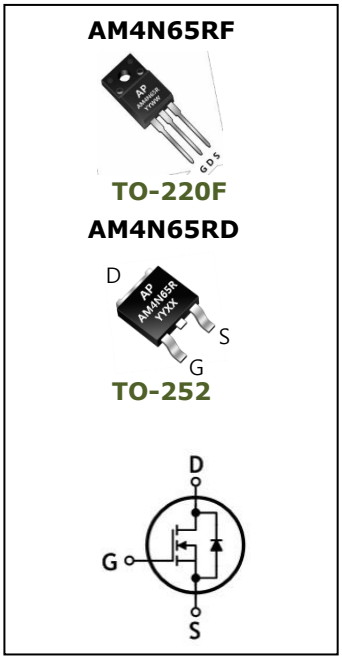
650V 4A Advanced N-Ch Power MOSFET

FEATURES

- **Low drain-source On resistance : RDS(on) = 2.4Ω (Typ.)**
- **Low gate charge : Qg = 12nC (Typ.)**
- **Low reverse transfer capacitance : Crss = 12pF (Typ.)**
- **Lower EMI Noise**
- **RoHS compliant device**
- **100% avalanche tested**



Marking Information

Row 1 : AP

Row 2 : Product Information

Row 3 : Date Code

- YY : Year Code
- WW : Week Code

Ordering Information

Part No.	Package	Packing	Finish	Halogen	Packing Unit
AM4N65RF	TO-220F	Tube	Sn	Free	5,000ea
AM4N65RD	TO-252	Tape & Reel	Sn	Free	2,500ea

Maximum Ratings (T_C=25 °C, unless otherwise noted)

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V_{DSS}		650	V
Gate-source voltage	V_{GSS}		±30	V
Drain current (DC)*	I_D	T_C = 25℃	4	A
		T_C = 100℃	2.53	
Drain current (Pulsed)*	I_{DM}		16	A
Power Dissipation	P_D	TO-220F	32	W
		TO-252	48	
Single pulsed avalanche energy (Note 2)	E_{AS}		173	mJ
Avalanche current (Repetitive) (Note 1)	I_{AR}		4	A
Repetitive avalanche energy (Note 1)	E_{AR}		3.2	mJ
Junction temperature	T_J		150	℃
Storage temperature range	T_{stg}		-55~150	

***Limited only maximum junction temperature**

Thermal Characteristic

Characteristic	Symbol	Rating	Unit
Thermal resistance, junction to case	$R_{th(j-c)}$	Max. 3.9	℃/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 62.5	

Electrical Characteristics (T_C=25 °C, unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	I_D = 250uA, V_{GS}= 0	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D = 250uA, V_{DS} = V_{GS}	3	-	5	V
Drain-source cut-off current	I_{DSS}	V_{DS} = 650V,V_{GS} = 0V	-	-	1	uA
		V_{DS} = 650V,T_C = 150℃	-	-	100	
Gate leakage current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±30V	-	-	±100	nA
Drain-source on-resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 2A	-	2.4	3	Ω
Forward transfer conductance (Note 3)	g_{fs}	V_{DS} = 10V, I_D = 2A	-	4.4	-	S
Input capacitance	C_{iss}	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	-	711	-	pF
Output capacitance	C_{oss}		-	57	-	
Reverse transfer capacitance	C_{rss}		-	12	-	
Turn-on delay time (Note 3,4)	$T_{d(on)}$	V_{DS} = 325V, I_D = 4A, RG = 25Ω	-	62	-	ns
Rise time (Note 3,4)	T_r		-	81	-	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		-	109	-	
Fall time (Note 3,4)	t_f		-	46	-	
Total gate charge (Note 3,4)	Q_g	V_{DS} = 520V,V_{GS} = 10V I_D = 4A	-	12	16	nC
Gate-source charge (Note 3,4)	Q_{gs}		-	5	-	
Gate-drain charge (Note 3,4)	Q_g		-	2.5	-	

