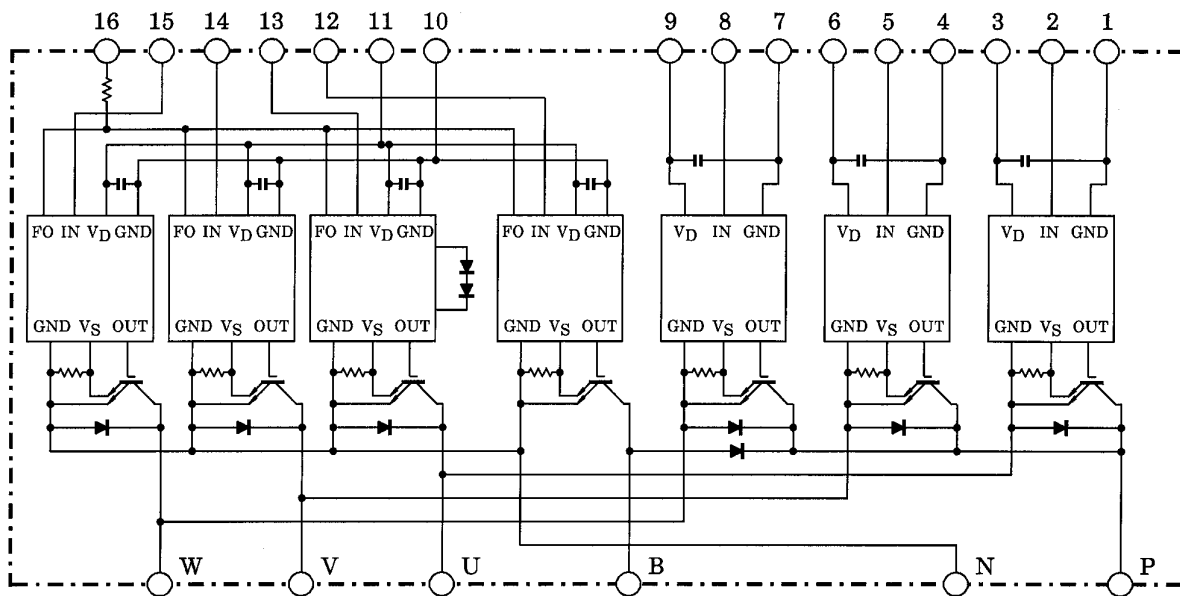


MIG75Q202H

High Power Switching Applications
 Motor Control Applications

- Integrates inverter, brake power circuits & control circuits (IGBT drive units, protection units for over-current, realtime-current-control (RTC), under-voltage & over-temperature) in one package.
- The electrodes are isolated from case.
- High speed type IGBT : $V_{CE(sat)} = 3.5\text{ V (Max)}$
 $t_{off} = 2.8\ \mu\text{s (Max)}$
 $t_{rr} = 0.21\ \mu\text{s (Max)}$
- Package dimensions : TOSHIBA 2-110A1A
- Weight : 520g

Equivalent Circuit



- | | | | | | |
|------------|------------|-----------------------|-------------|------------------------|-----------------------|
| 1. GND (U) | 2. IN (U) | 3. V _D (U) | 4. GND (V) | 5. IN (V) | 6. V _D (V) |
| 7. GND (W) | 8. IN (W) | 9. V _D (W) | 10. GND (L) | 11. V _D (L) | 12. IN (B) |
| 13. IN (X) | 14. IN (Y) | 15. IN (Z) | 16. FO | | |

Maximum Ratings (T_j = 25°C)

