

## Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

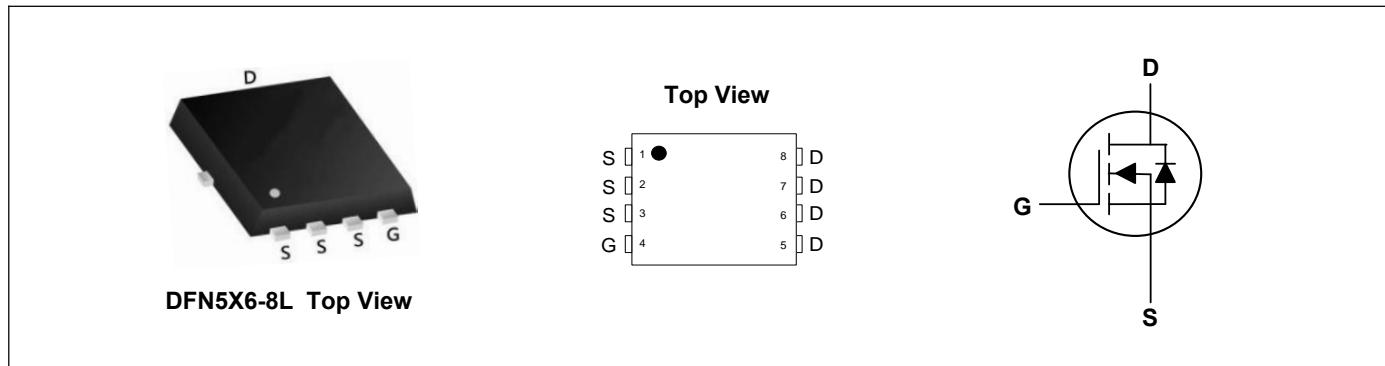
## Product Summary



$V_{DS}$	40	V
$I_D$	142	A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	2.8	mΩ
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	3.8	mΩ

## Applications

- High Frequency Point-of-Load,Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch



## Absolute Maximum Ratings( $T_c=25^\circ C$ , unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>1</sup>	$I_D @ T_c = 25^\circ C$	142	A
Continuous Drain Current <sup>1</sup>	$I_D @ T_c = 100^\circ C$	92	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	142	A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	68	mJ
Avalanche Current	$I_{AS}$	37	A
Total Power Dissipation <sup>4</sup>	$P_D @ T_c = 25^\circ C$	87	W
Storage Temperature Range	$T_{STG}$	-55 to 150	°C
Operating Junction Temperature Range	$T_J$	-55 to 150	°C

## Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient <sup>1</sup>	$R_{\theta JA}$	---	50	°C/W
Thermal Resistance Junction-Case <sup>1</sup>	$R_{\theta JC}$	---	1.4	°C/W

**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}}=0\text{V}$ , $I_D=250\mu\text{A}$	40	---	---	V
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}$ , $I_D=20\text{A}$	---	2.3	2.8	$\text{m}\Omega$
		$V_{\text{GS}}=4.5\text{V}$ , $I_D=15\text{A}$	---	2.9	3.8	$\text{m}\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}$ , $I_D=250\mu\text{A}$	1	1.5	2	V
Drain-Source Leakage Current	$I_{\text{DSS}}$	$V_{\text{DS}}=32\text{V}$ , $V_{\text{GS}}=0\text{V}$	---	---	1	$\mu\text{A}$
Gate-Source Leakage Current	$I_{\text{GSS}}$	$V_{\text{GS}}=\pm 20\text{V}$ , $V_{\text{DS}}=0\text{V}$	---	---	$\pm 100$	nA
Forward Transconductance	$g_{\text{fs}}$	$V_{\text{DS}}=5\text{V}$ , $I_D=10\text{A}$	---	46.4	---	S
Gate Resistance	$R_g$	$V_{\text{DS}}=0\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $f=1\text{MHz}$	---	1.6	---	$\Omega$
Total Gate Charge	$Q_g$	$V_{\text{DS}}=20\text{V}$ , $V_{\text{GS}}=10\text{V}$ , $I_D=20\text{A}$	---	156	---	nC
Gate-Source Charge	$Q_{\text{gs}}$		---	29	---	
Gate-Drain Charge	$Q_{\text{gd}}$		---	26	---	
Turn-On Delay Time	$T_{\text{d}(\text{on})}$	$V_{\text{DS}}=25\text{V}$ , $V_{\text{GS}}=10\text{V}$ , $R_G=6\Omega$ , $I_D=1\text{A}$	---	20.8	---	ns
Rise Time	$T_r$		---	26	---	
Turn-Off Delay Time	$T_{\text{d}(\text{off})}$		---	213	---	
Fall Time	$T_f$		---	81	---	
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}}=20\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $f=1\text{MHz}$	---	5440	---	pF
Output Capacitance	$C_{\text{oss}}$		---	480	---	
Reverse Transfer Capacitance	$C_{\text{rss}}$		---	400	---	

