

**Features**

- Trench FET Structure
- High Dense Cell Design for Extremely Low  $R_{DS(ON)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)
- Moisture Sensitivity Level 1

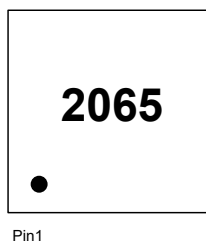
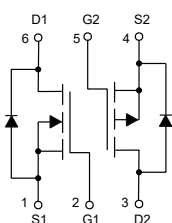
**Maximum Ratings**

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Typical Thermal Resistance: 62.5°C/W Junction to Ambient(Note2)

Parameter	Symbol	Rating	Unit
<b>N-Channel</b>			
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	±10	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	6
		$T_A=70^\circ\text{C}$	4.8
Pulsed Drain Current	$I_{DM}$	20	A
Total Power Dissipation	$P_D$	2.2	W
<b>P-Channel</b>			
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	±10	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	-6
		$T_A=70^\circ\text{C}$	-4.8
Pulsed Drain Current	$I_{DM}$	-20	A
Total Power Dissipation	$P_D$	1.8	W

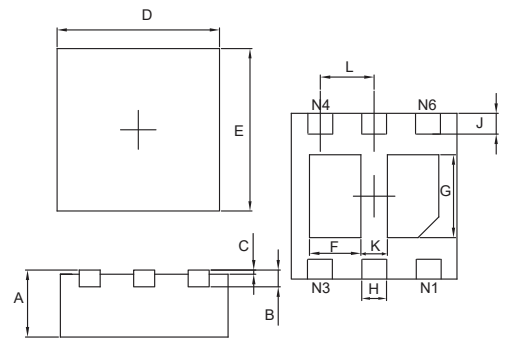
Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.  
2. Surface Mounted on 1 square inch of 2oz copper for FR4 Board.

**Internal Structure and Marking Code**



**Dual  
N&P-Channel  
MOSFET**

**DFN2020-6L**



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.030	0.034	0.750	0.850	
B	0.008		0.200		TYP.
C	0.000	0.002	0.000	0.050	
D	0.077	0.081	1.950	2.050	
E	0.077	0.081	1.950	2.050	
F	0.017	0.027	0.440	0.690	
G	0.033	0.043	0.840	1.090	
H	0.010	0.014	0.250	0.350	
J	0.007	0.015	0.175	0.375	
K	0.010	0.014	0.250	0.350	
L	0.026		0.650		TYP.

**N-MOSFET ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 10V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$			1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	0.6	1.0	V
Drain-Source On-Resistance <sup>(Note3)</sup>	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=5A$		20	25	m $\Omega$
		$V_{GS}=2.5V, I_D=4A$		25	32	m $\Omega$
		$V_{GS}=1.8V, I_D=2A$		33	49	m $\Omega$
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=3A$			1.2	V
Reverse Recovery Time	$t_{rr}$	$I_{SD}=4.5 A, dI_{SD}/dt=100A/\mu s$		17.9		nS
Reverse Recovery Charge	$Q_{rr}$			1.38		nC
<b>Dynamic Characteristics<sup>(Note4)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V, f=1MHz$		418		pF
Output Capacitance	$C_{oss}$			82		
Reverse Transfer Capacitance	$C_{rss}$			70		
Total Gate Charge	$Q_g$	$V_{GS}=4.5V, V_{DS}=10V, I_D=4.5A$		6.07		nC
Gate-Source Charge	$Q_{gs}$			1.16		
Gate-Drain Charge	$Q_{gd}$			1.64		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=4.5V, V_{DS}=10V, R_L=1.5\Omega$ $R_{GEN}=3\Omega, I_{DS}=4.5A$		8.1		ns
Turn-On Rise Time	$t_r$			52.9		
Turn-Off Delay Time	$t_{d(off)}$			23.5		
Turn-Off Fall Time	$t_f$			57.9		

Notes:

 3.Pulse Test: Pulse Width $\leq 300\mu A$ , Duty Cycles $\leq 2\%$ .

