

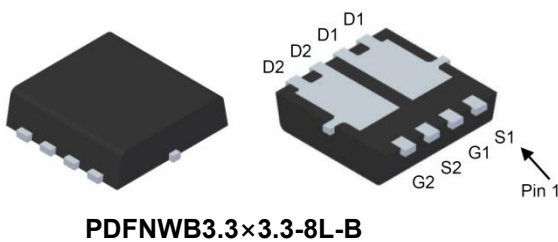
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
30V	11mΩ@10V	16A
	15mΩ@4.5V	
-30V	28mΩ@-10V	-8A
	38mΩ@-4.5V	

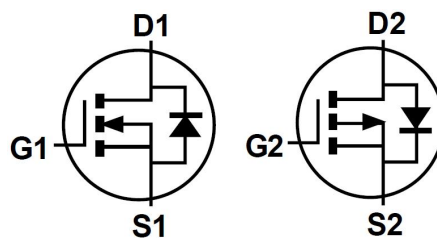
Feature

- N-Channel
 $V_{DS} = 30V, I_D = 16A$
 $R_{DS(ON)} < 15m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 28m\Omega @ V_{GS} = 4.5V$
- P-Channel
 $V_{DS} = -30V, I_D = -8A$
 $R_{DS(ON)} < 42m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 55m\Omega @ V_{GS} = -4.5V$
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

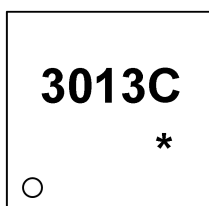
Package



Circuit diagram



Marking



3013C: Product code
 * : Month code

Absolute maximum ratings (Ta=25°C unless otherwise noted)

Parameter	Symbol	Value		Unit
		N-Channel	P-Channel	
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current	I_D	16	-8	A
Maximum Power Dissipation	P_D	2		W
Thermal Resistance from Junction to Ambient($t \leq 10s$)	$R_{\theta JA}$	62.5		$^{\circ}C/W$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	-55 To 150	$^{\circ}C$

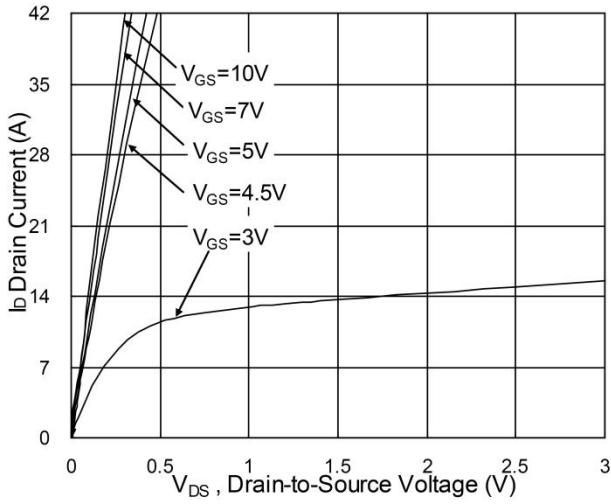
N-Channel Electrical characteristics (T_A=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30			V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 30V, V_{GS} = 0V$			1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.5	2.2	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 8A$		11	15	m Ω
		$V_{GS} = 4.5V, I_D = 6A$		15	28	
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$		940	1316	pF
Output capacitance	C_{oss}		131	183		
Reverse transfer capacitance	C_{rss}		109	153		
Total gate charge@4.5V	Q_g	$V_{DS} = 15V, V_{GS} = 4.5V, I_D = 8A$		9.63	13.5	nC
Gate-source charge	Q_{gs}		3.88	5.4		
Gate-drain charge	Q_{gd}		3.44	4.8		
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15V, V_{GS} = 10V, R_G = 1.5\Omega, I_D = 8A$		4.2	8.4	ns
Turn-on rise time	t_r		8.2	15		
Turn-off delay time	$t_{d(off)}$		31	62		
Turn-off fall time	t_f		4	8		
Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 1A, T_J = 25^{\circ}C$			1.2	V