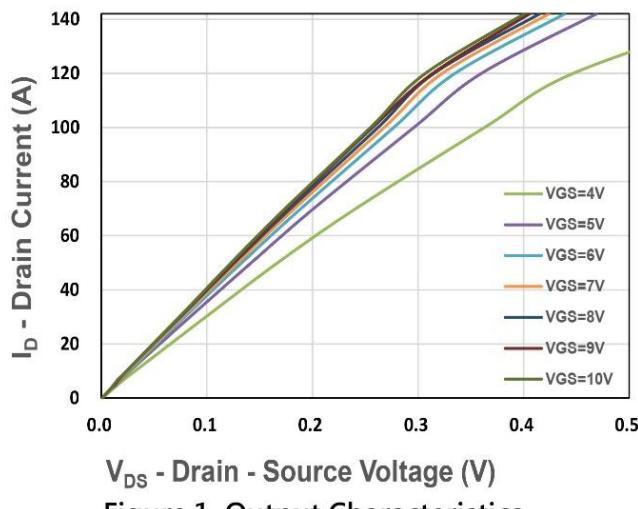
**Drain-Source Diode Characteristics**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage <sup>2</sup>	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}$ , $I_S=10\text{A}$	---	0.7	1.1	V
Reverse Recovery Time	$t_{\text{rr}}$	$I_F=10\text{A}$ , $V_R=20\text{V}$ $dI/dt=100\text{A}/\mu\text{s}$ , $T_J=25^\circ\text{C}$	---	31	---	nS
Reverse Recovery Charge	$Q_{\text{rr}}$		---	32.1	---	nC

**Note:**

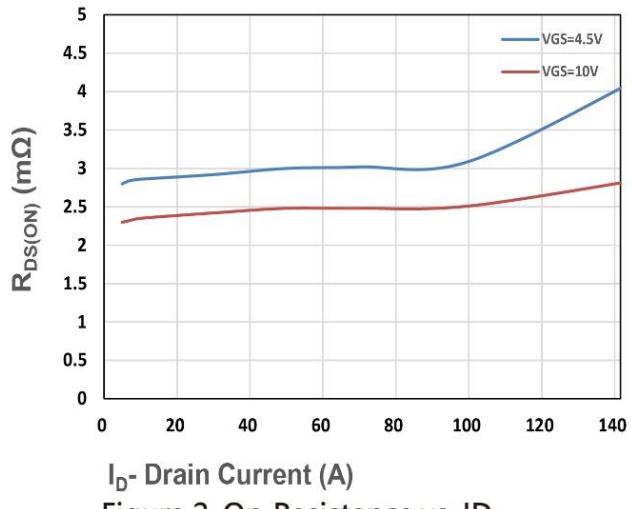
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{\text{DD}}=20\text{V}$ , $V_{\text{GS}}=10\text{V}$ , $L=0.1\text{mH}$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  junction temperature

## Typical Characteristics



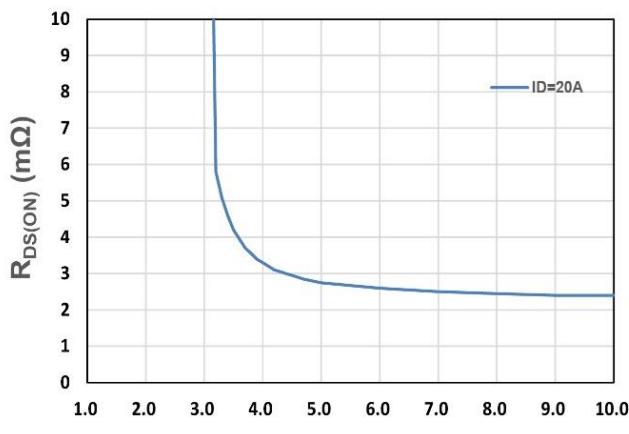
$V_{DS}$  - Drain - Source Voltage (V)