4.Guaranteed by Design, Not Subject to Production Testing.

**P-MOSFET ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 10V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-20V, V_{GS}=0V$			-1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.6	-1.0	V
Drain-Source On-Resistance <sup>(Note3)</sup>	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-5A$		33	42	m $\Omega$
		$V_{GS}=-2.5V, I_D=-4A$		39	55	m $\Omega$
		$V_{GS}=-1.8V, I_D=-3A$		49	75	m $\Omega$
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-3A$			-1.2	V
Reverse Recovery Time	$t_{rr}$	$I_{SD}=-4 A, di_{SD}/dt=100A/\mu s$		24.8		nS
Reverse Recovery Charge	$Q_{rr}$			4.38		nC
<b>Dynamic Characteristics<sup>(Note4)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$		1010		pF
Output Capacitance	$C_{oss}$			130		
Reverse Transfer Capacitance	$C_{rss}$			109		
Total Gate Charge	$Q_g$	$V_{GS}=-4.5V, V_{DS}=-10V, I_D=-4A$		9.33		nC
Gate-Source Charge	$Q_{gs}$			2.05		
Gate-Drain Charge	$Q_{gd}$			2.19		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=-4.5V, V_{DS}=-10V, R_L=2.5\Omega$ $R_{GEN}=3\Omega, I_{DS}=-4A$		8.2		ns
Turn-On Rise Time	$t_r$			53.1		
Turn-Off Delay Time	$t_{d(off)}$			23.3		
Turn-Off Fall Time	$t_f$			58.4		