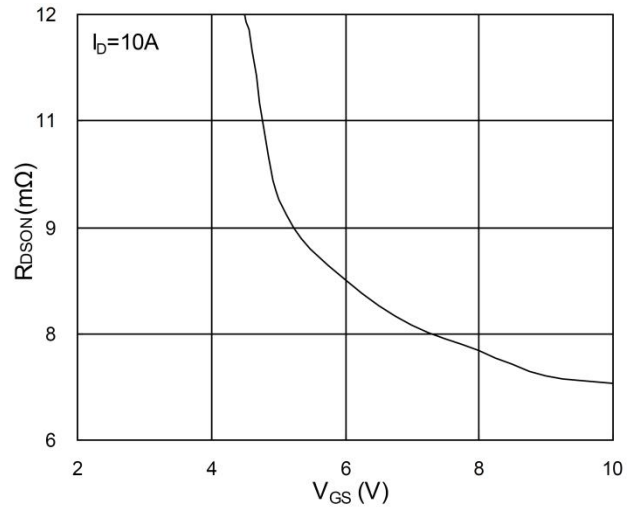
P-Channel Electrical characteristics (T_A=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-30			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = -30V, V _{GS} = 0V			-1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
On characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	-1.2	-1.6	-2.5	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -6.5A		28	42	mΩ
		V _{GS} = -4.5V, I _D = -5A		38	55	
Forward transconductance	g _{FS}	V _{DS} = -5V, I _D = -6.5A	14			S
Switching characteristics						
Total gate charge	Q _g	V _{DS} = -15V, V _{GS} = -10V, I _D = -6.5A		9.2		nC
Gate-source charge	Q _{gs}			1.6		
Gate-drain charge	Q _{gd}			2.2		
Turn-on delay time	t _{d(on)}	V _{DD} = -15V, I _D = -4A, V _{GS} = -10V, R _G = 3Ω		7.5		ns
Turn-on rise time	t _r			5.5		
Turn-off delay time	t _{d(off)}			19		
Turn-off fall time	t _f			7		
Drain-Source Diode characteristics						
Diode Forward voltage	V _{SD}	V _{GS} = 0V, I _S = -1A			-1.2	V