Figure 1. Output Characteristics



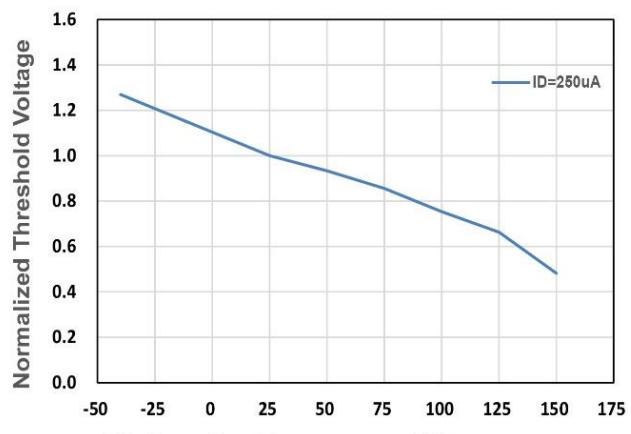
$I_D$  - Drain Current (A)

Figure 2. On-Resistance vs. ID



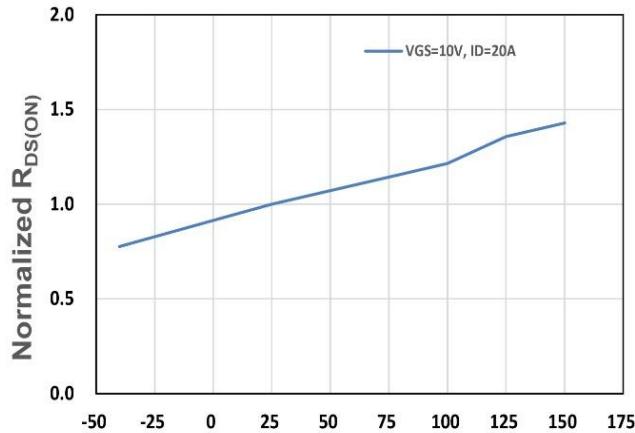
$V_{GS}$  - Gate - Source Voltage (V)

Figure 3. On-Resistance vs. VGS



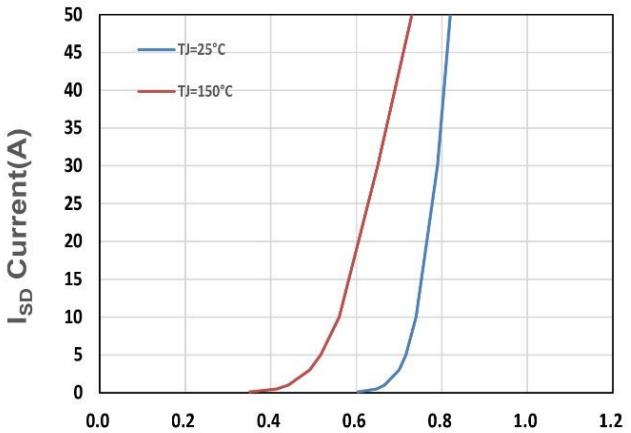
$T_j$ , Junction Temperature(°C)

Figure 4. Gate Threshold Voltage



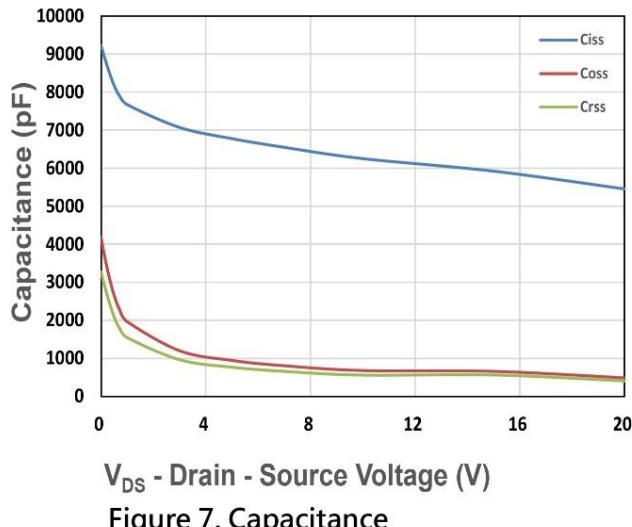
$T_j$  , Junction Temperature(°C)

Figure 5. Drain-Source On Resistance



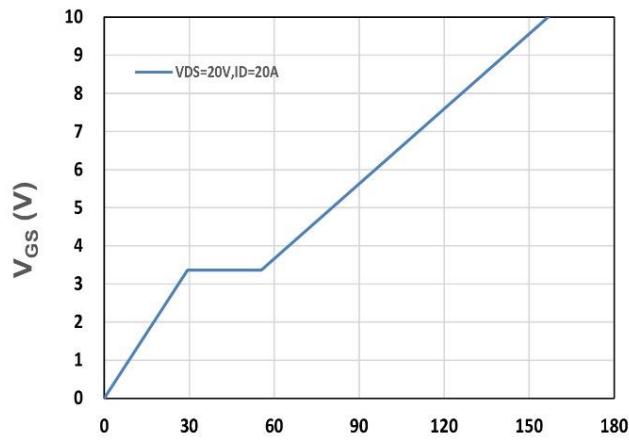
$V_{SD}$ , Source-Drain Voltage(V)