Source-Drain Diode Ratings and Characteristics (T_C=25 °C, unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I_S	Integral reverse diode in the MOSFET	-	-	4	A
Source current (Pulsed)	I_{SM}		-	-	16	A
Forward voltage	V_{SD}	V_{GS} = 0V, I_S = 2A	-	-	1.4	V
Reverse recovery time (Note 3,4)	t_{rr}	I_S = 4A, V_{GS} = 0V dIF/dt = 100A/us	-	487	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	1.27	-	uC

Note :

1. Repetitive rating : Pulse width limited by maximum junction temperature.
2. L=20mH, I_{AS}=4A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃
3. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
4. Essentially independent of operating temperature

Typical Electrical Characteristic

Fig. 1 Typical Output Characteristics

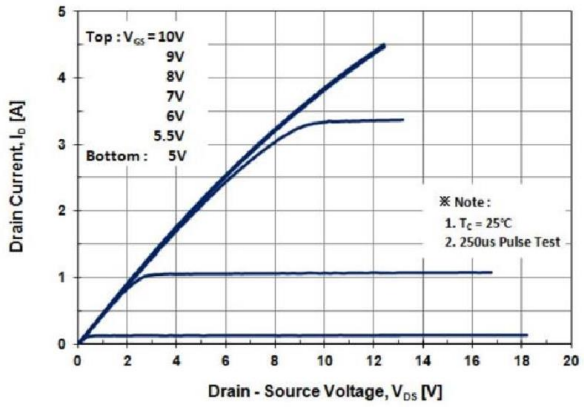


Fig. 2 Typical Output Characteristics

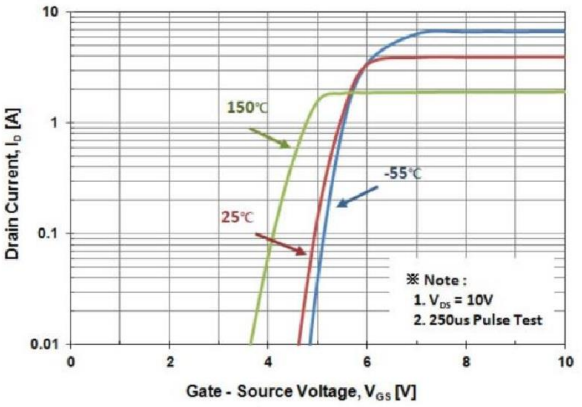


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

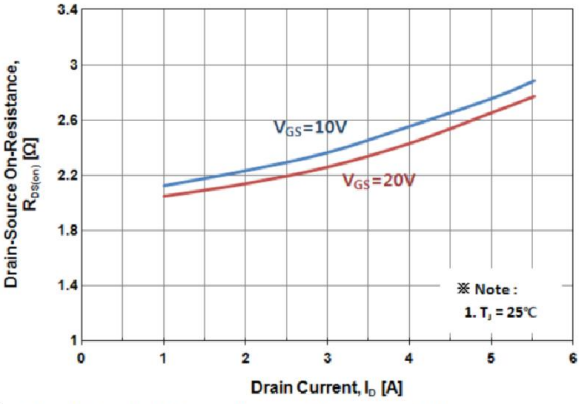


Fig. 4 Body Diode Forward Voltage Variation with Source Current

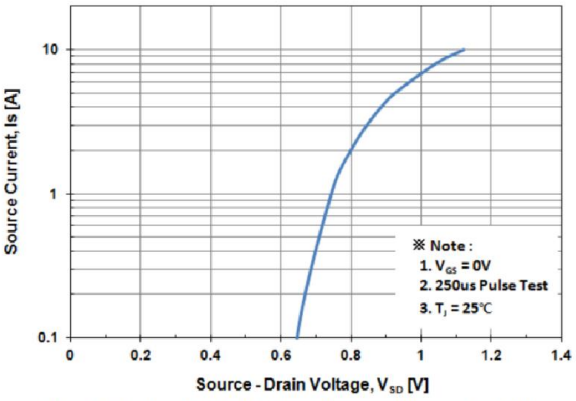


Fig. 5 Typical Capacitance Characteristics

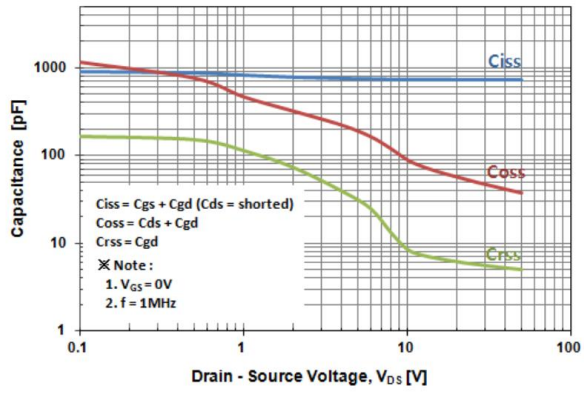
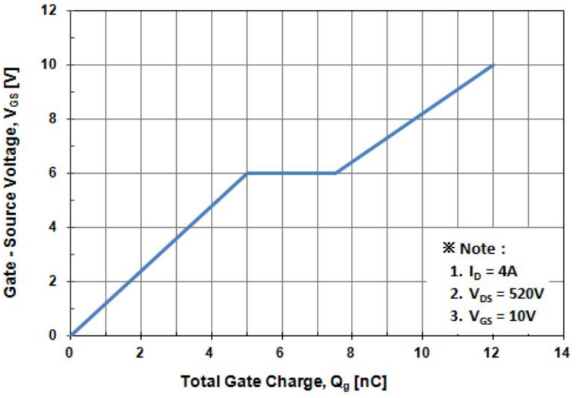


