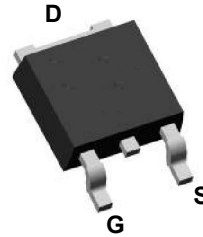
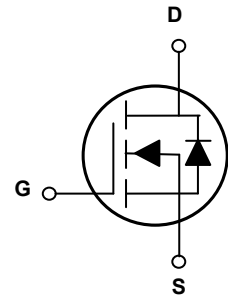


### Main Product Characteristics

$BV_{DSS}$	100V
$R_{DS(ON)}$	17m $\Omega$
$I_D$	40A



TO-252 (DPAK)



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The GSFD1040 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous(Silicon limited)	$I_D$	40	A
Drain Current-Continuous( $T_C=100^\circ\text{C}$ )		28	A
Drain Current-Pulsed	$I_{DM}$	160	A
Single Pulse Avalanche Energy <sup>5</sup>	$E_{AS}$	520	mJ
Maximum Power Dissipation	$P_D$	140	W
Derating Factor		0.94	W/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Case <sup>2</sup>	$R_{\theta JC}$	1.07	$^\circ\text{C}/\text{W}$
Storage Temperature Range	$T_{STG}$	-55 To +175	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 To +175	$^\circ\text{C}$

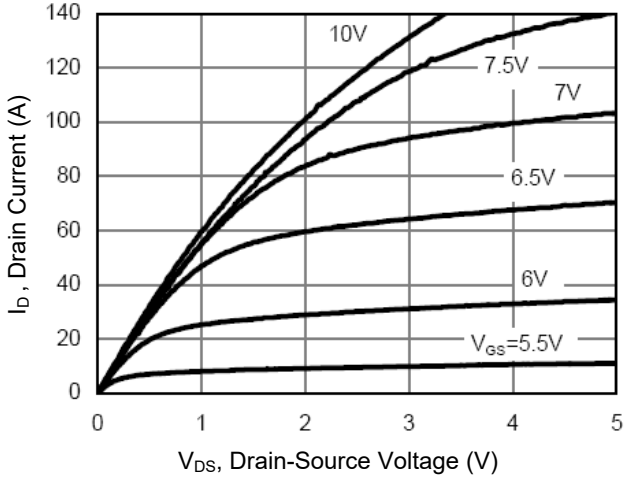
**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	110	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics<sup>3</sup></b>						
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=28A$	-	14.5	17	m $\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	V
Forward Transconductance	$g_{fs}$	$V_{DS}=25V, I_D=28A$	32	-	-	S
<b>Dynamic and Switching Characteristics<sup>4</sup></b>						
Total Gate Charge	$Q_g$	$V_{DD}=30V, I_D=30A, V_{GS}=10V$	-	94	-	nC
Gate-Source Charge	$Q_{gs}$		-	16	-	
Gate-Drain Charge	$Q_{gd}$		-	24	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=30V, R_L=15\Omega, R_G=2.5\Omega, V_{GS}=10V, I_D=2A$	-	15	-	nS
Rise Time	$t_r$		-	11	-	
Turn-Off Delay Time	$t_{d(off)}$		-	52	-	
Fall Time	$t_f$		-	13	-	
Input Capacitance	$C_{iss}$	$V_{DS}=30V, V_{GS}=0V, F=1MHz$	-	3400	-	pF
Output Capacitance	$C_{oss}$		-	290	-	
Reverse Transfer Capacitance	$C_{rss}$		-	221	-	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Diode Forward Current <sup>2</sup>	$I_S$		-	-	40	A
Diode Forward Voltage <sup>3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=28A$	-	0.85	1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=28A, di/dt=100A/\mu s^3, T_J=25^\circ C$	-	33	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	54	-	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

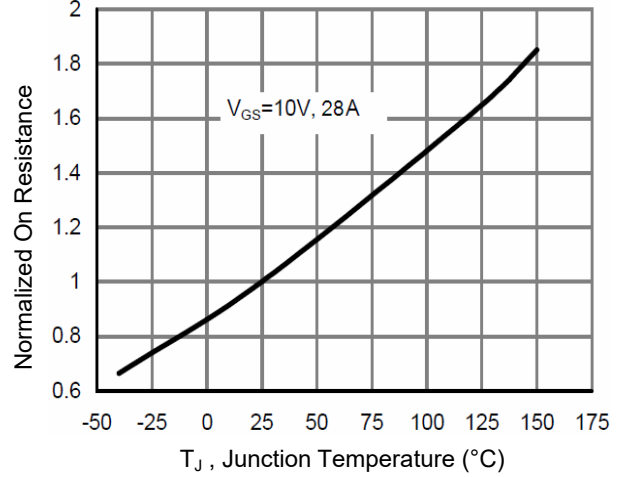
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition :  $T_J=25^\circ C, V_{DD}=50V, V_G=10V, L=0.5mH, R_G=25\Omega$ .