Figure 6. Source-Drain Diode Forward



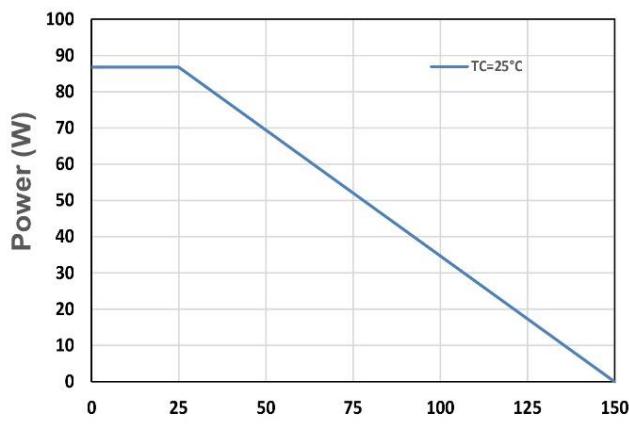
V<sub>DS</sub> - Drain - Source Voltage (V)

Figure 7. Capacitance



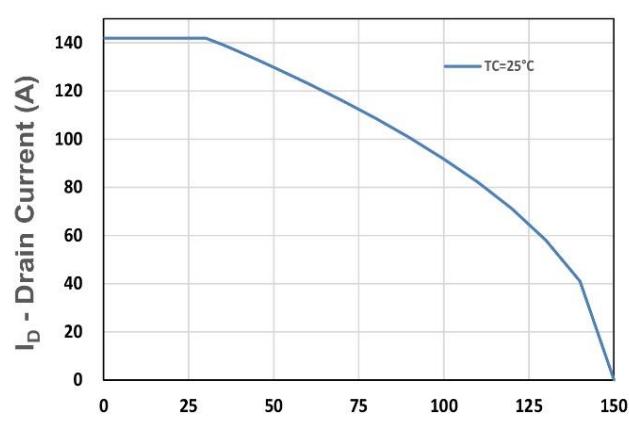
Q<sub>g</sub>, Total Gate Charge (nC)

Figure 8. Gate Charge Characteristics



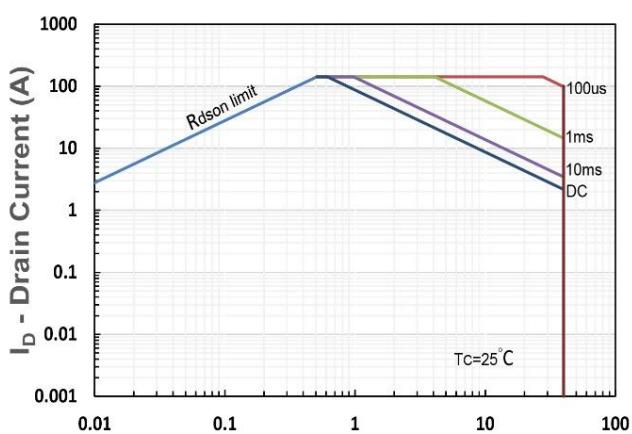
T<sub>c</sub> - Case Temperature (°C)

Figure 9. Power Dissipation



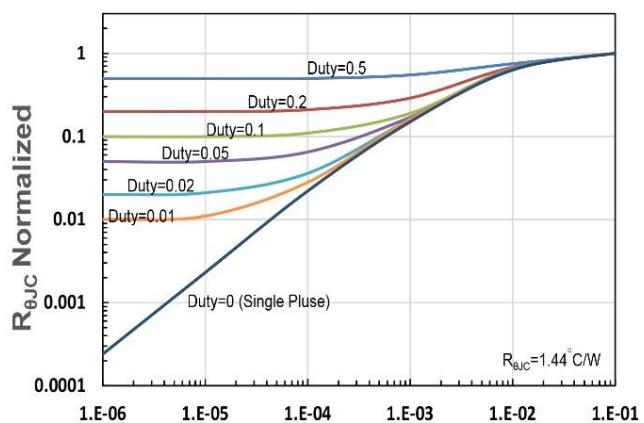
T<sub>c</sub> - Case Temperature (°C)