Fig. 6 Typical Total Gate Charge Characteristics



Typical Electrical Characteristic

Fig. 7 Breakdown Voltage Variation vs. Temperature

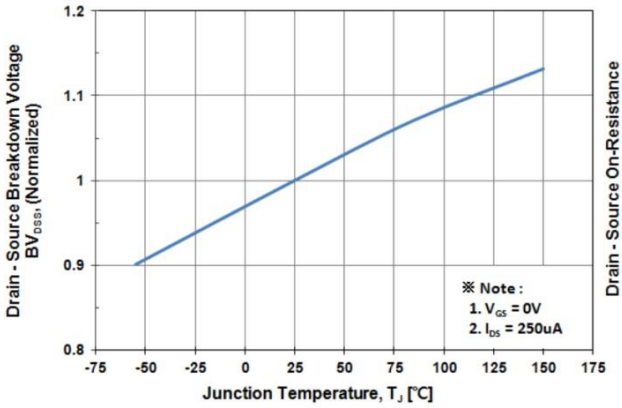


Fig. 8 On-Resistance Variation vs. Temperature

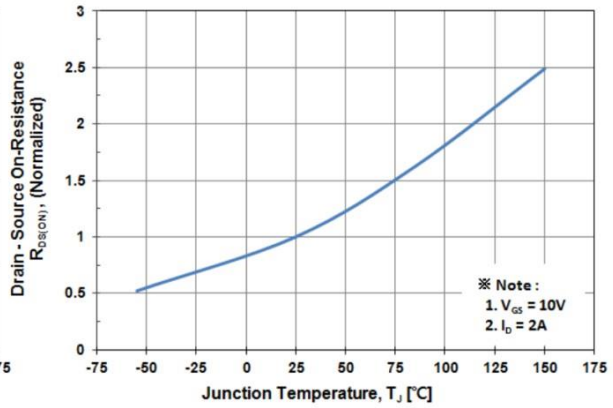


Fig. 9 Maximum Drain Current vs. Case Temperature

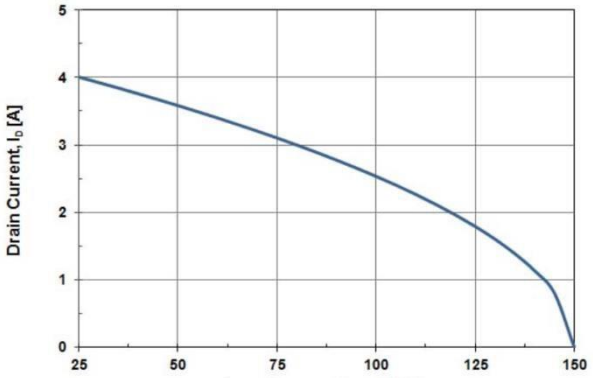


