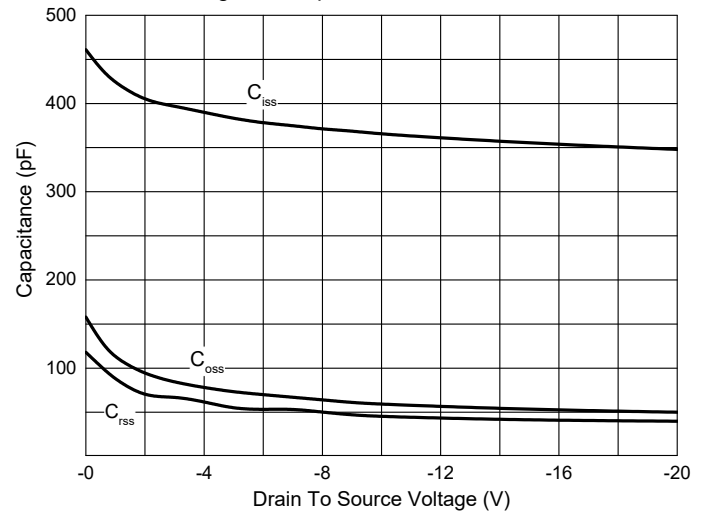


Fig. 12 - Capacitance Characteristics



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

Note : Adding "-HF" Suffix for Halogen Free, eg. Part Number-TP-HF

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