## N-MOSFET Curve Characteristics

Fig. 1 - Output Characteristics

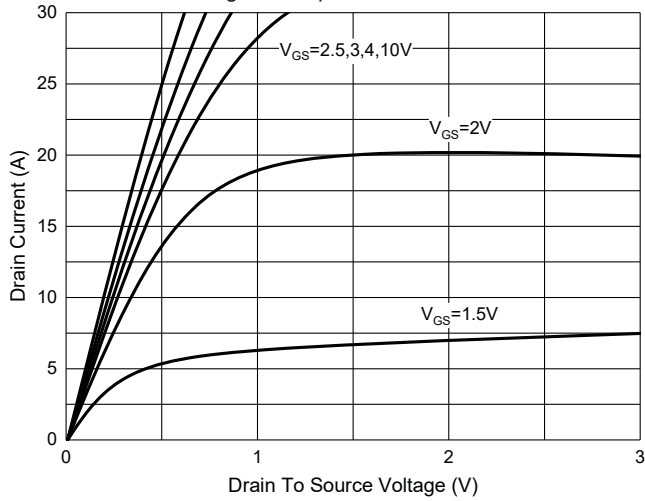


Fig. 2 - Transfer Characteristics

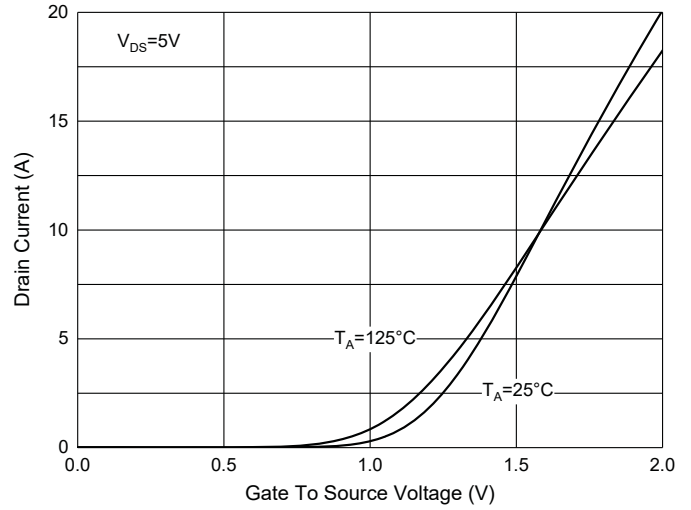


Fig. 3 - Normalized On Resistance Characteristics

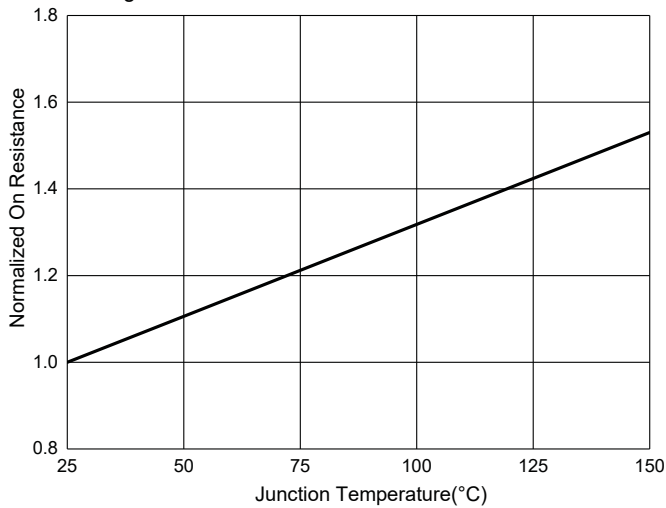


Fig. 4 - Gate Charge

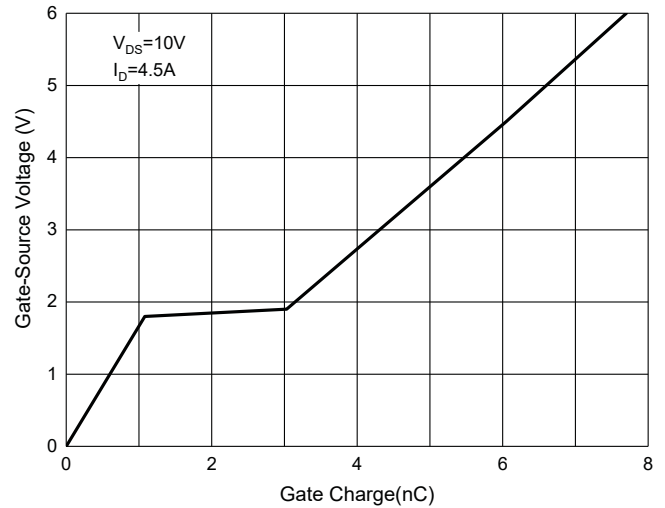


Fig. 5 - Capacitance Characteristics

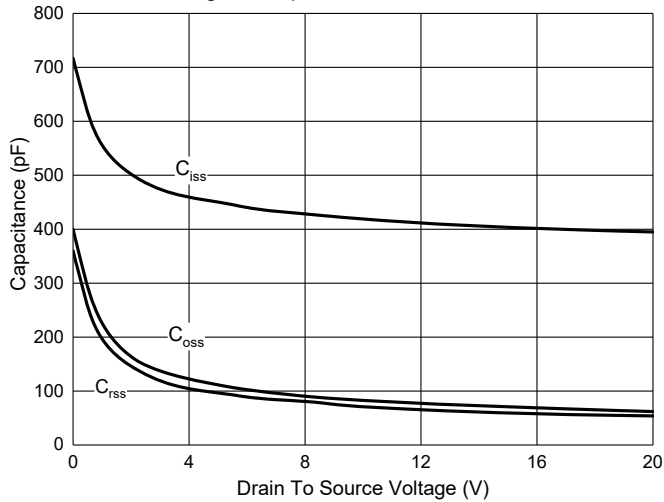
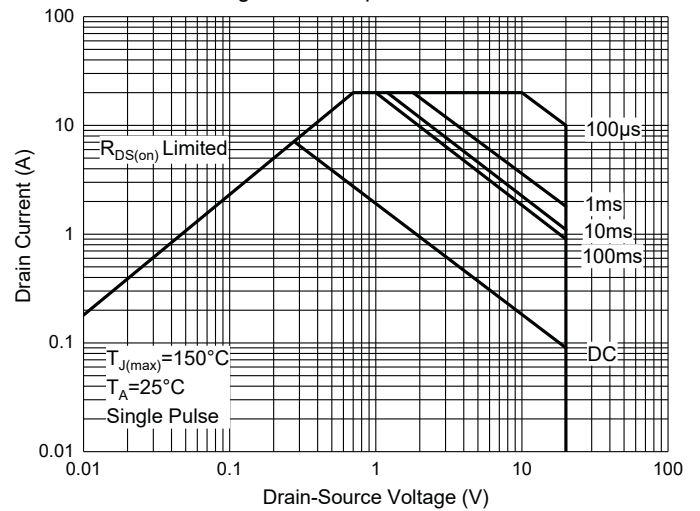