Stage	Characteristic	Condition	Symbol	Ratings	Unit
Inverter	Supply voltage	P-N power terminal	V _{CC}	900	V
	Collector-emitter voltage	—	V _{CES}	1200	V
	Collector current	T _c = 25°C, DC	I _C	75	A
	Forward current	T _c = 25°C, DC	I _F	75	A
	Collector power dissipation	T _c = 25°C	P _C	400	W
	Junction temperature	—	T _j	150	°C
Brake	Supply voltage	P-N power terminal	V _{CC}	900	V
	Collector-emitter voltage	—	V _{CES}	1200	V
	Collector current	T _c = 25°C, DC	I _C	25	A
	Reverse voltage	—	V _R	1200	V
	Forward current	T _c = 25°C, DC	I _F	25	A
	Collector power dissipation	T _c = 25°C	P _C	140	W
	Junction temperature	—	T _j	150	°C
Control	Control supply voltage	V _D -GND terminal	V _D	20	V
	Input voltage	IN-GND terminal	V _{IN}	20	V
	Fault output voltage	FO-GND (L) terminal	V _{FO}	20	V
	Fault output current	FO sink current	I _{FO}	10	mA
Module	Operating temperature	—	TC	-20 ~ +100	°C
	Storage temperature range	—	T _{stg}	-40 ~ +125	°C
	Isolation voltage	AC 1 minute	V _{ISO}	2500	V
	Screw torque	M5	—	3	Nm

Electrical Characteristics

a. Inverter Stage

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Collector cut-off current	I _{CEX}	V _{CE} = 1200V	T _j = 25°C	—	—	1	mA
			T _j = 125°C	—	—	10	
Collector-emitter saturation voltage	V _{CE (sat)}	V _D = 15 V, I _C = 75 A V _{IN} = 15 V → 0 V	T _j = 25°C	—	2.6	3.5	V
			T _j = 125°C	—	2.5	—	
Forward voltage	V _F	I _F = 75A	—	2.2	3.0	V	
Switching time	t _{on}	V _{CC} = 600 V, I _C = 75 A V _D = 15 V, V _{IN} = 15 V ↔ 0 V Inductive load (Note 1)	—	1.0	1.7	μs	
	t _{c (on)}		—	0.4	0.8		
	t _{rr}		—	0.16	0.21		
	t _{off}		—	1.9	2.6		
	t _{c (off)}		—	0.35	0.6		

b. Brake Stage

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Collector cut-off current	I_{CEX}	$V_{CE} = 1200V$	$T_j = 25^\circ C$	—	—	1	mA
			$T_j = 125^\circ C$	—	—	10	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_D = 15V, I_C = 25A, V_{IN} = 15V \rightarrow 0V$	$T_j = 25^\circ C$	—	2.6	3.5	V
			$T_j = 125^\circ C$	—	2.5	—	
Reverse current	I_R	$V_R = 1200V$		—	—	1	mA
				—	—	10	
Forward voltage	V_F	$I_F = 25A$	—	1.4	2.2	V	
Switching time	t_{on}	$V_{CC} = 600V, I_C = 25A, V_D = 15V, V_{IN} = 15V \leftrightarrow 0V$ Inductive load		—	1.3	1.9	μs
	$t_{c(on)}$			—	0.85	1.6	
	t_{rr}			—	0.42	0.50	
	t_{off}		(Note 1)	—	1.9	2.6	
	$t_{c(off)}$			—	0.3	0.6	

