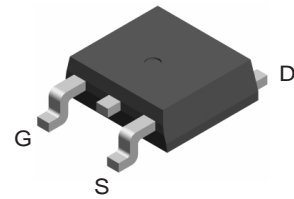




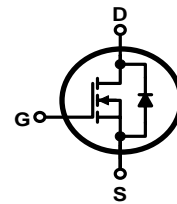
PIN Connection TO-252(D-PAK)

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Qg= 31nC (Typ.).
- BVDS=100V,Id= 20A
- R_{DS(on)} : 0.07Ω (Max) @V_G=10V
- 100% Avalanche Tested



Schematic diagram



Marking Diagram



- Y = Year
- A = Assembly Location
- WW = Work Week
- V = Version
- FIR20N10L = Specific Device Code

Absolute Maximum Ratings* (T_c=25°C Unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	100	V
Gate-Source Voltage	V _{GS}	±20	V
Drain Current-Continuous	I _D	20	A
Drain Current-Continuous(T _C =100°C)	I _D (100°C)	12	A
Pulsed Drain Current	I _{DM}	60	A
Maximum Power Dissipation	P _D	55	W
Single pulse avalanche energy (Note 5)	E _{AS}	250	mJ
Operating Junction and Storage Temperature Range	T _J ,T _{STG}	-55 To 150	°C

Thermal Characteristics

Thermal Resistance,Junction-to-Case(Note 2)	R _{θJC}	2.27	°C/W
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**Electrical Characteristics (T_C=25°C unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	100	110	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.2	1.8	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =5A	-	56	70	mΩ
Forward Transconductance	g _{FS}	V _{DS} =50V, I _D =9A	12	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	1350	-	PF
Output Capacitance	C _{OSS}		-	240	-	PF
Reverse Transfer Capacitance	C _{rss}		-	180	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =2A, R _L =15Ω V _{GS} =10V, R _G =2.5Ω	-	13.8	-	nS
Turn-on Rise Time	t _r		-	9.3	-	nS
Turn-Off Delay Time	t _{d(off)}		-	43.8	-	nS
Turn-Off Fall Time	t _f		-	11.4	-	nS
Total Gate Charge	Q _g	V _{DS} =30V, I _D =3A, V _{GS} =10V	-	31	-	nC
Gate-Source Charge	Q _{gs}		-	6.4	-	nC
Gate-Drain Charge	Q _{gd}		-	9.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =9A	-	-	1.2	V
Diode Forward Current	I _S		-	-	17	A
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T_j=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25Ω



Typical Electrical and Thermal Characteristics (Curves)