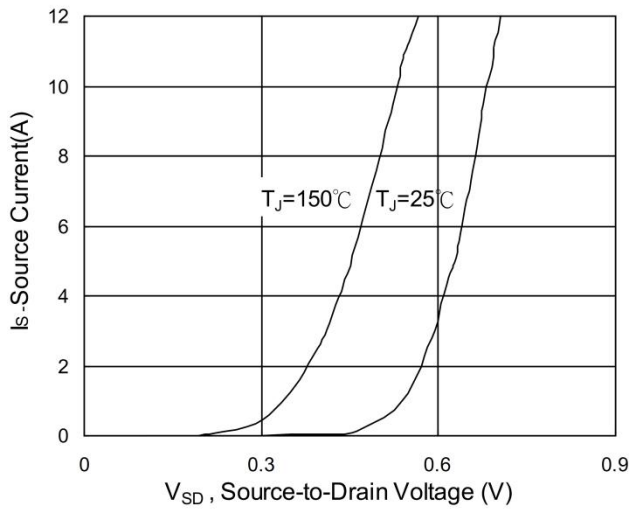
N-Channel Typical Characteristics



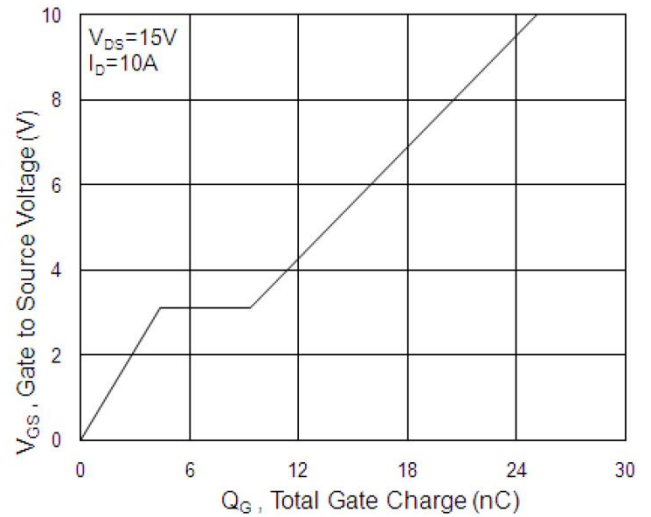
Typical Output Characteristics



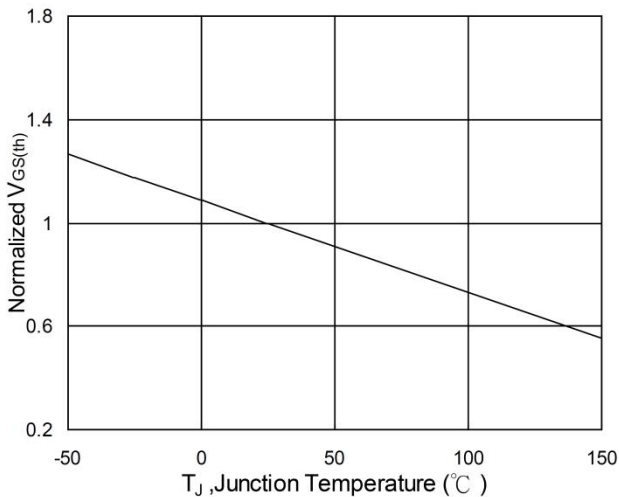
On-Resistance vs. Gate-Source



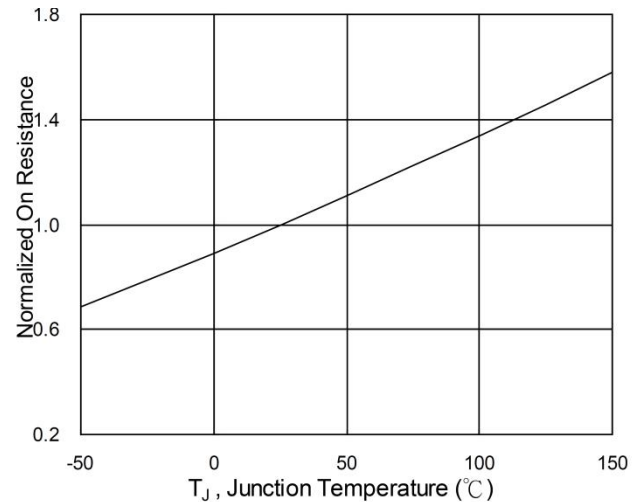