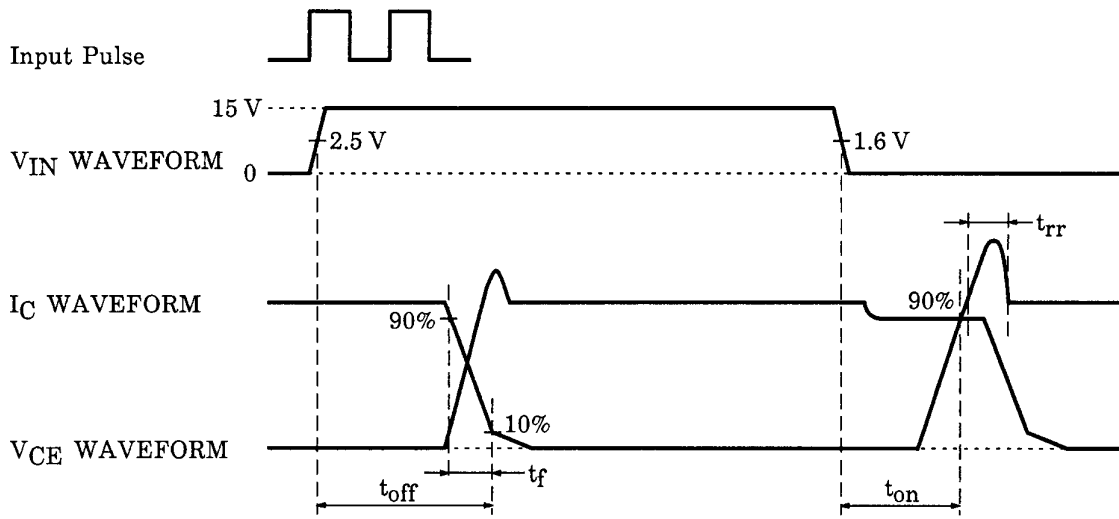
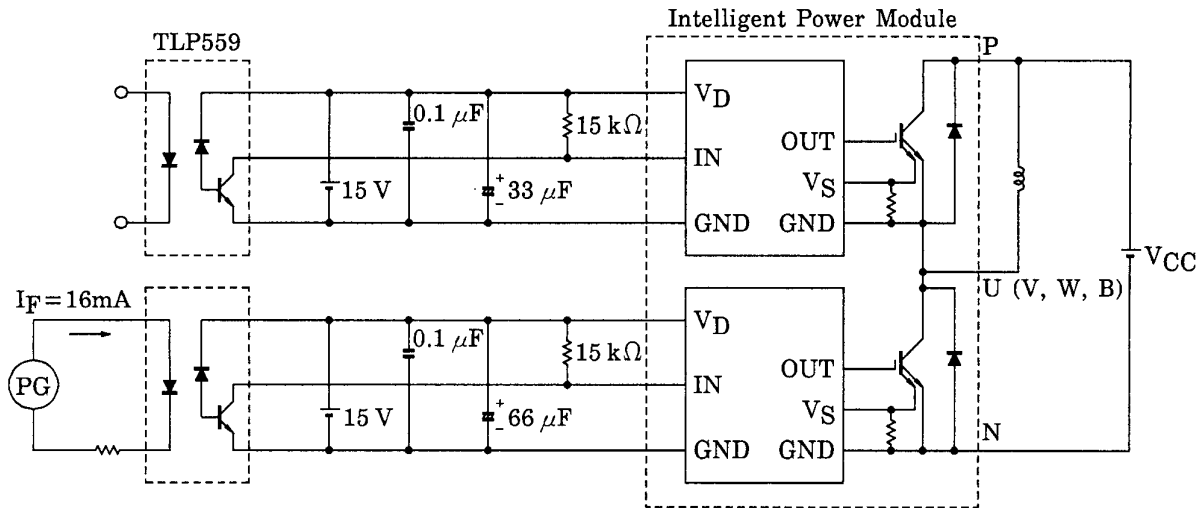
c. Control Stage ($T_j = 25^\circ C$)