Fig. 6 - Safe Operation Area



**P-MOSFET Curve Characteristics**

Fig. 7 - Output Characteristics

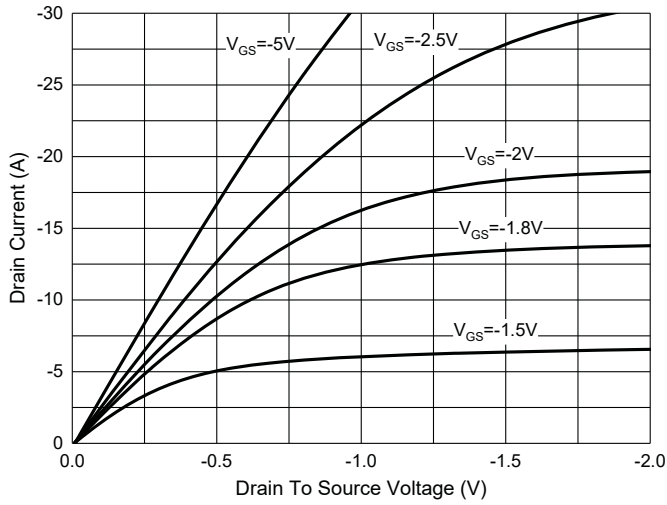


Fig. 8 - Transfer Characteristics

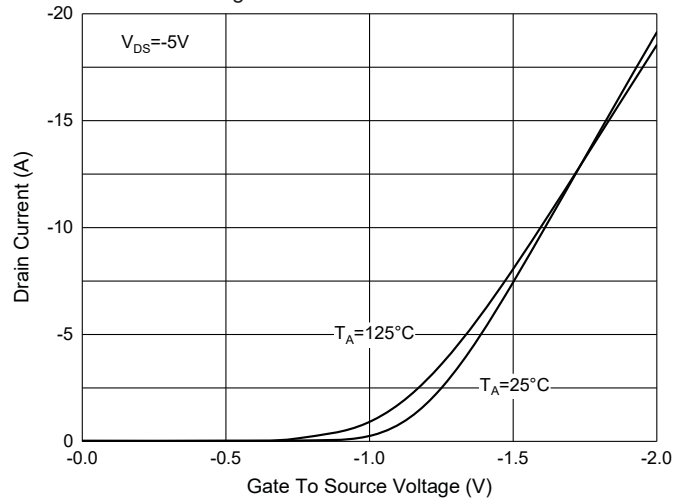


Fig. 9 - Normalized On Resistance Characteristics

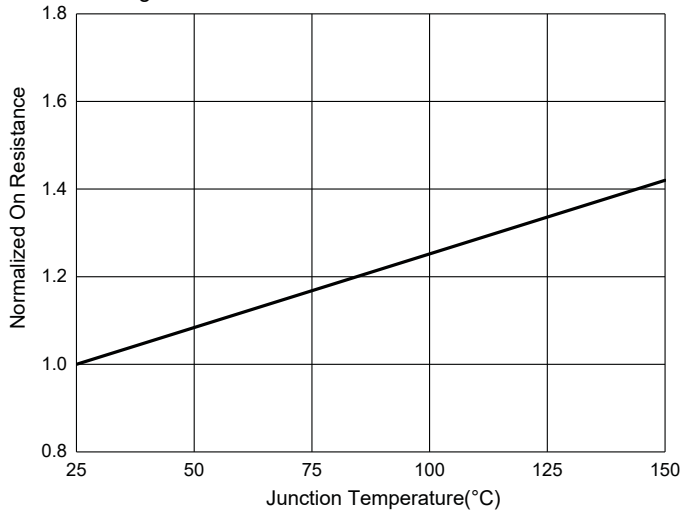


Fig. 10 - Gate Charge