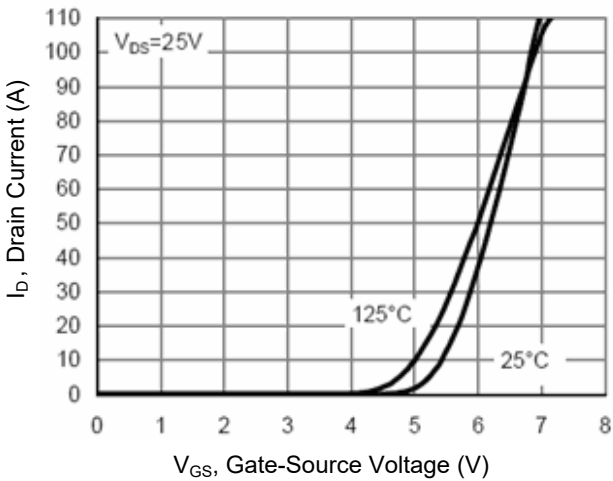
**Typical Electrical and Thermal Characteristic Curves**



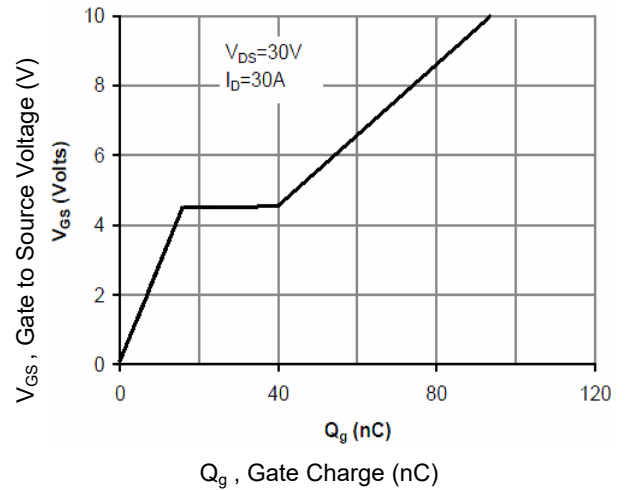
**Figure 1. Output Characteristics**



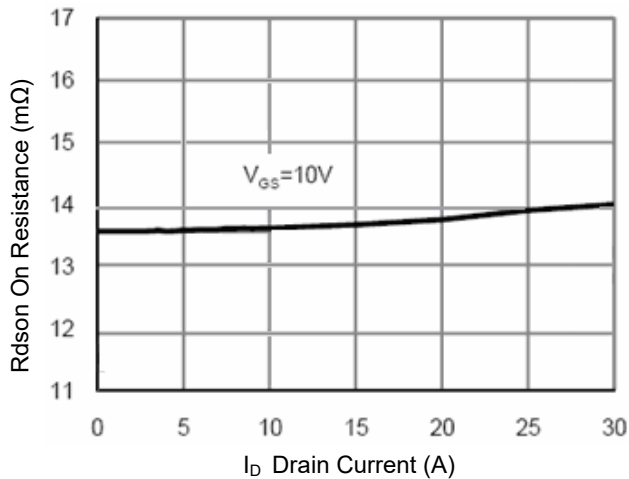
**Figure 2. Rdson- Junction Temperature**