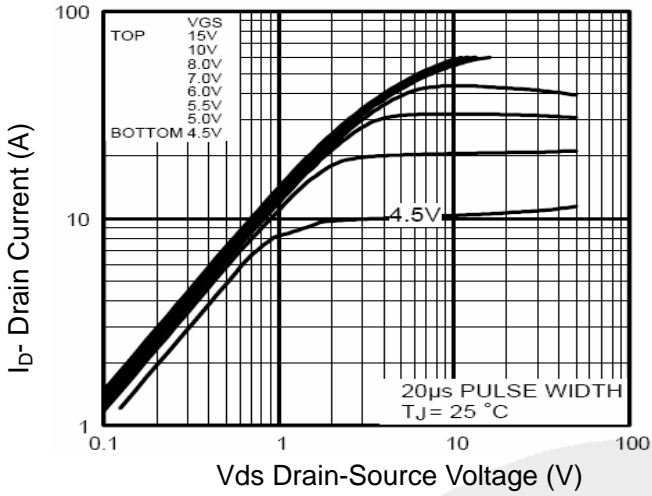


Figure 1 Output Characteristics

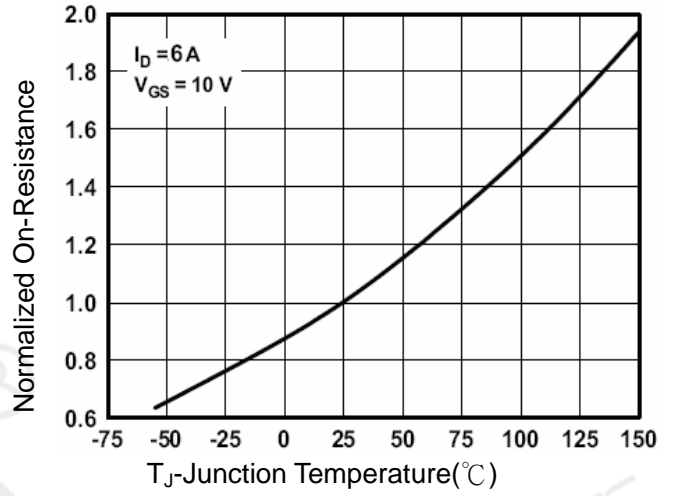


Figure 4 Rds(on)-Junction Temperature

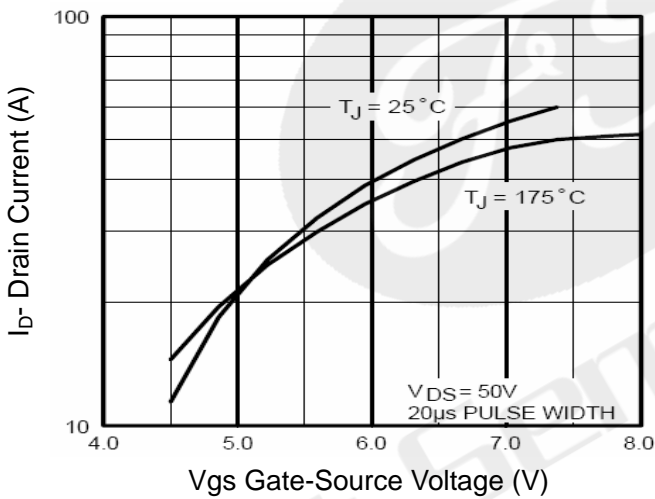


Figure 2 Transfer Characteristics

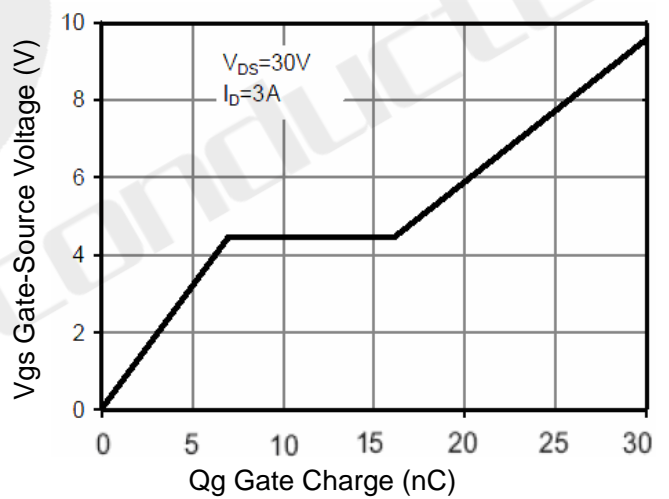