Figure 10. Drain Current



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

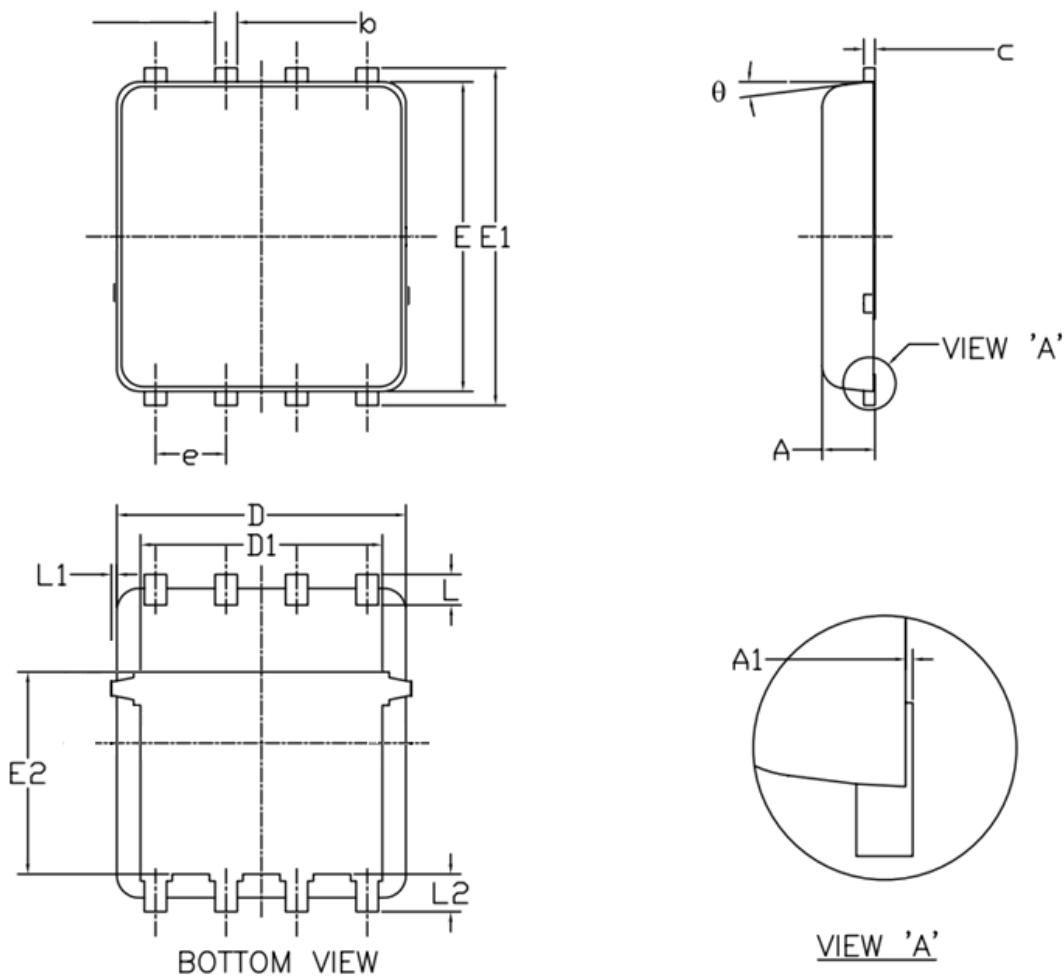
Figure 11. Safe Operating Area



t<sub>1</sub>, Square Wave Pulse Duration(s)

Figure 12. R<sub>θJC</sub> Transient Thermal Impedance

### DFN5X6-8L Package Outline Dimensions



<b>Symbol</b>	<b>Dimensions (unit:mm)</b>			<b>Symbol</b>	<b>Dimensions (unit:mm)</b>		
	<b>Min</b>	<b>Typ</b>	<b>Max</b>		<b>Min</b>	<b>Typ</b>	<b>Max</b>
<b>A</b>	0.90	1.00	1.20	<b>E1</b>	5.90	6.10	6.35
<b>A1</b>	0.00	--	0.05	<b>E2</b>	3.38	3.58	3.92
<b>b</b>	0.30	0.40	0.51	<b>e</b>	1.27 BSC		
<b>c</b>	0.20	0.25	0.33	<b>L</b>	0.51	0.61	0.71
<b>D</b>	4.80	4.90	5.40	<b>L1</b>	--	--	0.15
<b>D1</b>	3.61	4.00	4.25	<b>L2</b>	0.41	0.51	0.61
<b>E</b>	5.65	5.80	6.06	<b>θ</b>	0°	--	12°