Forward Characteristics Of Reverse



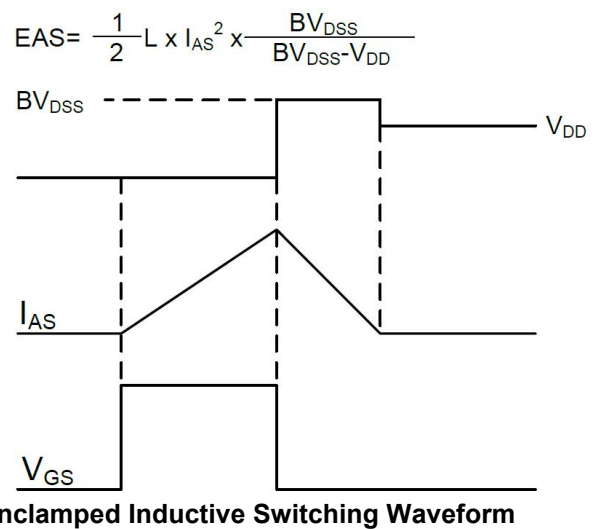
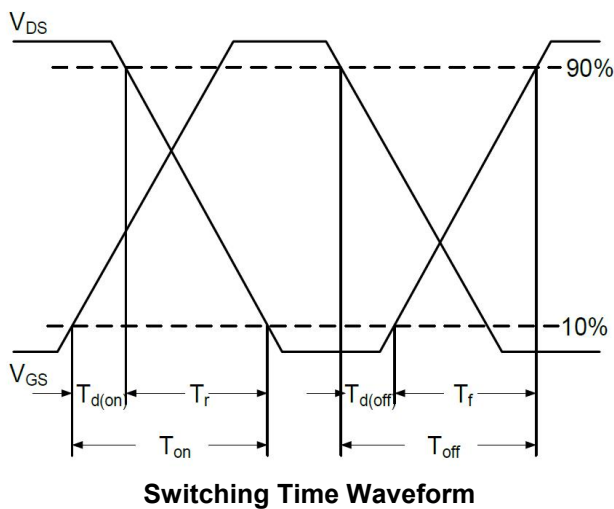
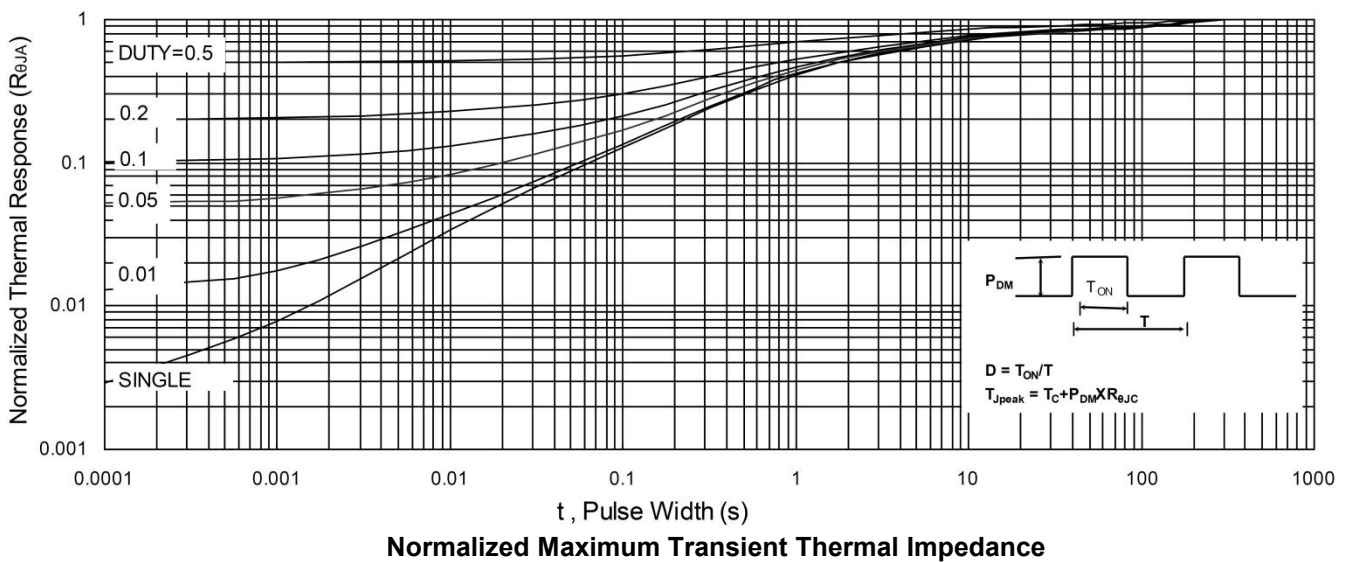
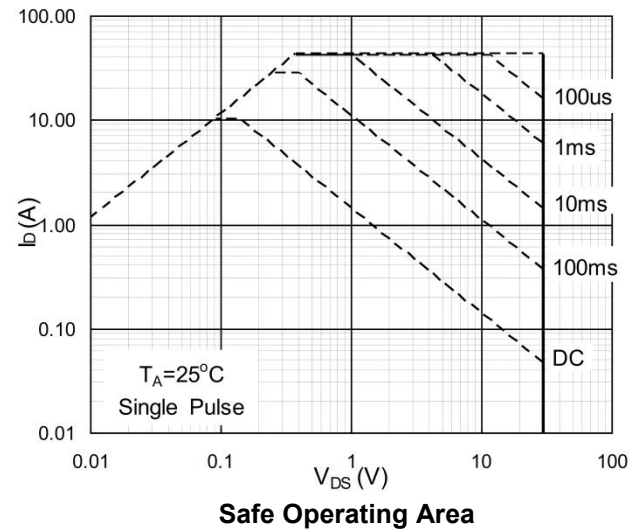
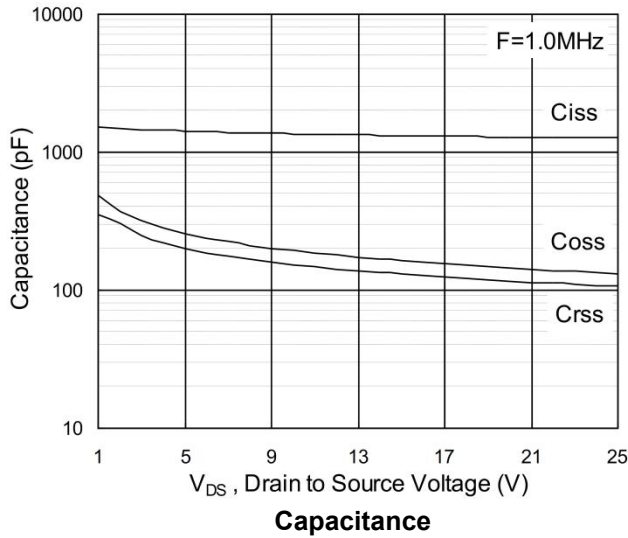
Gate-Charge Characteristics