Figure 5 Gate Charge

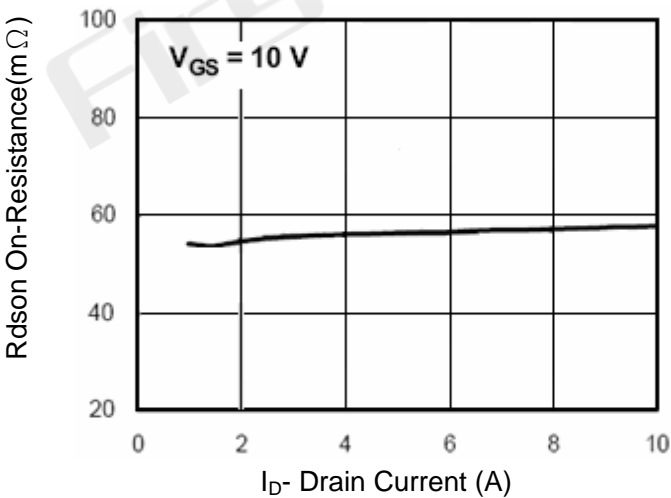


Figure 3 Rds(on)- Drain Current

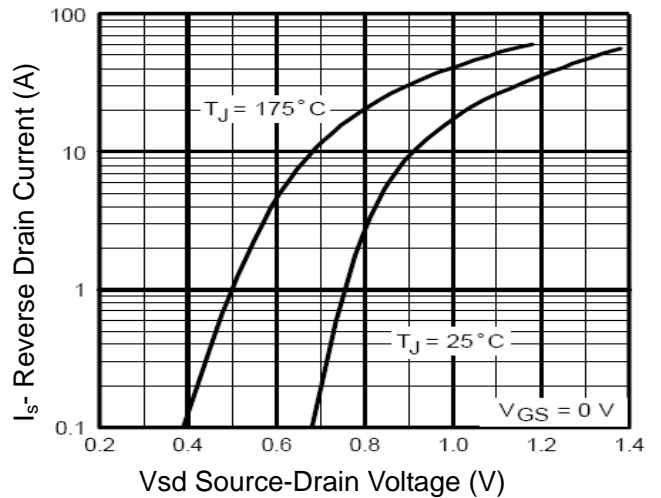


Figure 6 Source- Drain Diode Forward

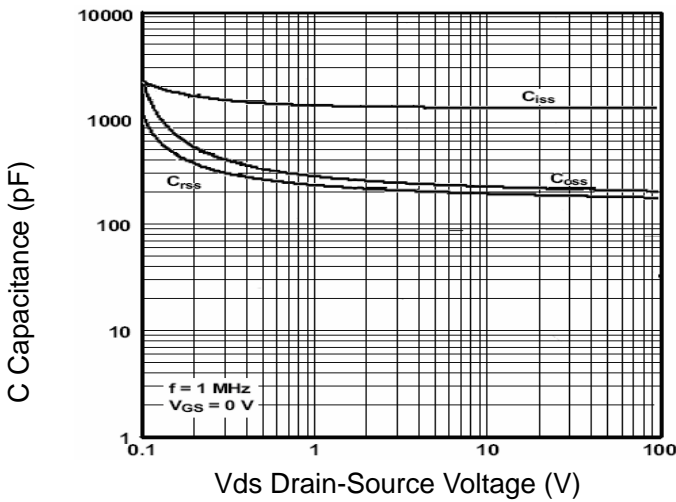


Figure 7 Capacitance vs Vds

