



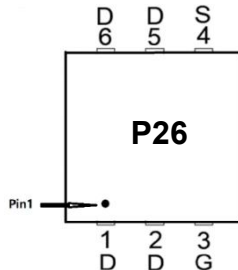
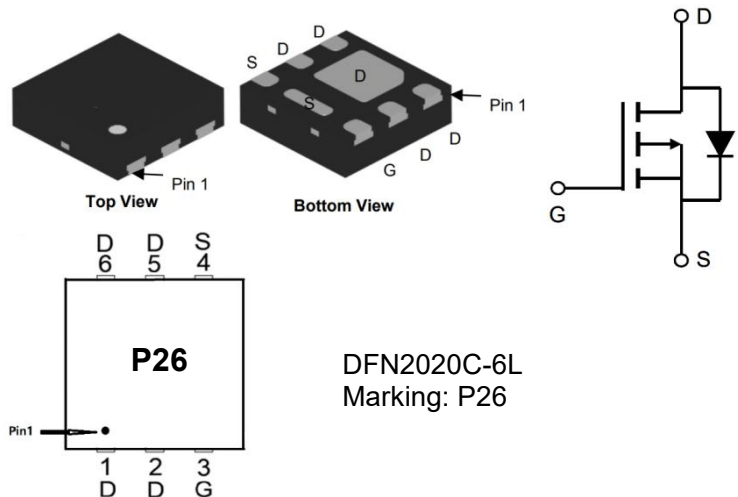
## P-Channel Enhancement Mode MOSFET

### Features

- Advanced trench cell design
- Low Thermal Resistance
- Low Gate Charge
- Fast Switching Speed
- Halogen-Free & Lead-Free

### Application

- Load Switch for Portable Devices
- DC-DC converters
- Voltage controlled small signal switch



DFN2020C-6L  
Marking: P26

### Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 10$	V
Continuous Drain Current	$I_D$	5	A
Peak Drain Current, Pulsed <sup>1)</sup>	$I_{DM}$	-24	A
Power Dissipation <sup>2)</sup>	$P_{tot}$	1.4	W
Operating Junction	$T_J$	-55~150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient <sup>2)</sup>	$R_{\theta JA}$	88	$^\circ\text{C/W}$

Note:

1) Pulse width  $\leq 100\mu\text{s}$ , duty cycle  $\leq 1\%$ , limited by  $T_{jmax}$ .