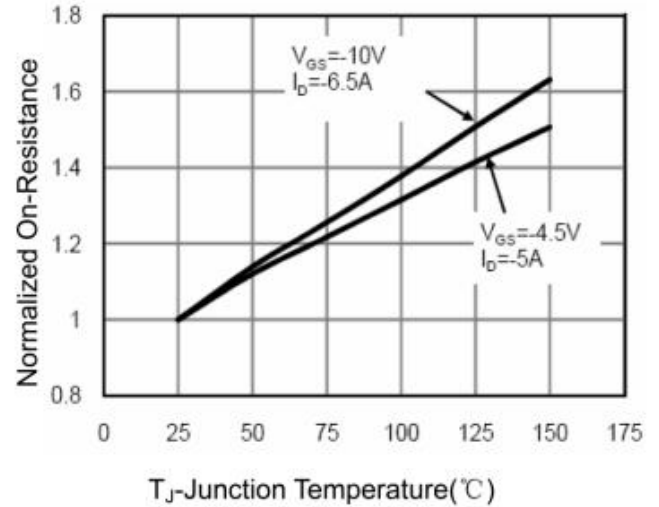
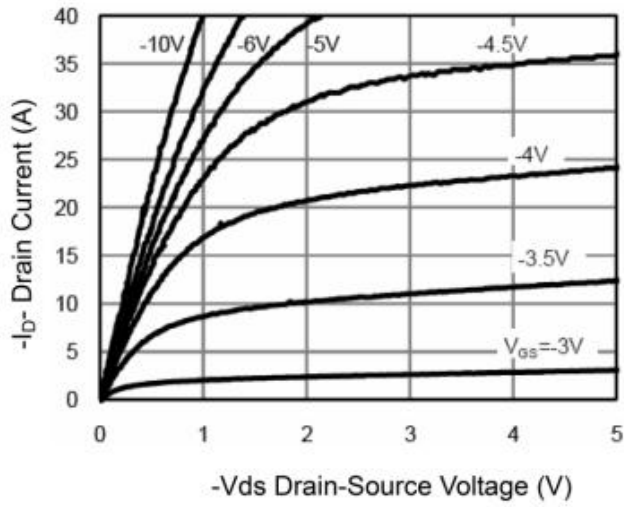
Normalized $V_{GS(th)}$ vs. T_J