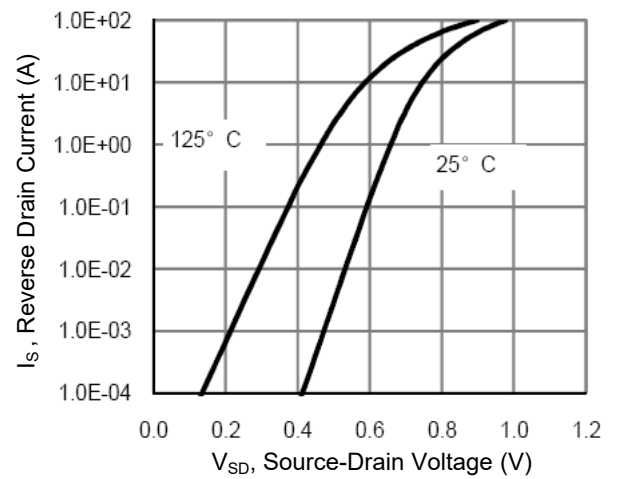
**Figure 3. Transfer Characteristics**



**Figure 4. Gate Charge**



**Figure 5. Rdson- Drain Current**



**Figure 6. Source-Drain Diode Forward**

## Typical Electrical and Thermal Characteristic Curves

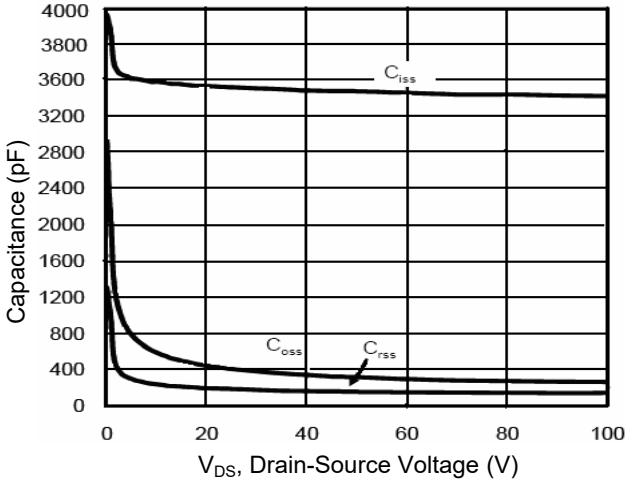


Figure 7. Capacitance Characteristics

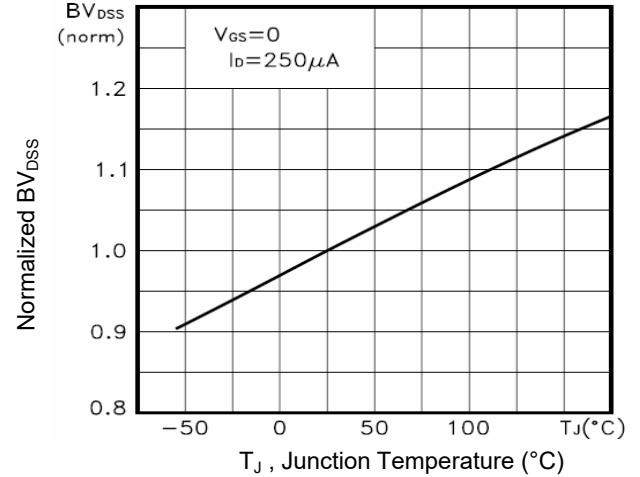


Figure 8.  $BV_{DS}$  Vs. Junction Temperature