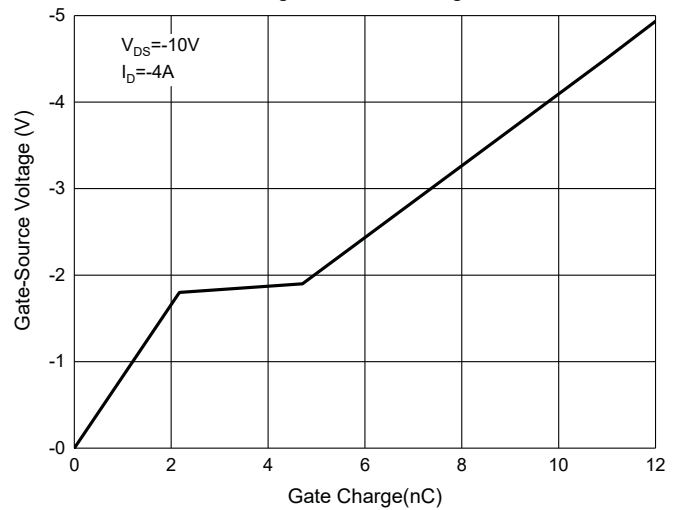


Fig. 11 - Capacitance Characteristics

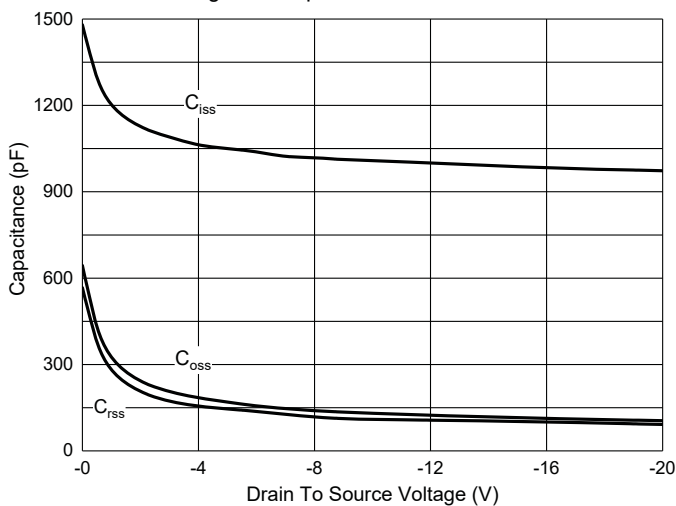
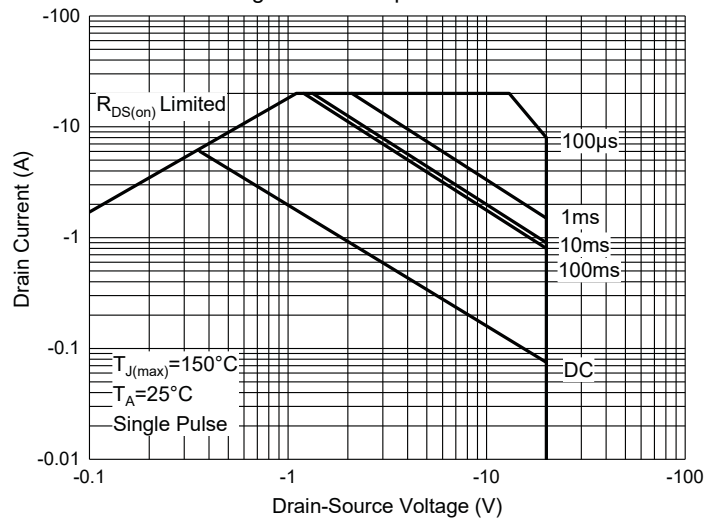


Fig. 12 - Safe Operation Area



## Ordering Information

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

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