Fig. 10 Maximum Safe Operating Area

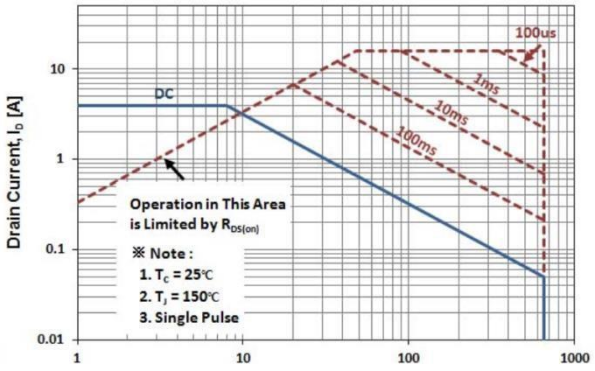


Fig. 11 Transient Thermal Impedance

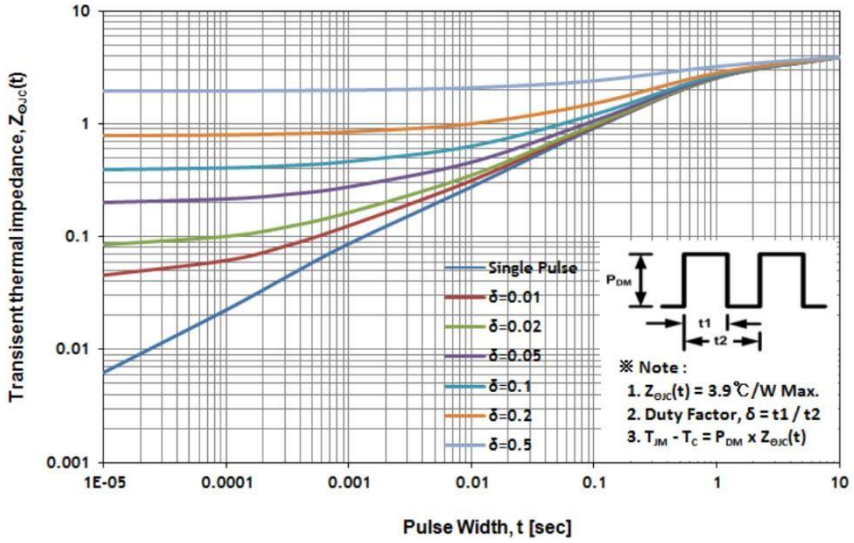
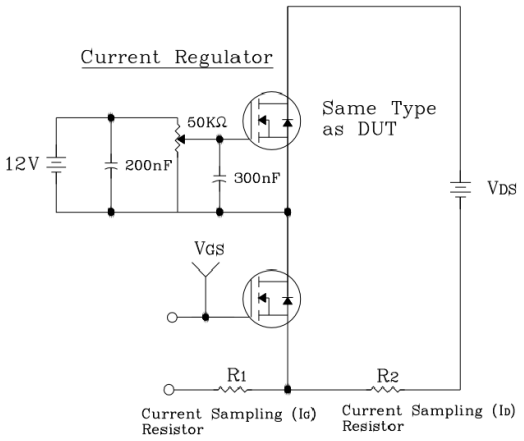


Fig. 12 Gate Charge Test Circuit & Waveform



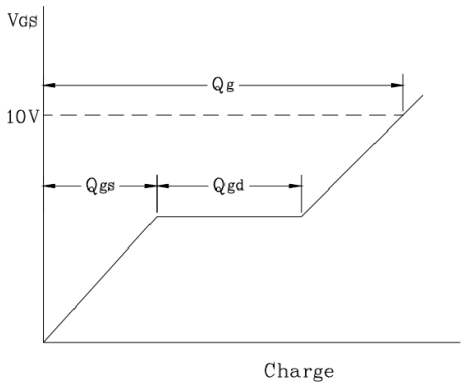
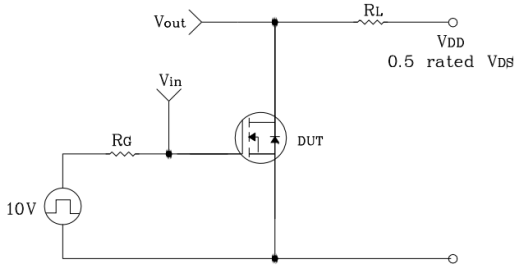