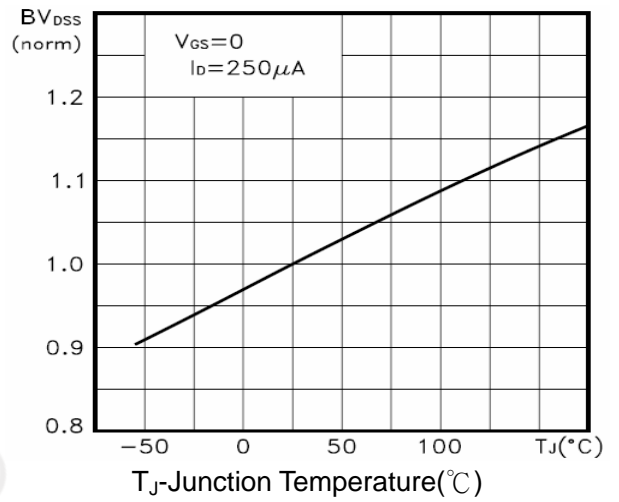


Figure 9 BV_{DSS} vs Junction Temperature

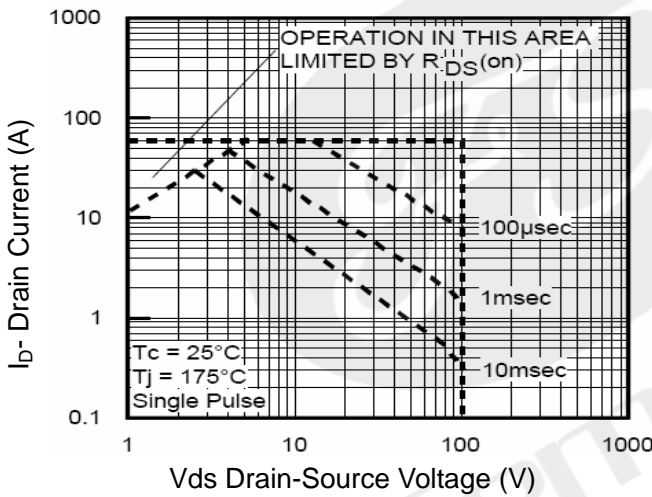


Figure 8 Safe Operation Area

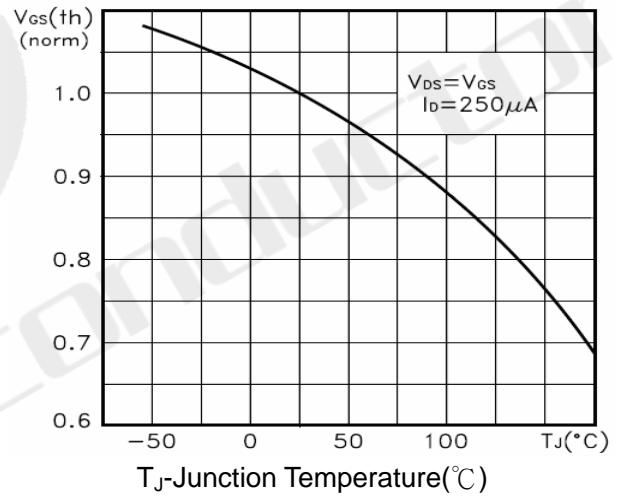


Figure 10 V_{GS(th)} vs Junction Temperature

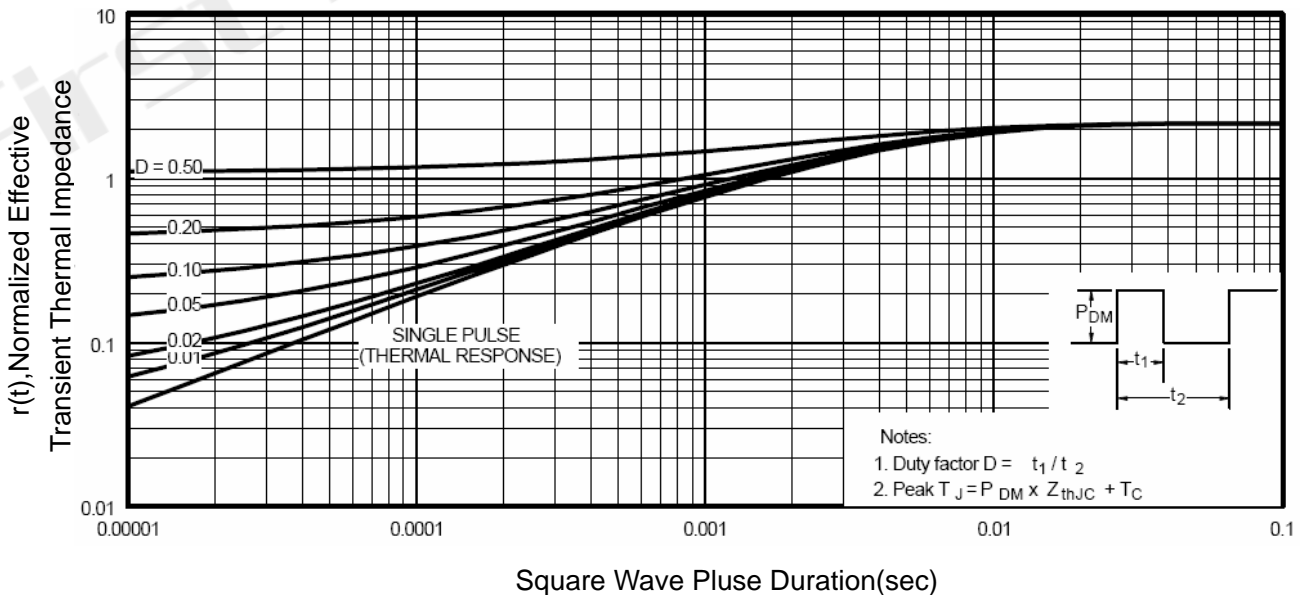