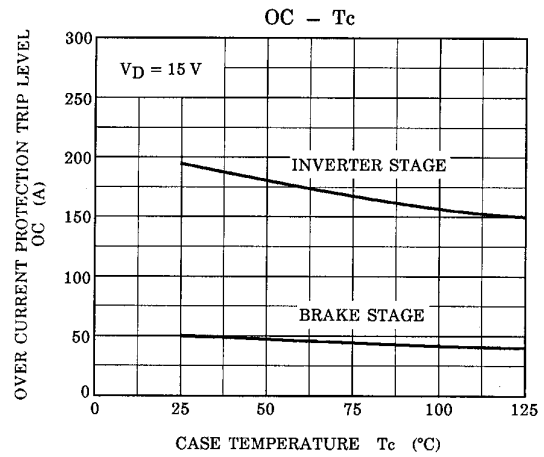
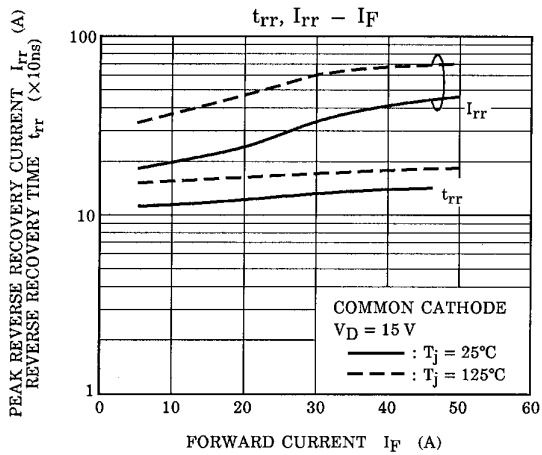
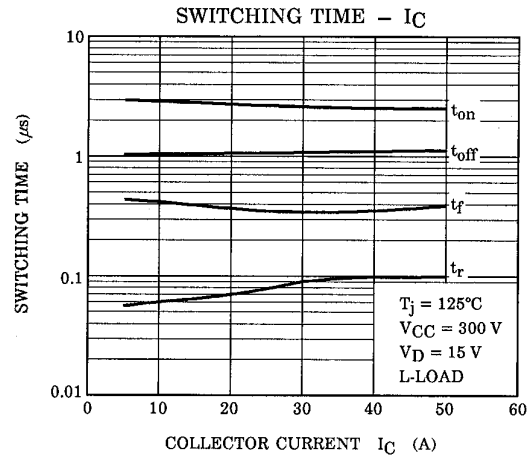
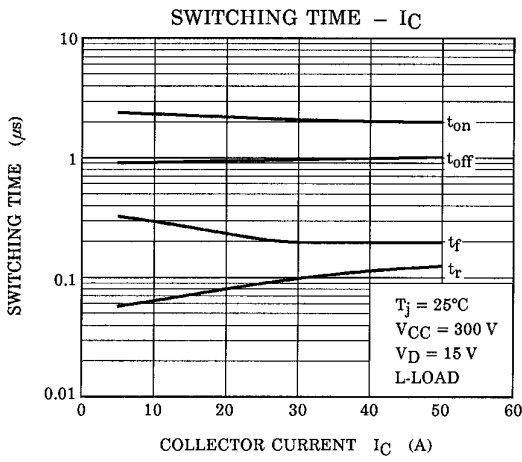
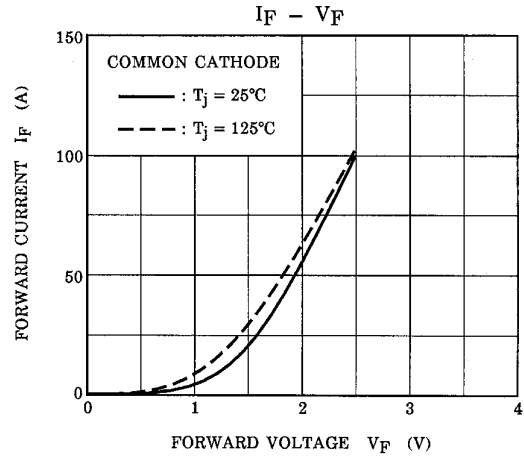
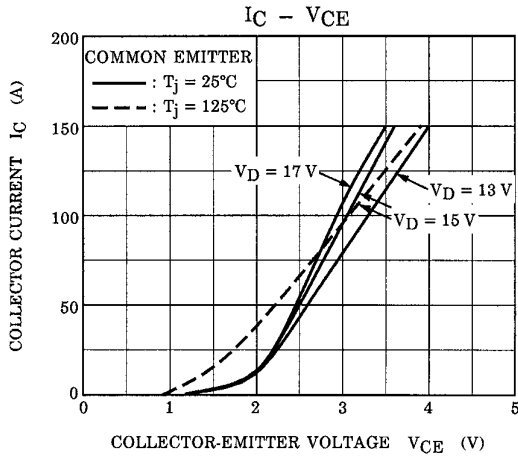
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Control circuit current	High side	$V_D = 15V$	$I_D(H)$	—	8	12	mA
	Low side		$I_D(L)$	—	32	48	
Input-on signal voltage	$V_{IN(on)}$	$V_D = 15V, I_C = 75mA$	1.4	1.6	1.8	V	
Input-off signal voltage	$V_{IN(off)}$	—	2.2	2.5	2.8	mA	
Fault output current	Protection	$V_D = 15V$	$I_{FO(on)}$	5.4	6.0		6.6
	Normal		$I_{FO(off)}$	—	—	0.1	
Over current protection trip level	Inverter	$V_D = 15V, T_j = 125^\circ C$	OC	105	150	—	A
	Brake			40	50	—	
Short circuit protection trip level	Inverter	$V_D = 15V, T_j = 125^\circ C$	SC	150	250	—	A
	Brake			60	75	—	
Over current cut-off time	$t_{off(OC)}$	$V_D = 15V$	—	5	—	μs	
Over temperature protection	Trip level	Case temperature	OT	110	118	125	$^\circ C$
	Reset level			OTr	—	98	
Control supply under voltage protection	Trip level	—	UV	11.0	12.0	12.5	V
	Reset level			UVr	12.0	12.5	
Fault output pulse width	t_{FO}	$V_D = 15V$	1	2	3	ms	