Fig. 13 Resistive Switching Test Circuit & Waveform



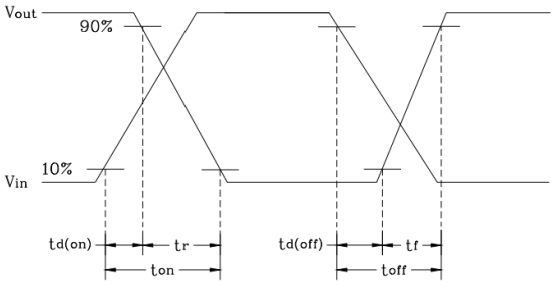
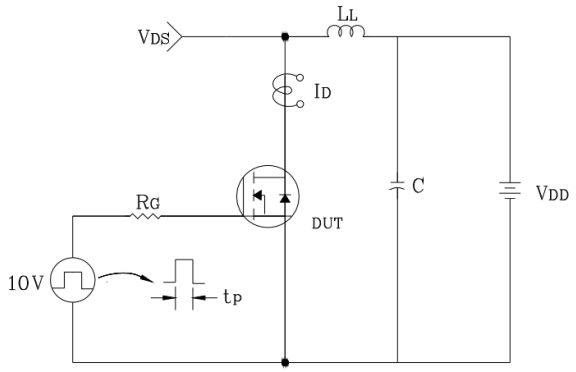