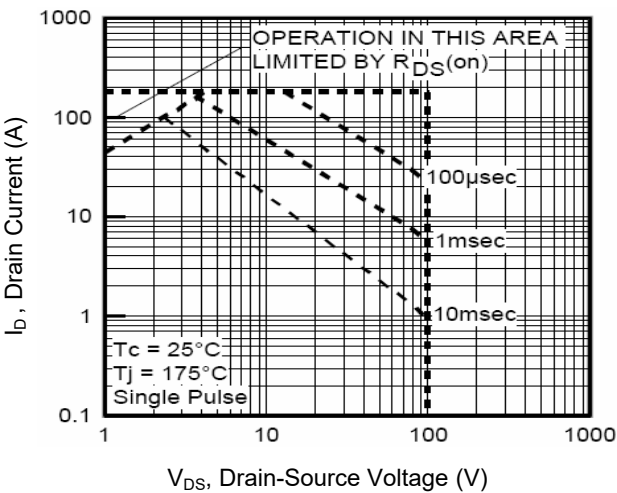


Figure 9. Safe Operation Area

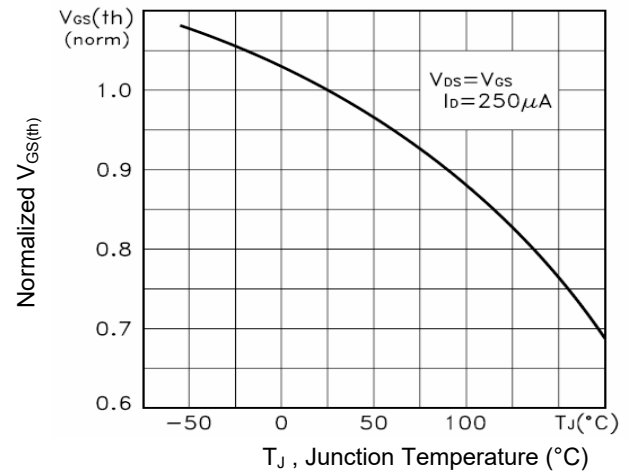


Figure 10.  $V_{GS(th)}$  Vs. Junction Temperature

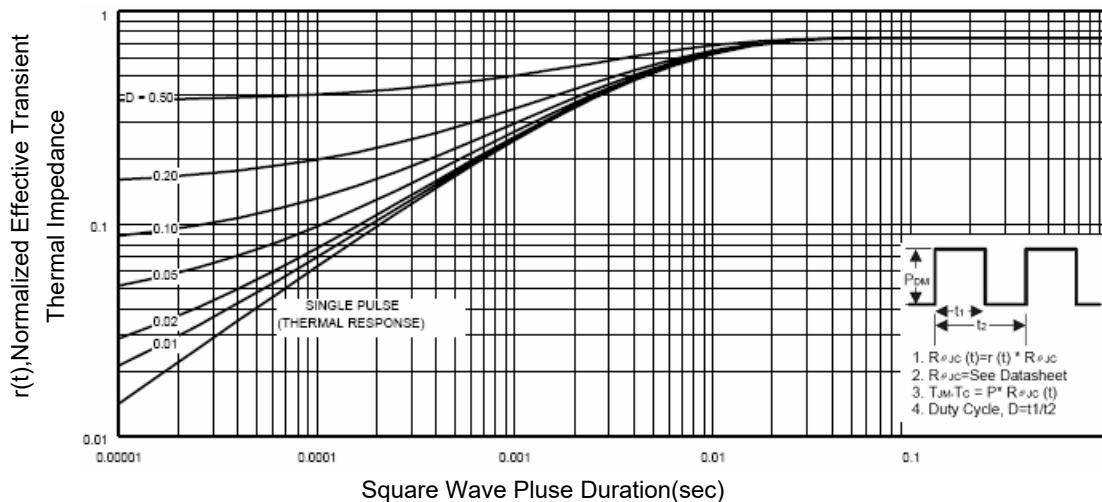
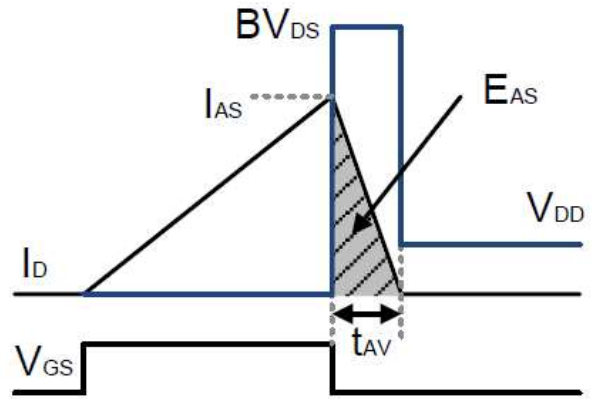
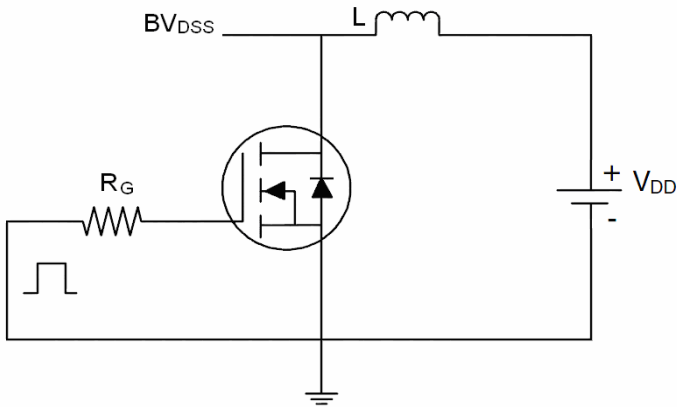
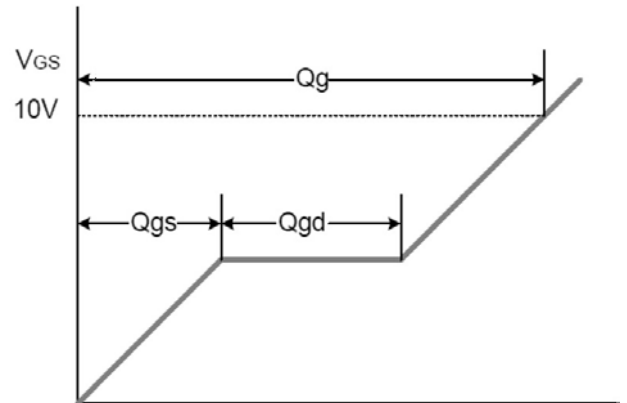
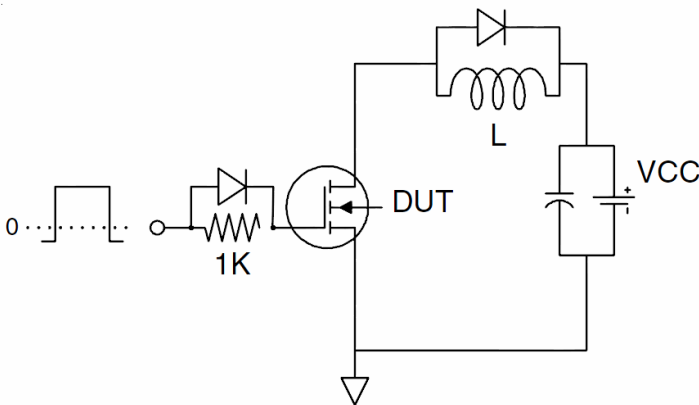