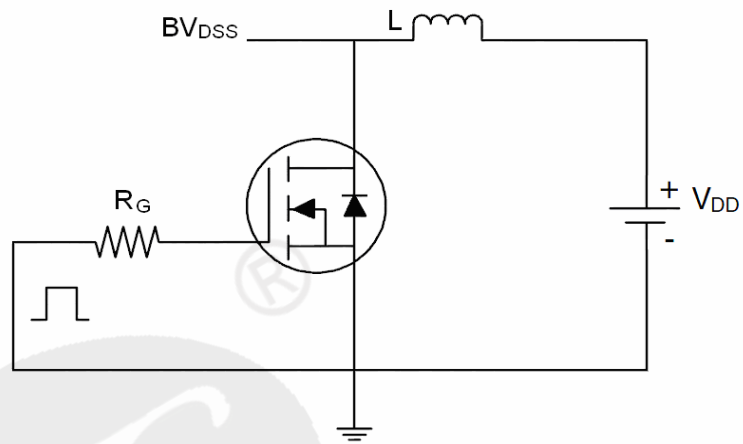


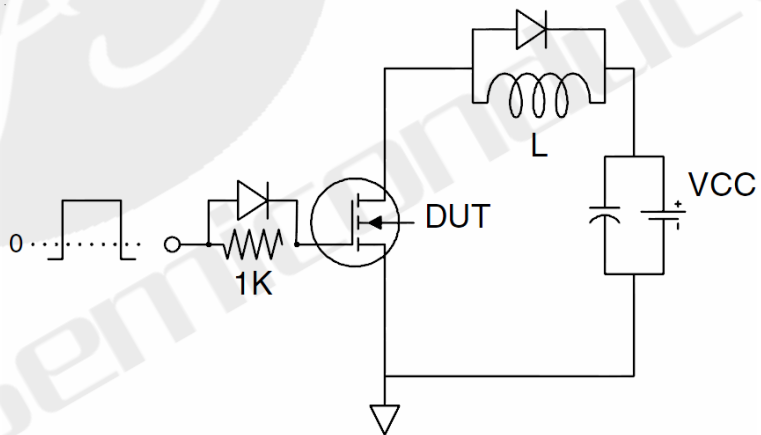
Figure 11 Normalized Maximum Transient Thermal Impedance

Test Circuit

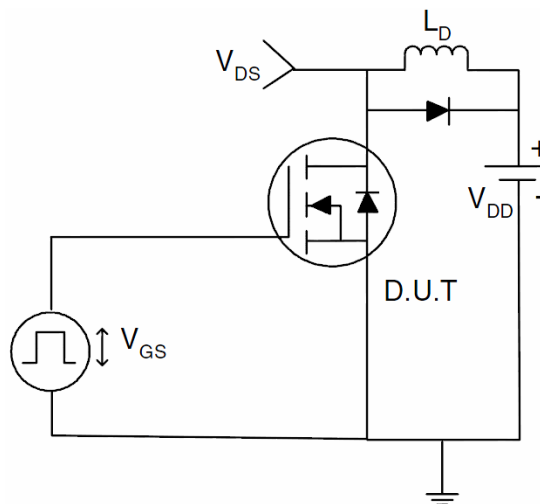
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit