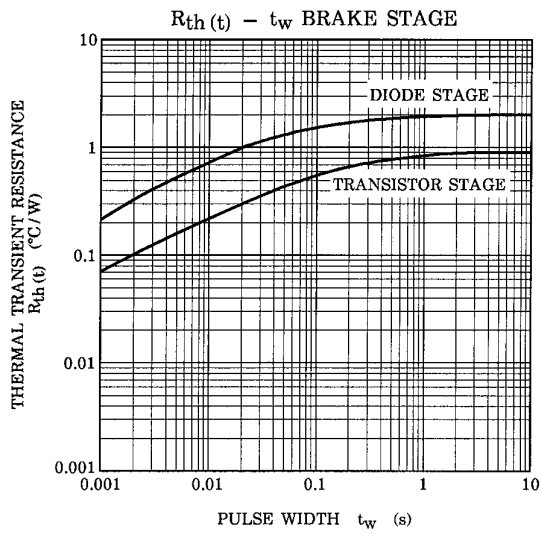
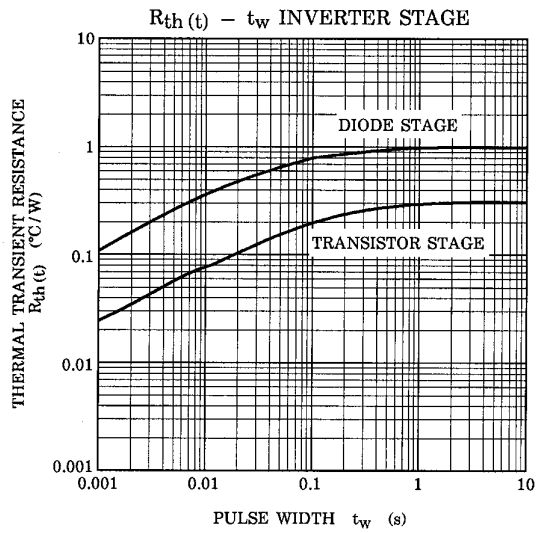
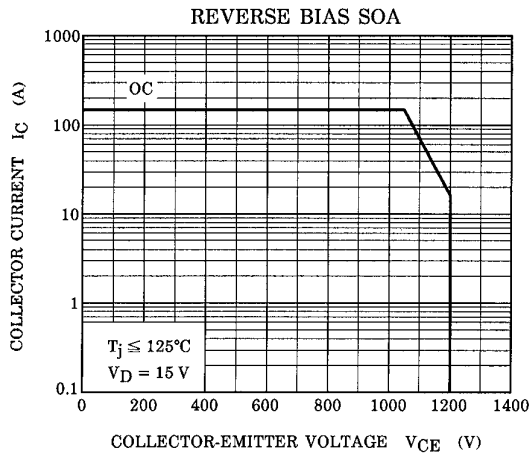
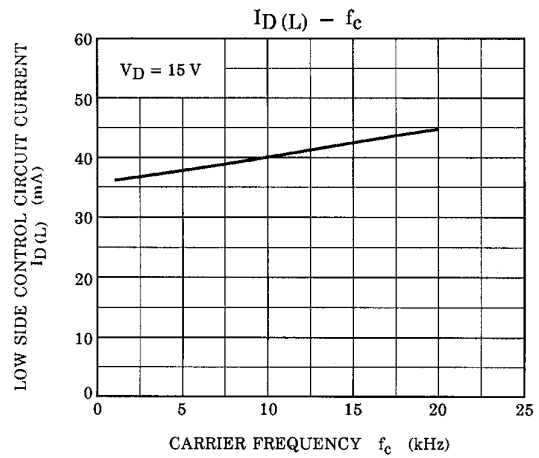
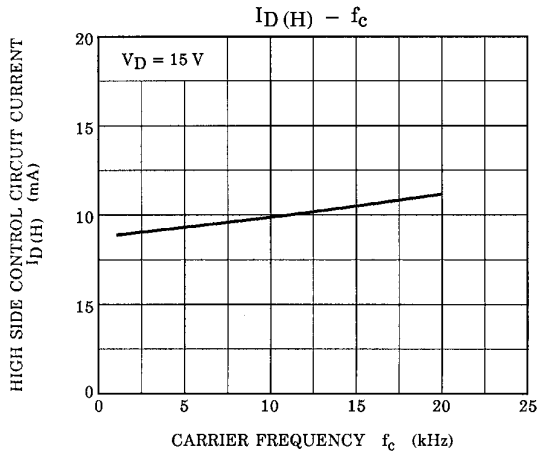
d. Thermal Resistance ($T_j = 25^\circ\text{C}$)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Junction to case thermal resistance	$R_{th(j-c)}$	Inverter IGBT stage	—	—	0.312	$^\circ\text{C} / \text{W}$
		Inverter FRD stage	—	—	1.00	
		Brake IGBT stage	—	—	0.892	
		Brake FRD stage	—	—	2.00	
Case to fin thermal resistance	$R_{th(c-f)}$	Compound is applied	—	0.05	—	$^\circ\text{C} / \text{W}$

