

Table 1. Detected Vulnerabilities. The ‘Cause’ column represents the reasons for the awake lock vulnerabilities. ‘I’ indicates that the application implements the awake lock through inheritance from a parent class, but the activity (**I**) inherits from a parent activity class that lacks the awake lock functionality. ‘O’ indicates that the application implements the awake lock in each activity, but the awake lock implementation is (**O**)mitted in this activity. ‘T’ indicates that this activity is from a Third-party library.

APK/Version	Downloads	NO.	Vulnerable Activity	Type	Cause	APK/Version	Downloads	NO.	Vulnerable Activity	Type	Cause
APP Lock 1.1.4.1	10M+	1	ProxyBillingActivity	Global	T	Journey 5.1.1B-play	1M+	68	SignInHubActivity	Global	T
Azar 5.27.2	100M+	2	EditImageActivity	Local	T	KeepLock 2.3.2	500K+	69	ProxyBillingActivity	Global	T
		3	EditLiveRoomInfoActivity	Local	I	LockMyPix 5.2.6.7 Gemini	10M+	70	ProxyBillingActivity	Global	T
		4	LiveActivity	Local	I			71	UCropActivity	Global	T
Best Wallet 1.5.0	10K+	5	MainActivity	Global	I	LumaDiary	1M+	72	OnboardingActivity	Global	O
Calculator 2.3.8	5M+	6	AdActivity	Global	T	My Calendar 1.75.298.GP	100M+	73	SignInHubActivity	Global	T
(com.cutestudio.calculator.lock)		7	ProxyBillingActivity	Global	T	My Diary 1.013.GP (diary.journal.lock.mood.daily)	1M+	74	ProxyBillingActivity	Global	T
Calculator 1.0.14	100K+	8	ProxyBillingActivity	Global	T			75	SignInHubActivity	Global	T
(com.eco.calculatorvault.hidephotos)	10M+	9	MoveToActivity	Global	I	My Diary 1.36 (com.msint.mypersonal.diary)	100K+	76	ProxyBillingActivity	Global	T
Calculator 1.1.3.0		10	QuestionActivity	Global	I			77	SignInHubActivity	Global	T
(calculator.lock.calculatorvault.photovault.hider)		11	CapturePhotoActivity	Global	O	Photo Vault 1.53	10K+	78	ProxyBillingActivity	Global	T
Calculator 1.3.0	100K+	12	CaptureVideoActivity	Global	O			79	IAPActivity	Global	I
(calculator.vault.hide.app.lock.photos.free)		13	ChatFilePickerActivity	Global	O	PixFolio 5.4.42	100K+	80	ProxyBillingActivity	Global	T
Calculator 1.97		14	CalculatorActivity	Global	I			81	SettingsDisplayActivity	Global	I
(com.calculator.lock.hide.photo.video)	100K+	15	ProxyBillingActivity	Global	T			82	SettingsMusicActivity	Global	I
Calculator Vault 1.6.9		16	ActivityFolderEdit	Local	O			83	SettingsSlideshowActivity	Global	I
ClevNote 2.23.11	5M+	17	ActivityTextMemoEdit	Global	O			84	SettingsSlideshowClockActivity	Global	I
		18	VideoPlayerActivity	Global	I	POPdiary 4.3.2	100K+	85	SettingsSlideshowDisplayActivity	Global	I
Clock+ 1.1.5	100K+	19	VideosGalleryVideosSingleActivity	Global	I			86	SettingsSupportActivity	Global	I
		20	VideosHiddenSingleActivity	Global	I			87	SettingsVLCActivity	Global	I
		21	ProxyBillingActivity	Global	T			88	CropActivity	Global	O
Clover 4.28.0	5M+	22	ImportBarcodeActivity	Global	I			89	ProxyBillingActivity	Global	T
Cosmotation 1.10.1	100K+	23	NaraePickerActivity	Global	I	Q-Diary V1.7.64	100K+	90	SketchActivit	Global	O
Daily Diary 1.0.15	500K+	24	SignInHubActivity	Global	T			91	RestoreStorage	Global	O
DailyLife 4.1.3.10	5M+	25	AdActivity	Global	T			92	PlacesActivity	Global	O
		26	AudienceNetworkActivity	Global	T			93	YearCalendarActivity	Global	O
		27	ProxyBillingActivity	Global	T			94	ProxyBillingActivity	Global	T