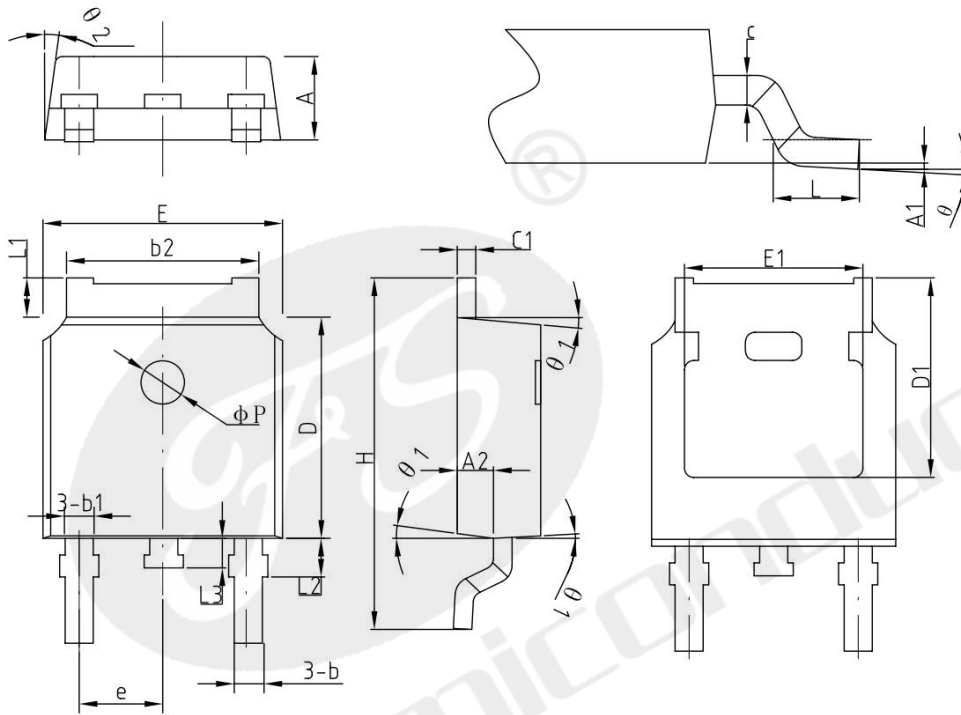




Package Dimension

TO-252

Unit: mm



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.2	2.30	2.38
A1	0	-	0.10
A2	0.90	1.01	1.10
b	0.71	0.76	0.86
b1		0.76	
b2	5.13	5.33	5.46
c	0.47	0.50	0.60
c1	0.47	0.50	0.60
D	6.0	6.10	6.20
D1	-	5.30	-
E	6.50	6.60	6.70
E1	-	4.80	-
e	2.286BSC		
H	9.70	10.10	10.40
L	1.40	1.50	1.70
L1	0.90	-	1.25
L2		1.05	
L3		0.8	
φP		1.2	
θ	0°	-	8°
θ 1	5°	7°	9°
θ 2	5°	7°	9°



Declaration

- FIRST reserves the right to change the specifications, the same specifications of products due to different packaging line mold, the size of the appearance will be slightly different, shipped in kind, without notice! Customers should obtain the latest version information before ordering, and verify whether the relevant information is complete and up-to-date.
- Any semiconductor product under certain conditions has the possibility of failure or failure, The buyer has the responsibility to comply with safety standards and take safety measures when using FIRST products for system design and manufacturing, To avoid To avoid potential failure risks, which may cause personal injury or property damage!
- Product promotion endless, our company will wholeheartedly provide customers with better products!

ATTACHMENT

Revision History

Date	REV	Description	Page
2018.01.01	1.0	Initial release	