Figure 11 Normalized Maximum Transient Thermal Impedance

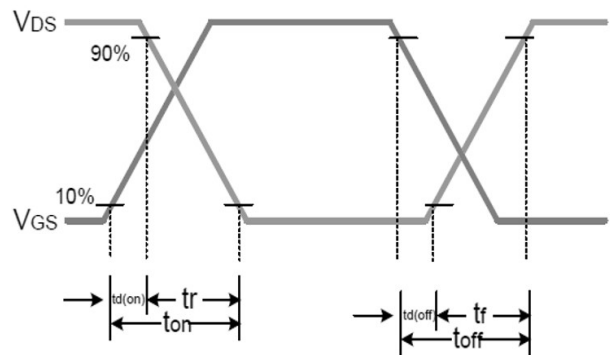
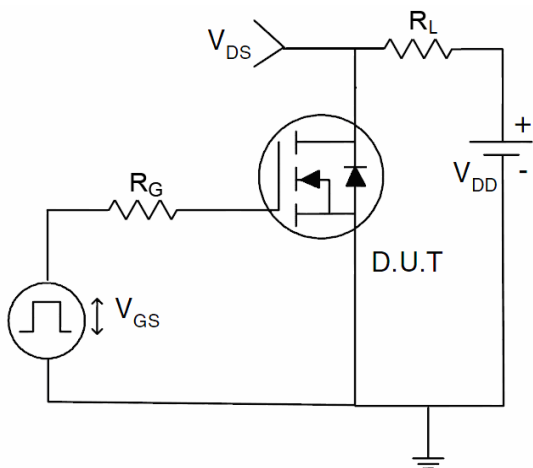
**Typical Electrical and Thermal Characteristic Curves**



**Figure 12.  $E_{AS}$  Test Circuit and Waveforms**

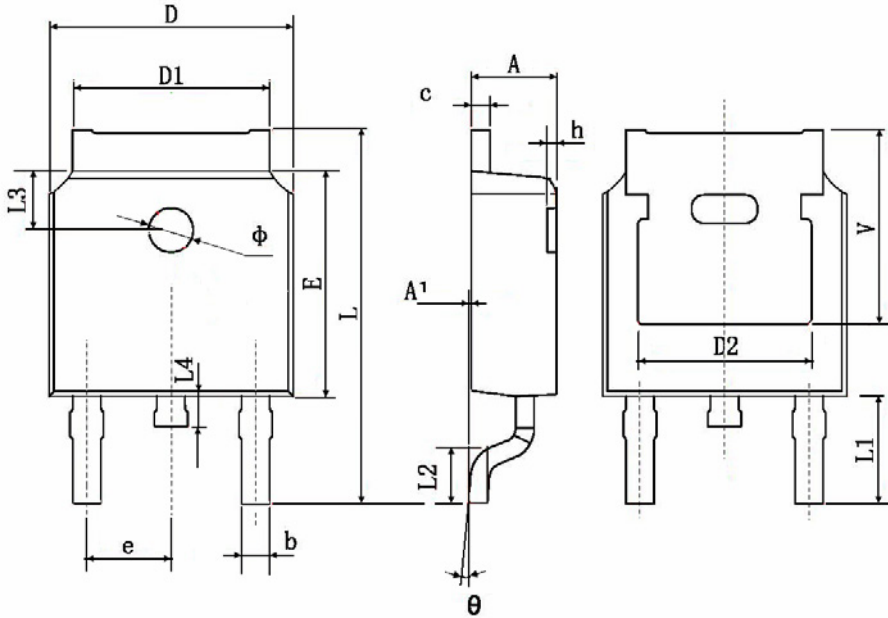


**Figure 13. Gate Charge Test Circuit and Waveforms**



**Figure 14. Switch Time Test Circuit and Waveforms**

**Package Outline Dimensions (TO-252/DPAK)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	