Fig. 14 E_{AS} Test Circuit & Waveform



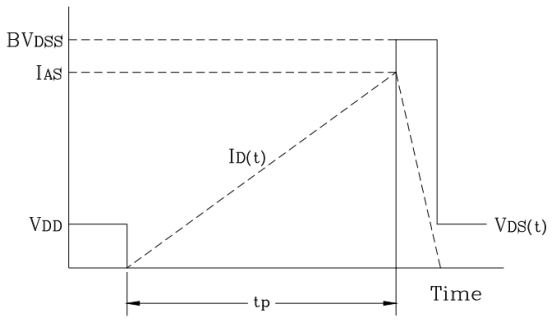
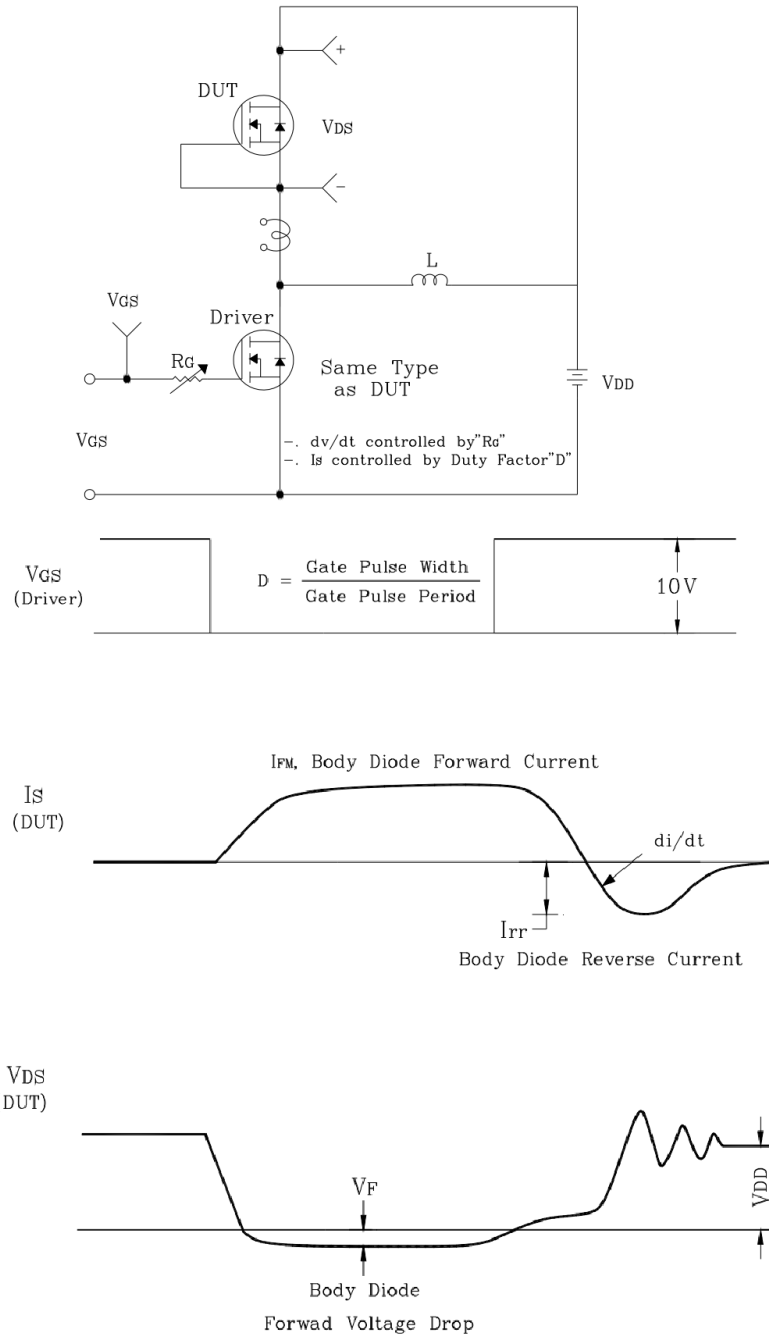
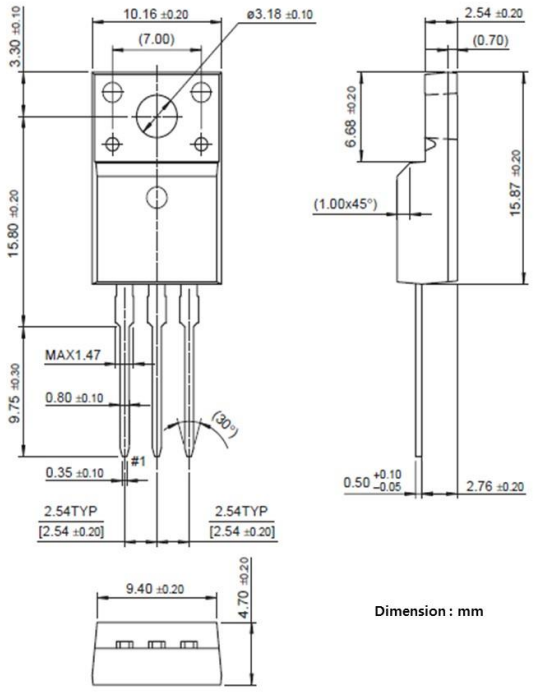


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

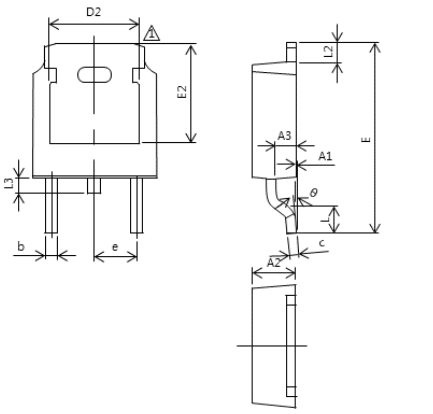


Package Dimensions

TO-220F



TO-252



TO-252-3L unit : mm			
DIM	MIN	NOM	MAX
A1	0	—	0.10
A2	2.2	2.3	2.4
A3	1.02	1.067	1.12
D	6.50	6.60	6.70
D1		5.334REF	
D2	4.70	4.826	4.92
E	9.90	10.10	10.30
E1	6.00	6.10	6.20
E2		5.30REF	
e		2.286BSC	
L	1.40	1.50	1.60
L2	0.90	—	1.25
L3	0.60	0.80	1.00
L4	1.70	1.80	1.90
Θ	0		8°
L/F		198×133	

Revision History

No	Date	Contents
0	2016-09-17	Initial Brief Datasheet Release

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