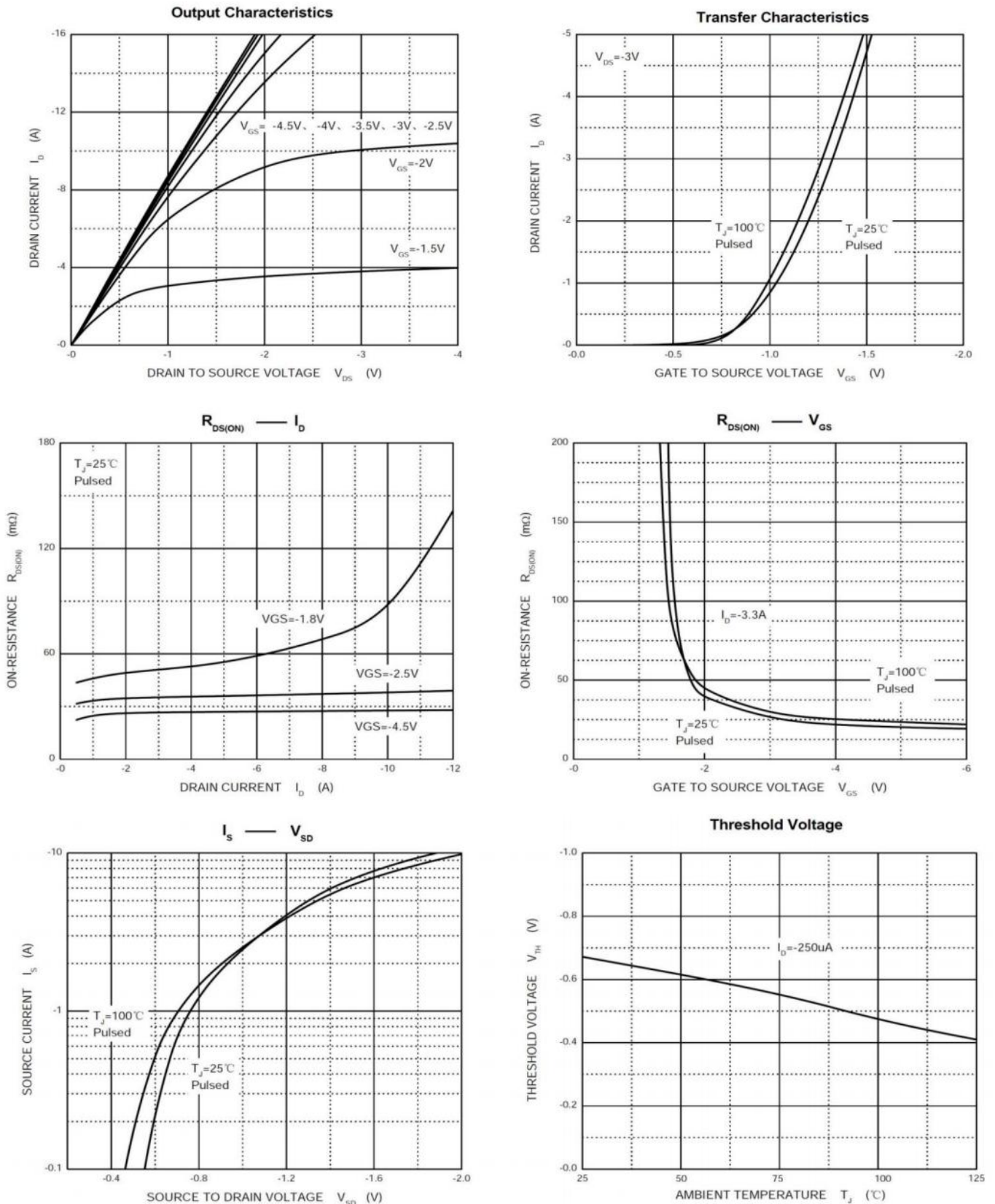
2) Device mounted on FR-4 substrate PC board, 2ozcopper, with 1-inch square copper plate in still air.

**Characteristics at Ta = 25°C unless otherwise specified**

Parameter	Symbol	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>					
Drain-Source Breakdown Voltage at $I_D = -250 \mu\text{A}$	$BV_{DSS}$	-20			V
Drain-Source Leakage Current at $V_{DS} = -20 \text{ V}$	$I_{DSS}$			-1	$\mu\text{A}$
Gate Leakage Current at $V_{GS} = \pm 10 \text{ V}$	$I_{GSS}$			$\pm 100$	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$ , $I_D = -250 \mu\text{A}$	$V_{GS(th)}$	-0.4	-0.65	-1.0	V
Drain-Source On-State Resistance at $V_{GS} = -4.5 \text{ V}$ , $I_D = -5 \text{ A}$ at $V_{GS} = -2.5 \text{ V}$ , $I_D = -3 \text{ A}$	$R_{DS(on)}$		32 42	42 60	m $\Omega$
<b>DYNAMIC PARAMETERS</b>					
Input Capacitance at $V_{GS} = 0 \text{ V}$ , $V_{DS} = -4 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{iss}$		740		pF
Output Capacitance at $V_{GS} = 0 \text{ V}$ , $V_{DS} = -4 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{oss}$		290		pF