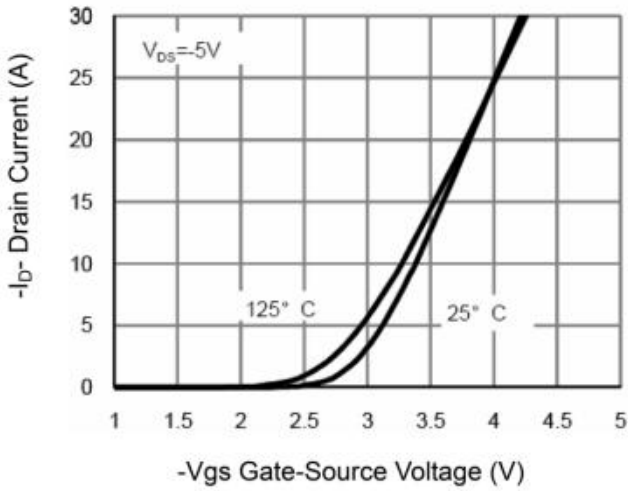
Normalized $R_{DS(on)}$ vs. T_J



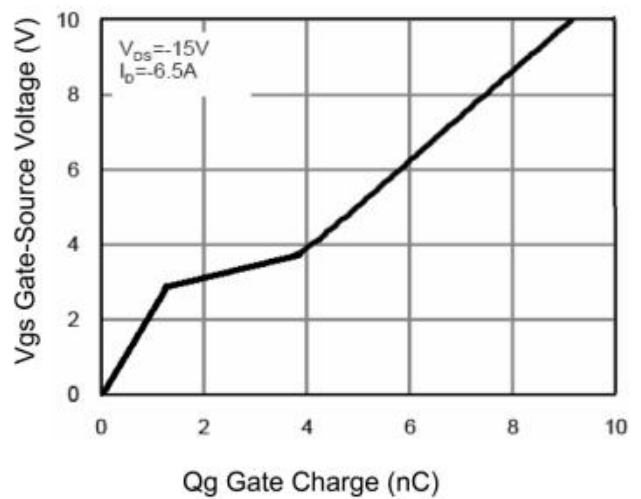
P-Channel Typical Characteristics



Typical Output Characteristics

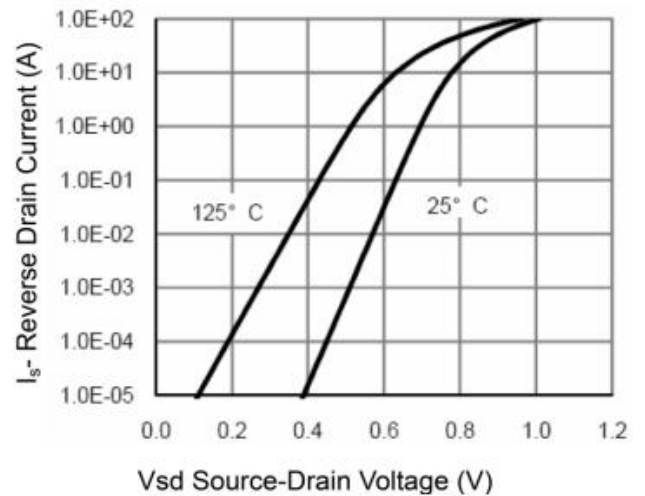
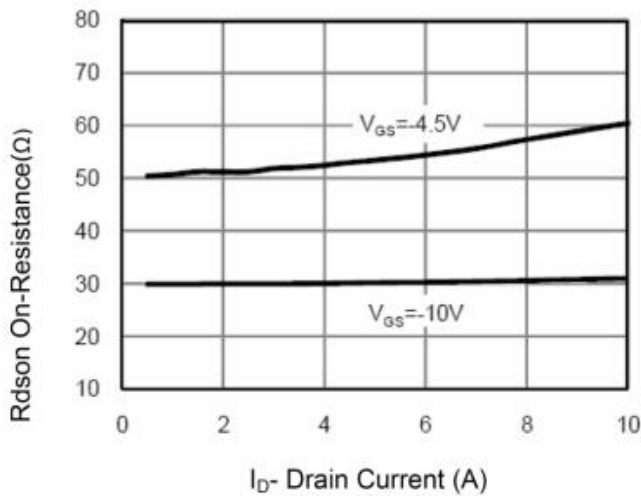