Note 1: Switching time test circuit & timing chart

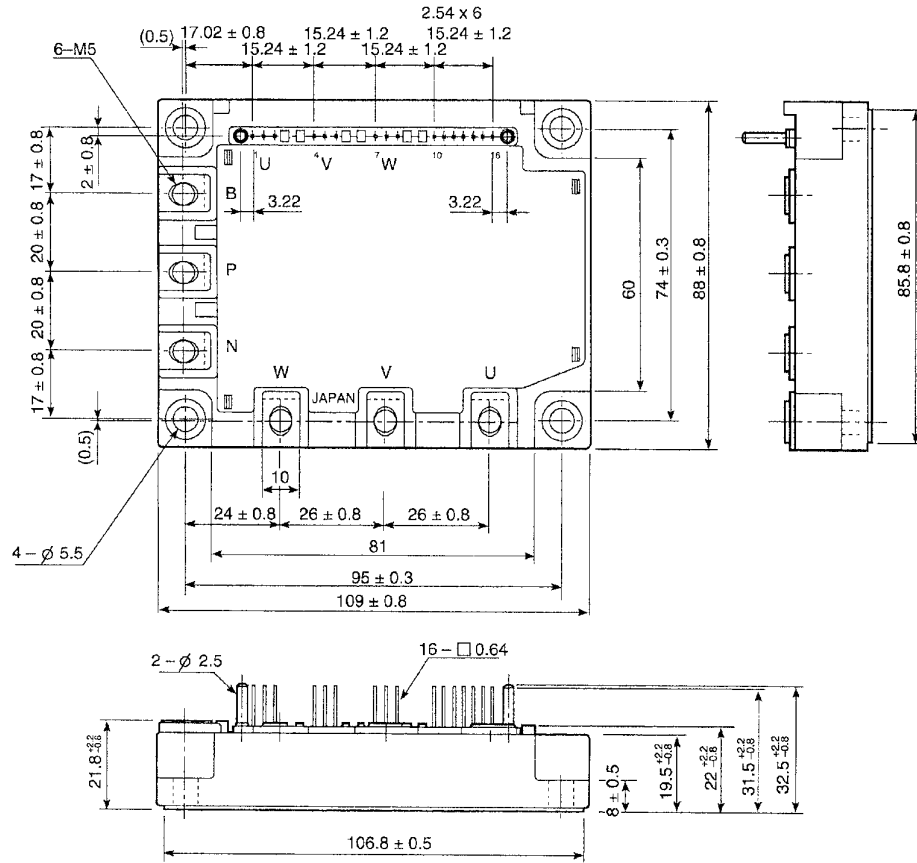






Package Dimensions: TOSHIBA 2-110A1A

Unit: mm



	GND	IN	VD	GND	IN	VD	GND	IN	VD	GND	IN	IN	IN	FO		
	(U)		(V)		(W)		(B)	(X)	(Y)	(Z)						
Signal Terminal	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

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000707EAA

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