Reverse Transfer Capacitance at $V_{GS} = 0 \text{ V}$ , $V_{DS} = -4 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{rss}$		190		pF
Gate charge total at $V_{DS} = -2.5 \text{ V}$ , $I_D = -4.1 \text{ A}$ , $V_{GS} = -4.5 \text{ V}$	$Q_g$		4.5		nC
Gate to Source Charge at $V_{DS} = -2.5 \text{ V}$ , $I_D = -4.1 \text{ A}$ , $V_{GS} = -4.5 \text{ V}$	$Q_{gs}$		1.2		nC
Gate to Drain Charge at $V_{DS} = -2.5 \text{ V}$ , $I_D = -4.1 \text{ A}$ , $V_{GS} = -4.5 \text{ V}$	$Q_{gd}$		1.6		nC
Turn-On Delay Time at $V_{GS} = -4.5 \text{ V}$ , $V_{DS} = -4 \text{ V}$ , $R_L = 1.2 \Omega$ , $R_g = 1 \Omega$	$t_{d(on)}$		13		nS
Turn-On Rise Time at $V_{GS} = -4.5 \text{ V}$ , $V_{DS} = -4 \text{ V}$ , $R_L = 1.2 \Omega$ , $R_g = 1 \Omega$	$t_r$		35		nS
Turn-Off Delay Time at $V_{GS} = -4.5 \text{ V}$ , $V_{DS} = -4 \text{ V}$ , $R_L = 1.2 \Omega$ , $R_g = 1 \Omega$	$t_{d(off)}$		32		ns
Turn-Off Fall Time at $V_{GS} = -4.5 \text{ V}$ , $V_{DS} = -4 \text{ V}$ , $R_L = 1.2 \Omega$ , $R_g = 1 \Omega$	$t_f$		10		nS
<b>Body-Diode PARAMETERS</b>					
Drain-Source Diode Forward Voltage at $I_S = -1 \text{ A}$ , $V_{GS} = 0 \text{ V}$	$V_{SD}$			-1.2	V