Rdson-Junction Temperature



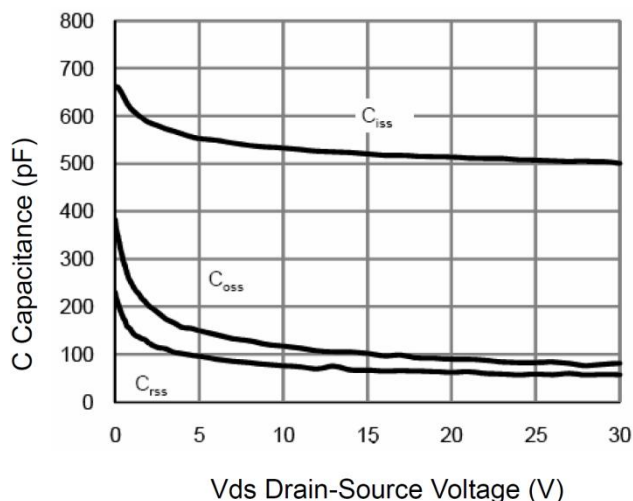
Transfer Characteristics

Gate-Charge

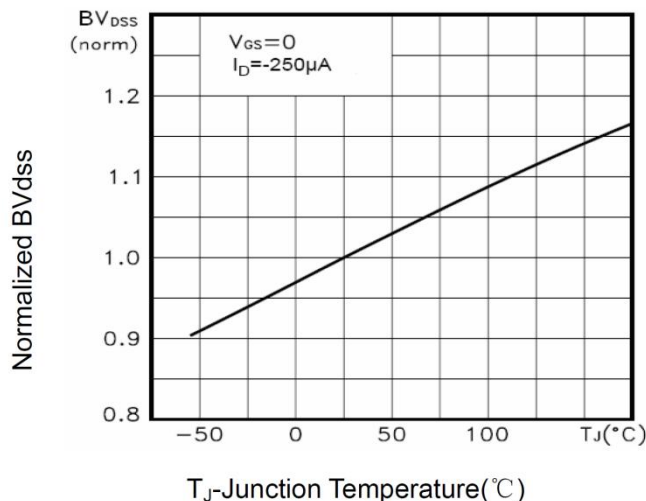


Rdson- Drain Current

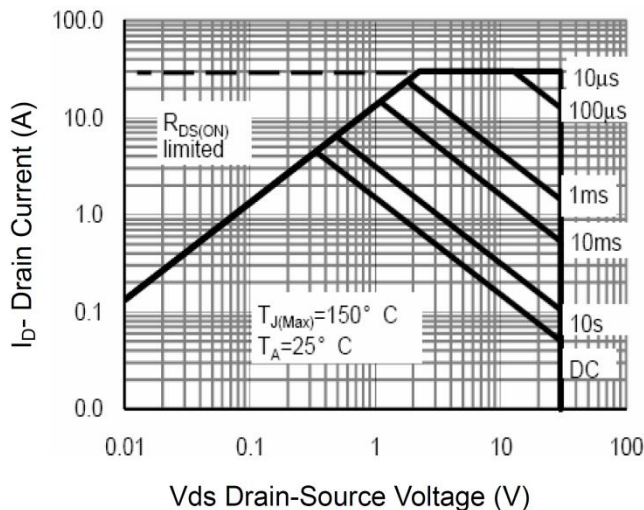
Source- Drain Diode Forward



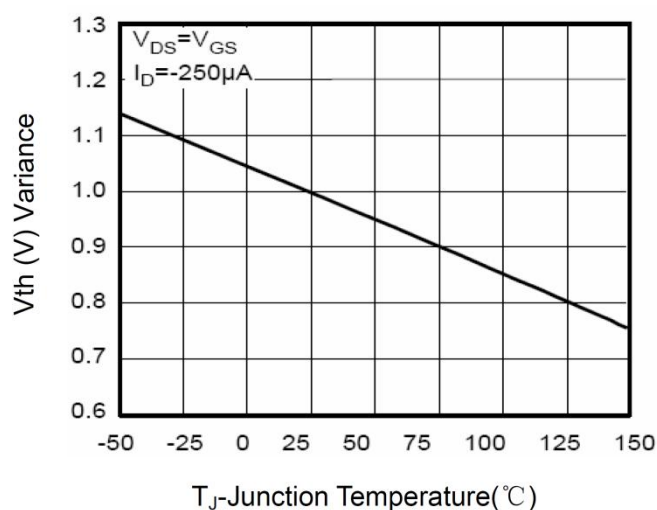
Capacitance vs Vds



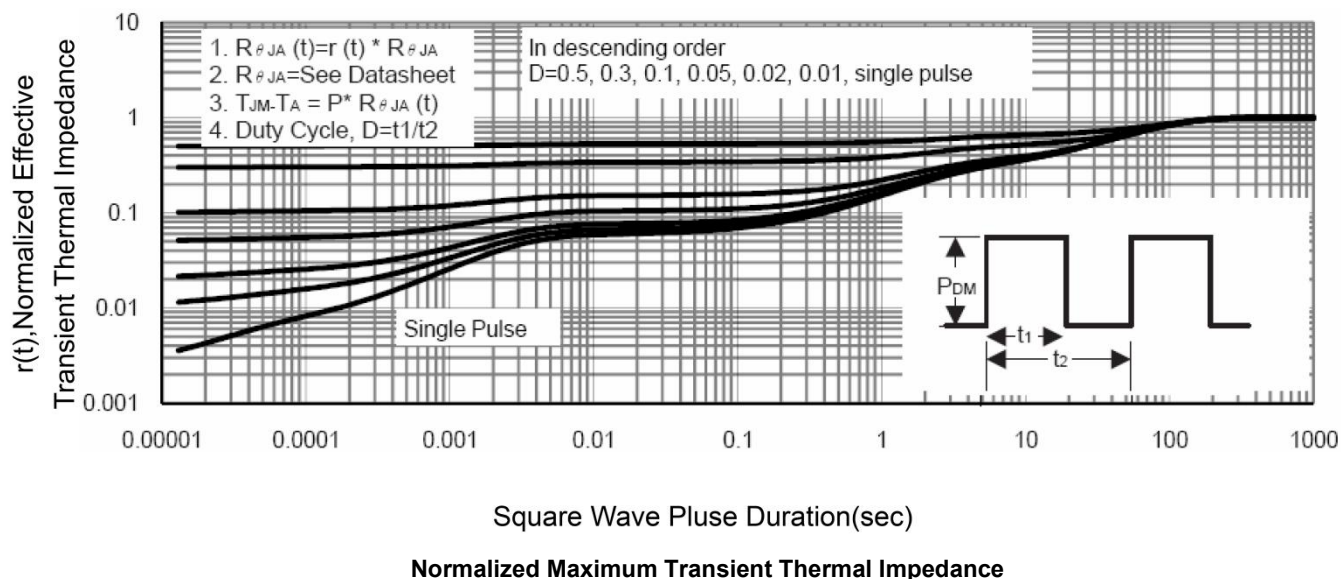
BVDSS vs Junction Temperature



Safe Operation Area



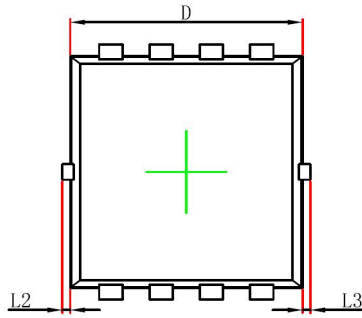
VGS(th) vs Junction Temperature



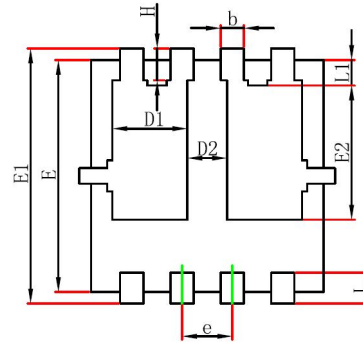
Normalized Maximum Transient Thermal Impedance



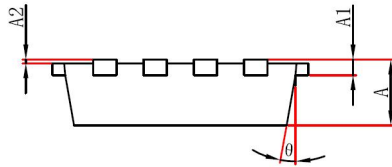
PDFNWB3.3×3.3-8L-B Package Information



Top View
[顶视图]



Bottom View
[背视图]



Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	0.935	1.135	0.037	0.045
D2	0.280	0.480	0.011	0.019
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°

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