Day One 2023.12	500K+	28	PlacePickerActivity	Global	I	QQ 8.9.68	600M+ (Membership)	95	SignInHubActivity	Global	T
Daybook 6.12.0	1M+	29	DexterActivity	Local	T			96	AioResourceContainerActivity	Global	I
Daylio 1.52.0	10M+	30	BackupActivity	Local	I			97	DatalinePluginProxyActivity	Global	I
		31	EditDayEntryNoteActivity	Local	I			98	QQGalleryActivity	Global	I
		32	RestoreBackupActivity	Local	I			99	QQVideoEditActivity	Global	I
DecoDiary 3.2.6	50K+	33	SignInHubActivity	Global	T	SecureCard 1.5.4	100K+	100	QQWinkActivity	Global	I
		34	CropActivity	Global	O			101	QZoneFeedKGalleryActivity	Global	I
		35	ProxyBillingActivity	Global	T			102	QZoneFriendFeedXActivity	Global	I
Diarium 2.9.84	100K+	36	RestoreStorage	Global	O			103	QZoneShellActivity	Global	I
		37	AuthorizationManagementActivity	Global	O			104	WinkHomeActivity	Global	I
		38	ProxyBillingActivity	Global	T	SkyFolio 5.4.41	10K+	105	WxaContainerActivity1	Global	I
Diario 3.92.10	1M+	39	WebAuthenticationCallbackActivity	Global	O			106	BarcodeScannerActivity	Global	I
		40	PhotoPickerActivity	Global	T			107	InputPinActivity	Global	I
		41	PickImageActivity	Global	T			108	PromoScreenActivity2	Global	I
Diary 1.16	50K+	42	SignInHubActivity	Global	T			109	ProxyBillingActivity	Global	T
		43	AlbumActivity	Global	T	Tenyear diary 6.1.0	100K+	110	SelectCurrencyActivity	Global	I
		44	AudioRecorderActivity	Local	T			111	AboutExtActivity	Global	I
Diary ++ 6.8	1M+	45	AuthActivity	Global	T			112	IAPActivity	Global	I
Dropbox 340.2.4	1B+	46	CameraActivity	Global	T			113	ProxyBillingActivity	Global	T
		47	CollageActivity	Global	T			114	SettingsDisplayActivity	Global	I
		48	DrawingActivity	Local	T	Time 35	1M+	115	SettingsMusicActivity	Global	I
FotoX pro 1.3	5K+	49	ImageEditorActivity	Global	T			116	SettingsSlideshowActivity	Global	I
		50	SignInHubActivity	Global	T		1M+	117	SettingsSlideshowClockActivity	Global	I
		51	SignInHubActivity	Global	T			118	SettingsSlideshowDisplayActivity	Global	I
Gallery 2.4.0	1M+	52	BulkRenameActivity	Local	I	Universum 3.53	100K+	119	SettingsSupportActivity	Global	I
		53	GroupedPhotoPreviewActivity	Local	I			120	SettingsVLCActivity	Global	I
		54	LicensesActivity	Global	O	WeVault 2.9.8	100K+	121	CancelLockActivity	Global	I
gFolio 5.4.38	50K+	55	SettingsActivity	Global	O			122	ChangeLockActivity	Global	I
		56	ProxyBillingActivity	Global	T	YallaChat 1.10.1	5M+	123	NotepadAct	Local	I
		57	IAPActivity	Global	I			124	UCropActivity	Local	T
Journal 3.6.5	100K+	58	SettingsSlideshowClockActivity	Global	I			125	ProxyBillingActivity	Global	T
		59	ProxyBillingActivity	Global	T			126	ProxyBillingActivity	Global	T
		60	SettingsSlideshowDisplayActivity	Global	I			127	YamiActivity0	Global	I
Journey 5.1.1B-play	1M+	61	SettingsDisplayActivity	Global	I			128	YamiActivity1	Global	I
		62	SettingsSupportActivity	Global	I			129	YamiActivity2	Global	I
		63	SettingsMusicActivity	Global	I	Zangi 5.9.6	10M+	130	YamiActivity3	Global	I
		64	SettingsVLCActivity	Global	I			131	YamiActivity4	Global	I
		65	SettingsSlideshowActivity	Global	I			132	CropImageActivity	Local	T
		66	ProxyBillingActivity	Global	T			133	EditImageActivity	Local	I
		67	ProxyBillingActivity	Global	T						

Table 2. Statistics data on the causes of awake lock vulnerabilities.

	I	O	T	I&T	O&T
Activity Numbers	65	17	51	-	-
App Numbers	19	7	33	8	3