### Electrical Characteristics Curves





Test Circuits

Fig.1-1 Switching times test circuit

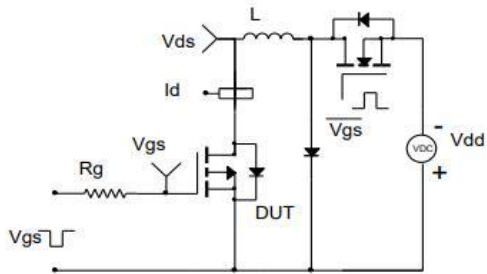


Fig.1-2 Switching Waveform

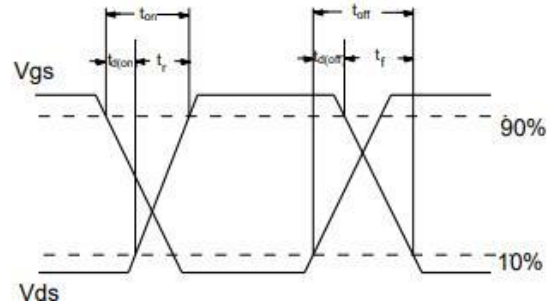


Fig.2-1 Gate charge test circuit

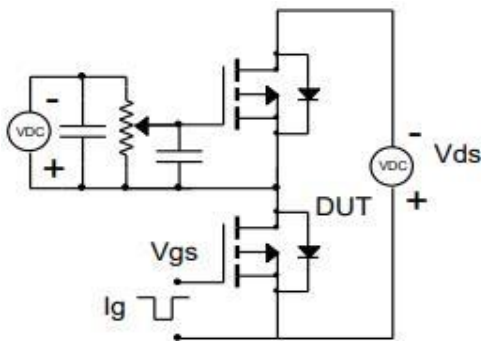


Fig.2-2 Gate charge waveform

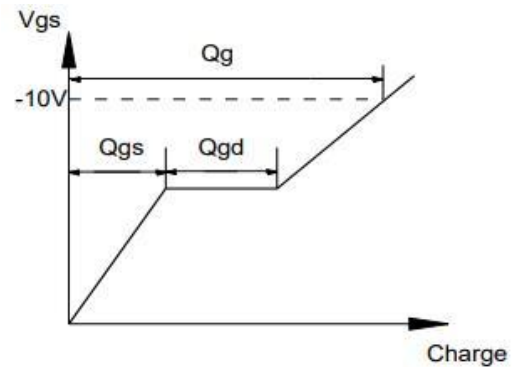


Fig.3-1 Avalanche test circuit

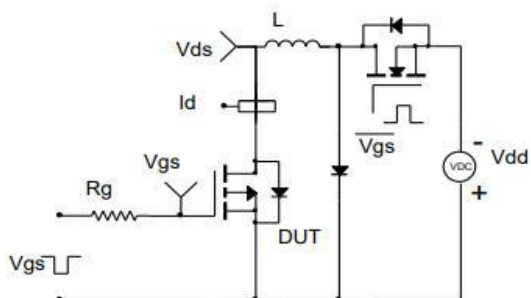
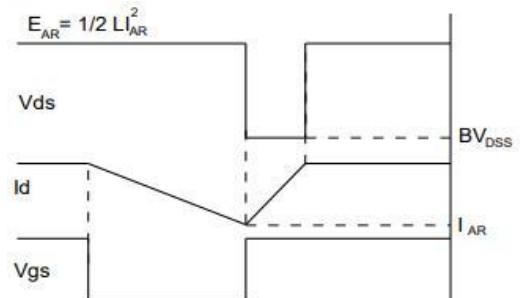


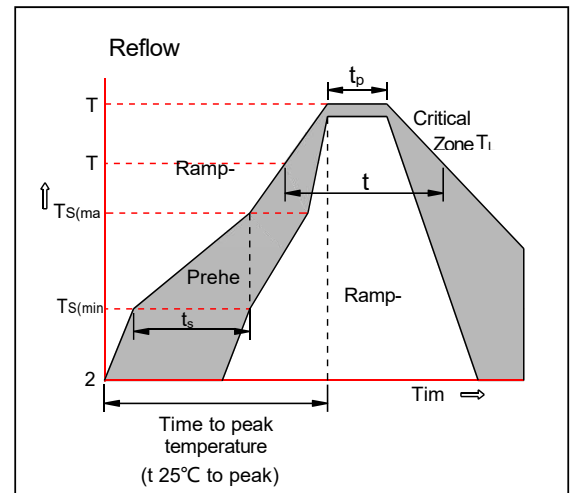
Fig.3-2 Avalanche waveform





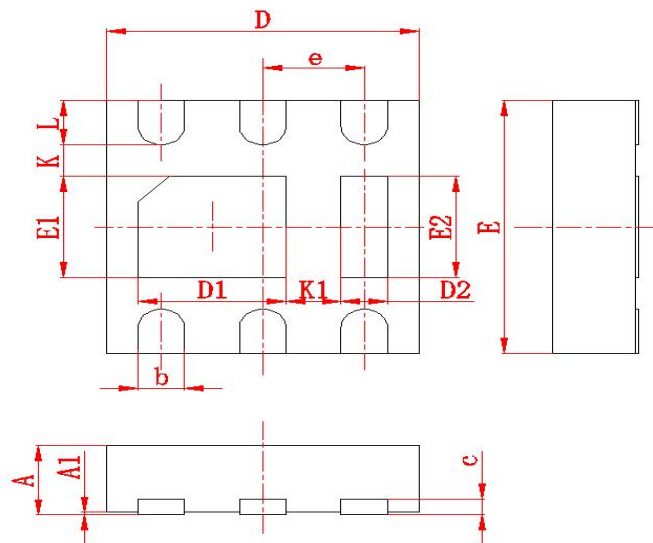
**Soldering parameters**

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature( $T_L$ )(Liquid us)	+217°C
	-Temperature( $t_L$ )	60-150 secs.
Peak Temp ( $T_P$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_P$ )		8 min. Max
Do not exceed		+260°C



**Package Outline Dimensions (Units: mm)**

**DFN2020C-6L**



符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max
A	0.5	0.6	E	1.9	2.1	e	(0.65)	
A1	0	0.05	E1	0.75	0.85	b	0.25	0.35
D	1.9	2.1	E2	0.75	0.85	c	(0.127)	
D1	0.9	1.0	K	(0.25)		L	0.3	0.4
D2	0.25	0.35	K1	(0.35)				